

# THE COMET HANDBOOK FOR 2020

# 彗星年表 2020

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Comet 95P/(2060) Chiron

Epoch = 2020 July 10.0 TT  
 T = 1996 Feb. 6.27330 TT  
 Peri. = 339.80425 e = 0.3785758  
 Node = 209.24627 2000.0 a = 13.6877436 AU  
 Incl. = 6.93852 n = 0.01946284  
 q = 8.5058951 AU P = 50.64 years

H = 5.8 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		V	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	00 00.27	+03 12.6	18.963	18.827	+0.07	+0.2	18.9	80.6
Jan. 12	00 01.15	+03 16.0	19.132	18.829	+0.10	+0.5	18.9	70.6
Jan. 22	00 02.33	+03 21.4	19.291	18.831	+0.13	+0.7	18.9	60.8
Feb. 1	00 03.77	+03 28.7	19.437	18.832	+0.16	+0.8	18.9	51.0
Feb. 11	00 05.44	+03 37.8	19.563	18.834	+0.18	+1.0	18.9	41.3
Feb. 21	00 07.31	+03 48.3	19.669	18.835	+0.20	+1.1	18.8	31.8
Mar. 2	00 09.32	+03 59.9	19.750	18.837	+0.21	+1.2	18.8	22.3
Mar. 12	00 11.43	+04 12.5	19.805	18.838	+0.21	+1.3	18.8	13.0
Mar. 22	00 13.60	+04 25.7	19.833	18.839	+0.22	+1.3	18.7	4.3
Apr. 1	00 15.78	+04 39.1	19.833	18.841	+0.22	+1.4	18.7	6.6
Apr. 11	00 17.92	+04 52.6	19.806	18.842	+0.21	+1.3	18.8	15.5
Apr. 21	00 19.98	+05 05.7	19.752	18.843	+0.20	+1.3	18.8	24.6
May 1	00 21.93	+05 18.4	19.674	18.845	+0.19	+1.2	18.9	33.8
May 11	00 23.71	+05 30.1	19.573	18.846	+0.17	+1.1	18.9	42.9
May 21	00 25.30	+05 40.8	19.452	18.847	+0.15	+1.0	18.9	52.1
May 31	00 26.65	+05 50.1	19.313	18.848	+0.12	+0.8	18.9	61.3
June 10	00 27.75	+05 57.8	19.162	18.849	+0.09	+0.7	18.9	70.6
June 20	00 28.56	+06 03.9	19.002	18.851	+0.06	+0.5	18.9	79.9
June 30	00 29.07	+06 08.0	18.837	18.852	+0.03	+0.3	18.9	89.3
July 10	00 29.26	+06 10.2	18.671	18.853	0.00	+0.1	18.8	98.8
July 20	00 29.13	+06 10.3	18.510	18.854	-0.03	-0.1	18.8	108.3
July 30	00 28.69	+06 08.3	18.357	18.855	-0.06	-0.3	18.8	118.0
Aug. 9	00 27.96	+06 04.2	18.218	18.856	-0.09	-0.5	18.7	127.7
Aug. 19	00 26.95	+05 58.3	18.097	18.857	-0.11	-0.7	18.7	137.6
Aug. 29	00 25.71	+05 50.6	17.998	18.857	-0.14	-0.9	18.7	147.5
Sept. 8	00 24.28	+05 41.4	17.923	18.858	-0.15	-1.0	18.6	157.5
Sept. 18	00 22.71	+05 31.1	17.877	18.859	-0.16	-1.1	18.6	167.5
Sept. 28	00 21.08	+05 20.0	17.860	18.860	-0.16	-1.1	18.5	176.6
Oct. 8	00 19.44	+05 08.6	17.873	18.861	-0.16	-1.1	18.5	171.2
Oct. 18	00 17.87	+04 57.3	17.916	18.861	-0.15	-1.1	18.6	161.1
Oct. 28	00 16.43	+04 46.5	17.989	18.862	-0.13	-1.0	18.6	150.8
Nov. 7	00 15.17	+04 36.7	18.088	18.863	-0.11	-0.9	18.7	140.5
Nov. 17	00 14.16	+04 28.2	18.211	18.863	-0.09	-0.8	18.7	130.2
Nov. 27	00 13.44	+04 21.5	18.353	18.864	-0.06	-0.6	18.8	119.9
Dec. 7	00 13.03	+04 16.6	18.511	18.865	-0.02	-0.4	18.8	109.6
Dec. 17	00 12.95	+04 13.9	18.679	18.865	+0.01	-0.2	18.8	99.4
Dec. 27	00 13.21	+04 13.3	18.852	18.866	+0.04	+0.1	18.9	89.3
Jan. 6	00 13.81	+04 14.9	19.024	18.866	+0.08	+0.3	18.9	79.3
Jan. 16	00 14.72	+04 18.7	19.191	18.867	+0.11	+0.5	18.9	69.3
Jan. 26	00 15.92	+04 24.5	19.348	18.867	+0.14	+0.7	18.9	59.5
Feb. 5	00 17.39	+04 32.2	19.490	18.867	+0.16	+0.9	18.9	49.7
Feb. 15	00 19.09	+04 41.5	19.613	18.868	+0.18	+1.0	18.9	40.1
Feb. 25	00 20.97	+04 52.1	19.714	18.868	+0.20	+1.1	18.9	30.5
Mar. 7	00 22.99	+05 03.9	19.791	18.868	+0.21	+1.2	18.8	21.1
Mar. 17	00 25.11	+05 16.5	19.842	18.869	+0.22	+1.3	18.8	11.8
Mar. 27	00 27.28	+05 29.6	19.865	18.869	+0.22	+1.3	18.7	3.2

## Comet 174P/(60558) Echeclus

Epoch = 2020 July 10.0 TT  
 T = 2015 Apr. 23.38211 TT  
 Peri. = 162.92983  
 Node = 173.25847 2000.0  
 Incl. = 4.34297  
 q = 5.8113368 AU

e = 0.4571286  
 a = 10.7048130 AU  
 n = 0.02814074  
 P = 35.02 years

H = 9.1 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		V	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	04 56.40	+17 49.6	8.411	9.302	-0.29	-0.2	18.9	153.7
Jan. 12	04 53.72	+17 48.2	8.525	9.328	-0.24	-0.1	18.9	143.0
Jan. 22	04 51.61	+17 48.3	8.663	9.355	-0.18	+0.1	19.0	132.4
Feb. 1	04 50.18	+17 50.0	8.823	9.381	-0.10	+0.3	19.1	121.9
Feb. 11	04 49.47	+17 53.4	8.998	9.408	-0.03	+0.4	19.2	111.7
Feb. 21	04 49.53	+17 58.2	9.185	9.434	+0.05	+0.6	19.3	101.6
Mar. 2	04 50.33	+18 04.2	9.377	9.460	+0.12	+0.7	19.3	91.8
Mar. 12	04 51.86	+18 11.3	9.570	9.487	+0.19	+0.8	19.4	82.2
Mar. 22	04 54.05	+18 19.2	9.760	9.513	+0.25	+0.8	19.4	72.8
Apr. 1	04 56.85	+18 27.6	9.941	9.539	+0.31	+0.8	19.4	63.6
Apr. 11	05 00.19	+18 36.1	10.111	9.565	+0.36	+0.9	19.4	54.6
Apr. 21	05 04.00	+18 44.5	10.265	9.591	+0.40	+0.8	19.4	45.8
May 1	05 08.19	+18 52.6	10.402	9.618	+0.44	+0.8	19.4	37.1
May 11	05 12.69	+19 00.0	10.519	9.644	+0.46	+0.7	19.4	28.6
May 21	05 17.42	+19 06.7	10.613	9.670	+0.48	+0.6	19.4	20.2
May 31	05 22.31	+19 12.5	10.685	9.696	+0.49	+0.5	19.4	12.0
June 10	05 27.28	+19 17.2	10.733	9.722	+0.50	+0.4	19.3	4.9
June 20	05 32.26	+19 20.8	10.756	9.747	+0.50	+0.3	19.3	6.7
June 30	05 37.17	+19 23.2	10.755	9.773	+0.48	+0.2	19.4	14.3
July 10	05 41.94	+19 24.4	10.730	9.799	+0.47	+0.1	19.5	22.5
July 20	05 46.50	+19 24.5	10.683	9.825	+0.44	-0.1	19.5	30.9
July 30	05 50.78	+19 23.5	10.614	9.851	+0.41	-0.2	19.5	39.4
Aug. 9	05 54.70	+19 21.6	10.526	9.876	+0.37	-0.2	19.6	48.0
Aug. 19	05 58.20	+19 18.8	10.421	9.902	+0.32	-0.3	19.6	56.7
Aug. 29	06 01.21	+19 15.3	10.302	9.928	+0.27	-0.4	19.6	65.6
Sept. 8	06 03.66	+19 11.4	10.171	9.953	+0.21	-0.4	19.6	74.7
Sept. 18	06 05.49	+19 07.1	10.034	9.979	+0.15	-0.4	19.6	84.0
Sept. 28	06 06.67	+19 02.6	9.894	10.004	+0.08	-0.4	19.5	93.5
Oct. 8	06 07.15	+18 58.1	9.755	10.030	+0.01	-0.4	19.5	103.2
Oct. 18	06 06.91	+18 53.9	9.623	10.055	-0.06	-0.4	19.5	113.1
Oct. 28	06 05.98	+18 49.9	9.502	10.080	-0.13	-0.4	19.4	123.2
Nov. 7	06 04.38	+18 46.5	9.398	10.106	-0.19	-0.3	19.4	133.5
Nov. 17	06 02.19	+18 43.5	9.314	10.131	-0.25	-0.3	19.3	144.0
Nov. 27	05 59.50	+18 41.2	9.256	10.156	-0.29	-0.2	19.2	154.6
Dec. 7	05 56.46	+18 39.5	9.226	10.181	-0.32	-0.1	19.2	165.1
Dec. 17	05 53.21	+18 38.5	9.227	10.206	-0.33	-0.1	19.1	174.3
Dec. 27	05 49.93	+18 38.3	9.259	10.231	-0.32	0.0	19.1	170.9
Jan. 6	05 46.79	+18 38.8	9.323	10.256	-0.30	+0.1	19.2	160.7
Jan. 16	05 43.95	+18 40.0	9.417	10.281	-0.26	+0.2	19.3	150.1
Jan. 26	05 41.55	+18 42.1	9.538	10.306	-0.21	+0.2	19.4	139.4
Feb. 5	05 39.71	+18 44.8	9.683	10.331	-0.15	+0.3	19.5	128.9
Feb. 15	05 38.50	+18 48.3	9.847	10.356	-0.08	+0.4	19.6	118.6
Feb. 25	05 37.98	+18 52.4	10.026	10.381	-0.01	+0.4	19.6	108.4
Mar. 7	05 38.14	+18 56.9	10.213	10.405	+0.05	+0.5	19.7	98.4
Mar. 17	05 39.00	+19 01.8	10.405	10.430	+0.12	+0.5	19.7	88.7
Mar. 27	05 40.50	+19 06.8	10.596	10.455	+0.18	+0.5	19.8	79.2

## Comet C/2011 KP36 (Spacewatch)

Epoch = 2020 July 10.0 TT  
 T = 2016 May 27.35877 TT  
 Peri. = 180.62181 e = 0.8742252  
 Node = 173.31259 2000.0 a = 38.7900176 AU  
 Incl. = 18.98320 n = 0.00407966  
 q = 4.8788067 AU P = 241.59 years

$$m_1 = 4.1 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	05 52.76	+02 33.8	9.014	9.918	-0.30	+0.6	18.8	155.7
Jan. 12	05 49.91	+02 41.6	9.112	9.968	-0.27	+1.0	18.9	149.0
Jan. 22	05 47.43	+02 52.8	9.238	10.017	-0.22	+1.3	18.9	140.5
Feb. 1	05 45.44	+03 07.2	9.388	10.067	-0.17	+1.6	19.0	131.4
Feb. 11	05 44.02	+03 23.8	9.559	10.116	-0.11	+1.8	19.1	122.0
Feb. 21	05 43.24	+03 42.2	9.745	10.165	-0.04	+1.9	19.1	112.5
Mar. 2	05 43.12	+04 01.6	9.944	10.215	+0.03	+2.0	19.2	103.1
Mar. 12	05 43.67	+04 21.4	10.149	10.264	+0.09	+2.0	19.2	93.9
Mar. 22	05 44.85	+04 40.8	10.357	10.314	+0.15	+1.9	19.3	84.8
Apr. 1	05 46.64	+04 59.5	10.562	10.363	+0.21	+1.8	19.4	75.8
Apr. 11	05 48.97	+05 16.9	10.761	10.412	+0.26	+1.7	19.4	67.1
Apr. 21	05 51.78	+05 32.6	10.950	10.461	+0.31	+1.5	19.5	58.6
May 1	05 55.01	+05 46.4	11.126	10.510	+0.34	+1.3	19.5	50.3
May 11	05 58.59	+05 57.9	11.285	10.560	+0.37	+1.0	19.6	42.3
May 21	06 02.45	+06 07.1	11.426	10.609	+0.40	+0.8	19.6	34.7
May 31	06 06.51	+06 13.7	11.546	10.658	+0.41	+0.5	19.7	27.6
June 10	06 10.71	+06 17.7	11.644	10.707	+0.42	+0.3	19.7	21.7
June 20	06 14.97	+06 19.0	11.719	10.756	+0.43	0.0	19.8	17.8
June 30	06 19.24	+06 17.8	11.771	10.805	+0.42	-0.3	19.8	17.4
July 10	06 23.43	+06 14.0	11.799	10.854	+0.41	-0.5	19.8	20.7
July 20	06 27.50	+06 07.8	11.804	10.903	+0.40	-0.7	19.8	26.3
July 30	06 31.36	+05 59.4	11.787	10.952	+0.37	-1.0	19.9	33.2
Aug. 9	06 34.96	+05 48.8	11.748	11.000	+0.34	-1.2	19.9	40.8
Aug. 19	06 38.23	+05 36.5	11.691	11.049	+0.31	-1.3	19.9	48.7
Aug. 29	06 41.12	+05 22.5	11.616	11.098	+0.27	-1.5	19.9	57.0
Sept. 8	06 43.57	+05 07.4	11.527	11.147	+0.22	-1.6	19.9	65.5
Sept. 18	06 45.53	+04 51.5	11.428	11.195	+0.17	-1.6	19.9	74.2
Sept. 28	06 46.95	+04 35.1	11.320	11.244	+0.11	-1.6	19.9	83.1
Oct. 8	06 47.80	+04 18.9	11.210	11.292	+0.05	-1.6	19.9	92.2
Oct. 18	06 48.05	+04 03.2	11.101	11.341	-0.01	-1.5	19.9	101.5
Oct. 28	06 47.71	+03 48.6	10.998	11.389	-0.07	-1.4	19.9	110.9
Nov. 7	06 46.80	+03 35.7	10.905	11.438	-0.12	-1.2	19.9	120.3
Nov. 17	06 45.34	+03 25.0	10.828	11.486	-0.17	-0.9	19.9	129.8
Nov. 27	06 43.40	+03 16.9	10.771	11.535	-0.22	-0.7	19.9	139.1
Dec. 7	06 41.08	+03 11.8	10.737	11.583	-0.25	-0.3	19.9	147.8
Dec. 17	06 38.48	+03 09.9	10.730	11.631	-0.27	0.0	19.9	155.2
Dec. 27	06 35.74	+03 11.4	10.752	11.679	-0.28	+0.3	19.9	159.6
Jan. 6	06 32.98	+03 16.2	10.804	11.727	-0.27	+0.7	20.0	159.0
Jan. 16	06 30.34	+03 24.0	10.886	11.776	-0.25	+0.9	20.0	153.6
Jan. 26	06 27.95	+03 34.7	10.996	11.824	-0.22	+1.2	20.0	145.8
Feb. 5	06 25.93	+03 47.6	11.133	11.872	-0.18	+1.4	20.1	136.9
Feb. 15	06 24.35	+04 02.3	11.292	11.920	-0.13	+1.5	20.1	127.5
Feb. 25	06 23.29	+04 18.1	11.470	11.967	-0.08	+1.6	20.2	118.1
Mar. 7	06 22.78	+04 34.6	11.662	12.015	-0.02	+1.7	20.2	108.6
Mar. 17	06 22.83	+04 51.1	11.865	12.063	+0.04	+1.6	20.3	99.2
Mar. 27	06 23.45	+05 07.1	12.072	12.111	+0.09	+1.6	20.3	89.9

## Comet C/2014 OE4 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2016 Dec. 12.65790 TT  
 Peri. = 65.86954  
 Node = 240.40460 2000.0  
 Incl. = 81.33006  
 q = 6.2481966 AU  
 e = 1.0028221

$$m_1 = -0.2 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	01 31.46	+57 08.8	9.180	9.639	+0.05	-6.7	19.4	115.1
Jan. 12	01 32.54	+56 03.4	9.333	9.686	+0.17	-6.3	19.4	108.2
Jan. 22	01 34.71	+55 02.2	9.499	9.732	+0.27	-5.8	19.5	100.9
Feb. 1	01 37.85	+54 06.5	9.673	9.779	+0.36	-5.2	19.6	93.3
Feb. 11	01 41.82	+53 17.0	9.852	9.826	+0.44	-4.6	19.7	85.6
Feb. 21	01 46.47	+52 34.0	10.031	9.873	+0.50	-3.9	19.7	78.0
Mar. 2	01 51.70	+51 57.7	10.207	9.920	+0.55	-3.3	19.8	70.5
Mar. 12	01 57.37	+51 27.9	10.376	9.967	+0.59	-2.6	19.9	63.2
Mar. 22	02 03.39	+51 04.4	10.534	10.014	+0.62	-2.0	19.9	56.2
Apr. 1	02 09.64	+50 46.8	10.678	10.062	+0.63	-1.5	20.0	49.8
Apr. 11	02 16.04	+50 34.7	10.807	10.109	+0.64	-0.9	20.0	43.9
Apr. 21	02 22.49	+50 27.5	10.918	10.156	+0.65	-0.5	20.1	39.0
May 1	02 28.91	+50 24.8	11.009	10.204	+0.64	0.0	20.1	35.4
May 11	02 35.21	+50 26.0	11.080	10.251	+0.62	+0.3	20.2	33.4
May 21	02 41.32	+50 30.7	11.129	10.299	+0.60	+0.6	20.2	33.4
May 31	02 47.15	+50 38.4	11.157	10.347	+0.56	+0.9	20.3	35.3
June 10	02 52.61	+50 48.6	11.165	10.394	+0.52	+1.1	20.3	38.9
June 20	02 57.62	+51 01.0	11.152	10.442	+0.47	+1.3	20.3	43.8
June 30	03 02.10	+51 14.9	11.120	10.490	+0.41	+1.5	20.3	49.6
July 10	03 05.95	+51 30.0	11.072	10.538	+0.35	+1.5	20.4	56.1
July 20	03 09.10	+51 45.7	11.008	10.586	+0.27	+1.6	20.4	63.0
July 30	03 11.45	+52 01.4	10.932	10.634	+0.19	+1.5	20.4	70.4
Aug. 9	03 12.94	+52 16.4	10.846	10.682	+0.10	+1.4	20.4	78.0
Aug. 19	03 13.51	+52 30.0	10.755	10.730	0.00	+1.2	20.4	85.9
Aug. 29	03 13.11	+52 41.3	10.661	10.778	-0.09	+1.0	20.4	93.9
Sept. 8	03 11.74	+52 49.4	10.570	10.826	-0.19	+0.6	20.4	102.1
Sept. 18	03 09.41	+52 53.3	10.484	10.874	-0.28	+0.1	20.4	110.3
Sept. 28	03 06.21	+52 52.1	10.409	10.923	-0.36	-0.4	20.5	118.5
Oct. 8	03 02.27	+52 44.8	10.349	10.971	-0.43	-1.1	20.5	126.4
Oct. 18	02 57.75	+52 30.9	10.307	11.019	-0.48	-1.8	20.5	133.7
Oct. 28	02 52.87	+52 10.0	10.288	11.067	-0.50	-2.5	20.5	140.0
Nov. 7	02 47.88	+51 42.2	10.294	11.116	-0.50	-3.2	20.6	144.6
Nov. 17	02 43.03	+51 07.9	10.326	11.164	-0.47	-3.8	20.6	146.5
Nov. 27	02 38.55	+50 28.0	10.386	11.213	-0.42	-4.2	20.6	145.4
Dec. 7	02 34.64	+49 43.8	10.474	11.261	-0.35	-4.6	20.7	141.4
Dec. 17	02 31.45	+48 56.9	10.589	11.310	-0.27	-4.8	20.7	135.3
Dec. 27	02 29.09	+48 08.7	10.728	11.358	-0.19	-4.8	20.8	127.9
Jan. 6	02 27.61	+47 20.9	10.887	11.407	-0.10	-4.7	20.8	119.7
Jan. 16	02 27.01	+46 34.7	11.064	11.455	-0.01	-4.5	20.9	111.1
Jan. 26	02 27.27	+45 51.3	11.253	11.504	+0.07	-4.1	21.0	102.3
Feb. 5	02 28.34	+45 11.6	11.450	11.552	+0.15	-3.7	21.0	93.5
Feb. 15	02 30.13	+44 36.1	11.651	11.601	+0.22	-3.3	21.1	84.7
Feb. 25	02 32.57	+44 05.2	11.850	11.649	+0.28	-2.8	21.2	76.0
Mar. 7	02 35.58	+43 39.0	12.043	11.698	+0.33	-2.4	21.2	67.4
Mar. 17	02 39.05	+43 17.4	12.227	11.747	+0.37	-1.9	21.3	59.1
Mar. 27	02 42.90	+43 00.3	12.397	11.795	+0.40	-1.5	21.3	51.1

## Comet C/2014 B1 (Schwartz)

Epoch = 2020 July 10.0 TT  
 T = 2017 Sept. 9.57397 TT  
 Peri. = 345.81066  
 Node = 161.40825 2000.0  
 Incl. = 28.40242  
 q = 9.5554213 AU  
 e = 0.9995295

$$m1 = 2.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	12 43.32	+07 02.7	10.522	10.628	+0.15	+1.3	17.4	93.5
Jan. 12	12 44.59	+07 17.1	10.382	10.652	+0.09	+1.7	17.4	103.3
Jan. 22	12 45.27	+07 35.4	10.249	10.676	+0.04	+2.0	17.3	113.2
Feb. 1	12 45.37	+07 57.2	10.129	10.700	-0.02	+2.3	17.3	123.2
Feb. 11	12 44.90	+08 21.8	10.025	10.725	-0.08	+2.6	17.3	133.2
Feb. 21	12 43.91	+08 48.4	9.942	10.749	-0.12	+2.7	17.3	143.1
Mar. 2	12 42.49	+09 16.1	9.885	10.774	-0.16	+2.8	17.3	152.6
Mar. 12	12 40.72	+09 43.8	9.854	10.799	-0.19	+2.7	17.3	161.1
Mar. 22	12 38.73	+10 10.5	9.853	10.825	-0.21	+2.6	17.3	166.4
Apr. 1	12 36.64	+10 35.2	9.882	10.850	-0.21	+2.3	17.3	164.8
Apr. 11	12 34.57	+10 57.0	9.941	10.876	-0.20	+2.0	17.4	157.8
Apr. 21	12 32.67	+11 15.1	10.027	10.901	-0.18	+1.6	17.4	149.0
May 1	12 31.02	+11 29.0	10.140	10.927	-0.15	+1.2	17.4	139.7
May 11	12 29.75	+11 38.5	10.274	10.953	-0.10	+0.7	17.5	130.2
May 21	12 28.90	+11 43.5	10.427	10.980	-0.06	+0.2	17.5	120.8
May 31	12 28.55	+11 44.0	10.595	11.006	-0.01	-0.2	17.5	111.4
June 10	12 28.71	+11 40.3	10.774	11.033	+0.05	-0.6	17.6	102.2
June 20	12 29.40	+11 32.8	10.958	11.060	+0.10	-1.0	17.6	93.1
June 30	12 30.61	+11 21.8	11.143	11.087	+0.15	-1.3	17.7	84.2
July 10	12 32.32	+11 07.8	11.326	11.114	+0.20	-1.5	17.7	75.4
July 20	12 34.50	+10 51.4	11.503	11.142	+0.24	-1.8	17.8	66.8
July 30	12 37.11	+10 33.0	11.670	11.169	+0.28	-1.9	17.8	58.2
Aug. 9	12 40.10	+10 13.2	11.823	11.197	+0.32	-2.0	17.9	49.9
Aug. 19	12 43.43	+09 52.3	11.961	11.225	+0.35	-2.1	17.9	41.6
Aug. 29	12 47.06	+09 31.0	12.080	11.253	+0.38	-2.1	17.9	33.7
Sept. 8	12 50.91	+09 09.8	12.178	11.281	+0.40	-2.1	18.0	26.1
Sept. 18	12 54.94	+08 49.0	12.253	11.310	+0.41	-2.0	18.0	19.3
Sept. 28	12 59.10	+08 29.2	12.305	11.338	+0.42	-1.9	18.0	14.6
Oct. 8	13 03.31	+08 10.9	12.333	11.367	+0.42	-1.7	18.0	14.2
Oct. 18	13 07.53	+07 54.4	12.336	11.396	+0.42	-1.5	18.0	18.5
Oct. 28	13 11.70	+07 40.2	12.315	11.425	+0.41	-1.3	18.0	25.3
Nov. 7	13 15.74	+07 28.8	12.271	11.454	+0.40	-1.0	18.0	33.1
Nov. 17	13 19.60	+07 20.4	12.205	11.483	+0.37	-0.7	18.0	41.5
Nov. 27	13 23.21	+07 15.5	12.120	11.513	+0.35	-0.3	18.0	50.2
Dec. 7	13 26.52	+07 14.2	12.017	11.542	+0.31	+0.1	18.0	59.1
Dec. 17	13 29.45	+07 16.8	11.901	11.572	+0.27	+0.5	18.0	68.2
Dec. 27	13 31.96	+07 23.3	11.776	11.602	+0.23	+0.9	18.0	77.5
Jan. 6	13 34.00	+07 33.8	11.644	11.632	+0.18	+1.3	18.0	86.9
Jan. 16	13 35.52	+07 48.1	11.512	11.662	+0.12	+1.6	18.0	96.4
Jan. 26	13 36.50	+08 05.9	11.383	11.693	+0.07	+2.0	18.0	106.0
Feb. 5	13 36.93	+08 26.8	11.263	11.723	+0.01	+2.2	17.9	115.6
Feb. 15	13 36.81	+08 50.0	11.156	11.754	-0.04	+2.4	17.9	125.2
Feb. 25	13 36.19	+09 15.0	11.068	11.784	-0.09	+2.6	17.9	134.7
Mar. 7	13 35.10	+09 40.7	11.001	11.815	-0.13	+2.6	17.9	143.7
Mar. 17	13 33.62	+10 06.3	10.958	11.846	-0.17	+2.5	17.9	152.0
Mar. 27	13 31.84	+10 30.7	10.944	11.878	-0.19	+2.3	17.9	158.5

## Comet C/2016 A1 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2017 Nov. 22.82875 TT  
 Peri. = 10.26928  
 Node = 128.20666 2000.0  
 Incl. = 121.20522  
 q = 5.3244768 AU  
 e = 1.0017097

$$m1 = 6.3 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .3			m	'		°
Jan. 2	23 56.50	+72 26.3	7.316	7.680	-0.12	-9.8	19.5	108.2
Jan. 12	23 56.54	+70 52.4	7.443	7.729	+0.14	-8.9	19.5	103.3
Jan. 22	23 58.80	+69 28.2	7.582	7.777	+0.32	-7.8	19.6	97.8
Feb. 1	00 02.63	+68 15.1	7.729	7.827	+0.45	-6.7	19.7	92.1
Feb. 11	00 07.56	+67 13.9	7.880	7.876	+0.54	-5.5	19.7	86.2
Feb. 21	00 13.25	+66 24.6	8.031	7.925	+0.60	-4.3	19.8	80.4
Mar. 2	00 19.42	+65 47.2	8.178	7.975	+0.64	-3.1	19.9	74.7
Mar. 12	00 25.87	+65 21.2	8.319	8.025	+0.65	-2.0	19.9	69.5
Mar. 22	00 32.41	+65 05.9	8.451	8.075	+0.65	-1.0	20.0	64.7
Apr. 1	00 38.91	+65 00.7	8.570	8.125	+0.64	0.0	20.1	60.5
Apr. 11	00 45.20	+65 04.9	8.676	8.175	+0.61	+0.9	20.1	57.1
Apr. 21	00 51.16	+65 17.5	8.767	8.225	+0.57	+1.7	20.2	54.6
May 1	00 56.63	+65 37.8	8.841	8.276	+0.51	+2.4	20.2	53.1
May 11	01 01.45	+66 04.9	8.899	8.326	+0.44	+3.1	20.3	52.8
May 21	01 05.46	+66 38.0	8.940	8.377	+0.35	+3.6	20.3	53.5
May 31	01 08.44	+67 16.2	8.965	8.428	+0.23	+4.1	20.3	55.3
June 10	01 10.18	+67 58.4	8.974	8.479	+0.10	+4.4	20.3	58.0
June 20	01 10.41	+68 43.5	8.969	8.530	-0.07	+4.6	20.4	61.4
June 30	01 08.84	+69 30.2	8.952	8.581	-0.27	+4.7	20.4	65.6
July 10	01 05.18	+70 16.7	8.924	8.633	-0.49	+4.6	20.4	70.2
July 20	00 59.11	+71 01.1	8.888	8.684	-0.75	+4.2	20.4	75.2
July 30	00 50.41	+71 41.0	8.847	8.735	-1.02	+3.6	20.4	80.4
Aug. 9	00 38.98	+72 13.7	8.804	8.787	-1.29	+2.7	20.5	85.7
Aug. 19	00 24.99	+72 36.0	8.761	8.839	-1.53	+1.6	20.5	91.1
Aug. 29	00 08.91	+72 45.2	8.722	8.890	-1.69	+0.1	20.5	96.3
Sept. 8	23 51.61	+72 38.9	8.690	8.942	-1.76	-1.5	20.5	101.3
Sept. 18	23 34.17	+72 15.9	8.667	8.994	-1.71	-3.2	20.5	105.8
Sept. 28	23 17.73	+71 36.0	8.658	9.046	-1.55	-4.9	20.6	109.7
Oct. 8	23 03.20	+70 41.0	8.664	9.098	-1.32	-6.3	20.6	112.8
Oct. 18	22 51.16	+69 33.2	8.687	9.150	-1.06	-7.4	20.6	114.8
Oct. 28	22 41.83	+68 15.8	8.728	9.202	-0.78	-8.1	20.6	115.6
Nov. 7	22 35.15	+66 52.4	8.789	9.254	-0.53	-8.5	20.7	115.2
Nov. 17	22 30.89	+65 26.3	8.867	9.306	-0.30	-8.6	20.7	113.5
Nov. 27	22 28.76	+64 00.6	8.964	9.358	-0.11	-8.4	20.8	110.7
Dec. 7	22 28.42	+62 37.8	9.076	9.411	+0.05	-8.0	20.8	107.0
Dec. 17	22 29.56	+61 20.3	9.201	9.463	+0.19	-7.4	20.9	102.5
Dec. 27	22 31.91	+60 09.7	9.338	9.515	+0.29	-6.6	20.9	97.4
Jan. 6	22 35.19	+59 07.2	9.482	9.568	+0.37	-5.8	21.0	92.1
Jan. 16	22 39.21	+58 13.7	9.630	9.620	+0.43	-4.8	21.0	86.5
Jan. 26	22 43.76	+57 29.7	9.778	9.673	+0.48	-3.9	21.1	81.0
Feb. 5	22 48.68	+56 55.2	9.925	9.725	+0.51	-2.9	21.2	75.5
Feb. 15	22 53.81	+56 30.1	10.065	9.778	+0.52	-2.0	21.2	70.4
Feb. 25	22 59.03	+56 14.2	10.197	9.830	+0.52	-1.1	21.3	65.7
Mar. 7	23 04.20	+56 06.9	10.318	9.883	+0.51	-0.3	21.3	61.5
Mar. 17	23 09.22	+56 07.6	10.426	9.936	+0.49	+0.5	21.4	58.1
Mar. 27	23 13.97	+56 15.8	10.519	9.988	+0.46	+1.2	21.4	55.5

## Comet C/2015 01 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2018 Feb. 19.46402 TT  
 Peri. = 89.63825  
 Node = 299.85194 2000.0  
 Incl. = 127.22660  
 q = 3.7302443 AU  
 e = 1.0008667

$$m_1 = 5.4 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ′			m	° ′		°
Jan. 2	08 45.01	+23 52.2	5.892	6.782	-0.89	+0.4	17.6	152.9
Jan. 12	08 35.88	+23 55.5	5.891	6.845	-0.94	+0.2	17.6	164.8
Jan. 22	08 26.46	+23 56.4	5.927	6.908	-0.94	-0.1	17.7	175.0
Feb. 1	08 17.15	+23 53.9	6.001	6.970	-0.91	-0.5	17.7	169.0
Feb. 11	08 08.33	+23 47.7	6.112	7.033	-0.84	-0.8	17.8	157.4
Feb. 21	08 00.31	+23 37.8	6.257	7.096	-0.75	-1.2	17.9	145.7
Mar. 2	07 53.36	+23 24.6	6.433	7.159	-0.63	-1.5	18.0	134.2
Mar. 12	07 47.61	+23 08.7	6.633	7.222	-0.51	-1.7	18.1	123.0
Mar. 22	07 43.12	+22 50.6	6.852	7.285	-0.38	-1.9	18.2	112.1
Apr. 1	07 39.88	+22 30.8	7.083	7.348	-0.26	-2.0	18.3	101.5
Apr. 11	07 37.83	+22 09.8	7.321	7.411	-0.14	-2.2	18.4	91.3
Apr. 21	07 36.85	+21 47.9	7.560	7.474	-0.04	-2.2	18.5	81.3
May 1	07 36.85	+21 25.3	7.794	7.537	+0.05	-2.3	18.6	71.6
May 11	07 37.67	+21 02.0	8.018	7.600	+0.12	-2.4	18.7	62.2
May 21	07 39.20	+20 38.1	8.230	7.663	+0.19	-2.4	18.8	53.0
May 31	07 41.30	+20 13.6	8.424	7.726	+0.24	-2.5	18.9	43.9
June 10	07 43.85	+19 48.5	8.598	7.789	+0.28	-2.5	19.0	35.1
June 20	07 46.74	+19 22.8	8.750	7.852	+0.30	-2.6	19.1	26.3
June 30	07 49.86	+18 56.7	8.878	7.915	+0.32	-2.6	19.1	17.6
July 10	07 53.10	+18 30.0	8.980	7.978	+0.33	-2.7	19.2	9.1
July 20	07 56.37	+18 02.8	9.056	8.041	+0.33	-2.7	19.2	2.7
July 30	07 59.58	+17 35.4	9.104	8.104	+0.31	-2.8	19.3	9.1
Aug. 9	08 02.63	+17 07.8	9.127	8.166	+0.29	-2.8	19.3	17.7
Aug. 19	08 05.42	+16 40.1	9.123	8.229	+0.26	-2.8	19.4	26.5
Aug. 29	08 07.88	+16 12.7	9.095	8.292	+0.22	-2.7	19.4	35.4
Sept. 8	08 09.91	+15 45.6	9.044	8.355	+0.18	-2.7	19.4	44.5
Sept. 18	08 11.43	+15 19.2	8.973	8.417	+0.12	-2.6	19.4	53.7
Sept. 28	08 12.34	+14 53.8	8.885	8.480	+0.06	-2.5	19.4	63.2
Oct. 8	08 12.58	+14 29.6	8.784	8.542	-0.02	-2.3	19.4	72.8
Oct. 18	08 12.07	+14 06.9	8.674	8.605	-0.09	-2.2	19.4	82.7
Oct. 28	08 10.75	+13 46.1	8.560	8.667	-0.18	-2.0	19.4	92.9
Nov. 7	08 08.59	+13 27.3	8.449	8.730	-0.26	-1.8	19.4	103.3
Nov. 17	08 05.57	+13 10.8	8.345	8.792	-0.35	-1.5	19.4	113.9
Nov. 27	08 01.74	+12 56.8	8.255	8.854	-0.43	-1.3	19.5	124.7
Dec. 7	07 57.15	+12 45.3	8.185	8.917	-0.50	-1.0	19.5	135.7
Dec. 17	07 51.93	+12 36.2	8.140	8.979	-0.55	-0.8	19.5	146.7
Dec. 27	07 46.23	+12 29.5	8.124	9.041	-0.59	-0.6	19.5	157.6
Jan. 6	07 40.26	+12 24.9	8.141	9.103	-0.60	-0.4	19.5	167.3
Jan. 16	07 34.22	+12 22.1	8.193	9.165	-0.60	-0.2	19.6	170.5
Jan. 26	07 28.34	+12 20.8	8.280	9.227	-0.57	-0.1	19.6	163.1
Feb. 5	07 22.84	+12 20.6	8.401	9.288	-0.52	0.0	19.7	152.8
Feb. 15	07 17.88	+12 21.1	8.552	9.350	-0.46	+0.1	19.8	142.0
Feb. 25	07 13.61	+12 21.9	8.731	9.412	-0.39	+0.1	19.8	131.2
Mar. 7	07 10.12	+12 22.7	8.931	9.474	-0.30	+0.1	19.9	120.5
Mar. 17	07 07.44	+12 23.2	9.148	9.535	-0.22	0.0	20.0	110.1
Mar. 27	07 05.59	+12 23.0	9.375	9.597	-0.14	-0.1	20.1	99.9

Comet C/2015 XY1 (Lemmon)

Epoch = 2020 July 10.0 TT  
 T = 2018 Apr. 28.22869 TT  
 Peri. = 196.25774  
 Node = 281.62579 2000.0  
 Incl. = 148.85580  
 q = 7.9250390 AU  
 e = 1.0034839

$$m1 = -4.6 + 5 \log(\Delta) + 20.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .5			m	'		°
Jan. 2	03 31.44	-07 41.5	8.179	8.756	-0.51	-0.5	18.8	123.2
Jan. 12	03 26.71	-07 43.3	8.345	8.782	-0.43	+0.1	18.9	113.4
Jan. 22	03 22.84	-07 39.6	8.527	8.808	-0.34	+0.6	19.0	103.4
Feb. 1	03 19.87	-07 31.5	8.717	8.834	-0.25	+1.0	19.0	93.6
Feb. 11	03 17.77	-07 20.1	8.909	8.860	-0.16	+1.3	19.1	84.0
Feb. 21	03 16.50	-07 06.4	9.099	8.887	-0.08	+1.5	19.2	74.6
Mar. 2	03 16.00	-06 51.4	9.281	8.914	-0.01	+1.5	19.2	65.4
Mar. 12	03 16.18	-06 36.2	9.450	8.941	+0.05	+1.5	19.3	56.6
Mar. 22	03 16.96	-06 21.6	9.602	8.969	+0.11	+1.4	19.4	48.2
Apr. 1	03 18.23	-06 08.2	9.735	8.997	+0.15	+1.2	19.4	40.4
Apr. 11	03 19.90	-05 56.9	9.845	9.025	+0.19	+1.0	19.5	33.4
Apr. 21	03 21.88	-05 48.1	9.931	9.054	+0.21	+0.7	19.5	27.7
May 1	03 24.08	-05 42.4	9.992	9.082	+0.23	+0.4	19.6	24.3
May 11	03 26.39	-05 40.2	10.026	9.111	+0.23	0.0	19.6	23.8
May 21	03 28.73	-05 41.9	10.035	9.141	+0.23	-0.4	19.6	26.5
May 31	03 31.01	-05 47.9	10.019	9.170	+0.22	-0.8	19.7	31.5
June 10	03 33.14	-05 58.5	9.979	9.200	+0.20	-1.3	19.7	38.0
June 20	03 35.03	-06 13.8	9.917	9.230	+0.17	-1.8	19.7	45.3
June 30	03 36.61	-06 34.2	9.835	9.260	+0.14	-2.3	19.7	53.1
July 10	03 37.77	-06 59.6	9.737	9.291	+0.09	-2.8	19.7	61.2
July 20	03 38.44	-07 30.0	9.625	9.322	+0.04	-3.3	19.7	69.7
July 30	03 38.54	-08 05.3	9.504	9.353	-0.02	-3.8	19.7	78.4
Aug. 9	03 38.00	-08 45.2	9.378	9.384	-0.09	-4.2	19.7	87.2
Aug. 19	03 36.75	-09 29.2	9.252	9.415	-0.17	-4.6	19.7	96.2
Aug. 29	03 34.75	-10 16.6	9.131	9.447	-0.24	-4.9	19.7	105.2
Sept. 8	03 31.97	-11 06.4	9.020	9.479	-0.32	-5.1	19.7	114.3
Sept. 18	03 28.41	-11 57.5	8.924	9.511	-0.40	-5.1	19.7	123.2
Sept. 28	03 24.11	-12 48.4	8.848	9.544	-0.47	-5.0	19.7	131.6
Oct. 8	03 19.16	-13 37.7	8.797	9.576	-0.53	-4.8	19.7	139.2
Oct. 18	03 13.66	-14 23.6	8.774	9.609	-0.57	-4.3	19.8	145.2
Oct. 28	03 07.78	-15 04.6	8.782	9.642	-0.60	-3.8	19.8	148.4
Nov. 7	03 01.69	-15 39.4	8.821	9.675	-0.61	-3.1	19.8	147.9
Nov. 17	02 55.61	-16 07.0	8.892	9.709	-0.60	-2.3	19.9	143.9
Nov. 27	02 49.74	-16 26.8	8.993	9.742	-0.57	-1.6	19.9	137.4
Dec. 7	02 44.26	-16 38.9	9.122	9.776	-0.52	-0.8	20.0	129.4
Dec. 17	02 39.32	-16 43.4	9.273	9.810	-0.46	-0.1	20.1	120.5
Dec. 27	02 35.06	-16 41.1	9.444	9.844	-0.39	+0.6	20.1	111.3
Jan. 6	02 31.54	-16 33.0	9.628	9.879	-0.31	+1.1	20.2	102.0
Jan. 16	02 28.80	-16 20.1	9.819	9.913	-0.23	+1.5	20.3	92.6
Jan. 26	02 26.84	-16 03.5	10.013	9.948	-0.15	+1.8	20.4	83.4
Feb. 5	02 25.63	-15 44.4	10.204	9.983	-0.08	+2.0	20.4	74.4
Feb. 15	02 25.12	-15 23.9	10.386	10.018	-0.01	+2.1	20.5	65.6
Feb. 25	02 25.24	-15 02.9	10.557	10.053	+0.04	+2.1	20.6	57.1
Mar. 7	02 25.92	-14 42.4	10.711	10.089	+0.10	+2.0	20.6	49.1
Mar. 17	02 27.07	-14 23.1	10.846	10.124	+0.14	+1.8	20.7	41.7
Mar. 27	02 28.60	-14 05.7	10.958	10.160	+0.17	+1.6	20.7	35.

## Comet C/2016 R2 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2018 May 9.28590 TT  
 Peri. = 33.17896  
 Node = 80.56854 2000.0  
 Incl. = 58.22582  
 q = 2.6029931 AU  
 e = 0.9952599

$$m1 = 4.0 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	16 16.08	+14 09.2	6.812	6.260	+0.56	-0.6	18.1	52.3
Jan. 12	16 21.37	+14 07.1	6.789	6.334	+0.49	+0.2	18.2	58.7
Jan. 22	16 25.98	+14 12.4	6.753	6.407	+0.42	+0.9	18.2	65.5
Feb. 1	16 29.82	+14 24.7	6.705	6.481	+0.34	+1.6	18.3	72.7
Feb. 11	16 32.77	+14 43.0	6.649	6.555	+0.24	+2.1	18.3	80.2
Feb. 21	16 34.77	+15 06.3	6.589	6.628	+0.14	+2.6	18.4	88.0
Mar. 2	16 35.74	+15 33.2	6.527	6.701	+0.04	+2.8	18.4	95.8
Mar. 12	16 35.64	+16 02.2	6.469	6.774	-0.07	+3.0	18.4	103.8
Mar. 22	16 34.46	+16 31.6	6.417	6.847	-0.18	+2.9	18.5	111.6
Apr. 1	16 32.23	+16 59.5	6.377	6.920	-0.28	+2.6	18.5	119.3
Apr. 11	16 29.03	+17 23.7	6.351	6.993	-0.37	+2.2	18.6	126.4
Apr. 21	16 24.99	+17 42.5	6.344	7.065	-0.44	+1.5	18.6	132.8
May 1	16 20.28	+17 54.2	6.359	7.138	-0.50	+0.7	18.7	137.8
May 11	16 15.14	+17 57.2	6.397	7.210	-0.53	-0.2	18.8	141.0
May 21	16 09.80	+17 50.9	6.460	7.282	-0.54	-1.2	18.8	141.7
May 31	16 04.51	+17 34.9	6.549	7.354	-0.52	-2.1	18.9	139.9
June 10	15 59.53	+17 09.5	6.662	7.425	-0.47	-3.0	19.0	136.0
June 20	15 55.04	+16 35.6	6.798	7.497	-0.41	-3.8	19.1	130.4
June 30	15 51.22	+15 54.2	6.956	7.568	-0.34	-4.5	19.2	123.8
July 10	15 48.18	+15 06.7	7.131	7.639	-0.26	-5.0	19.3	116.5
July 20	15 45.99	+14 14.7	7.321	7.710	-0.17	-5.4	19.4	108.9
July 30	15 44.67	+13 19.4	7.522	7.781	-0.08	-5.6	19.5	101.1
Aug. 9	15 44.22	+12 22.4	7.730	7.852	0.00	-5.8	19.6	93.2
Aug. 19	15 44.60	+11 24.7	7.941	7.923	+0.08	-5.8	19.7	85.3
Aug. 29	15 45.77	+10 27.5	8.152	7.993	+0.16	-5.7	19.8	77.4
Sept. 8	15 47.64	+09 31.6	8.359	8.063	+0.22	-5.5	19.9	69.6
Sept. 18	15 50.16	+08 37.8	8.558	8.133	+0.28	-5.2	20.0	61.9
Sept. 28	15 53.23	+07 46.8	8.746	8.203	+0.33	-4.9	20.1	54.4
Oct. 8	15 56.77	+06 59.0	8.920	8.273	+0.38	-4.6	20.2	47.2
Oct. 18	16 00.71	+06 15.0	9.077	8.343	+0.41	-4.2	20.3	40.3
Oct. 28	16 04.95	+05 35.0	9.216	8.412	+0.44	-3.8	20.4	34.1
Nov. 7	16 09.41	+04 59.5	9.334	8.481	+0.45	-3.3	20.5	29.1
Nov. 17	16 14.01	+04 28.5	9.429	8.550	+0.46	-2.8	20.5	25.8
Nov. 27	16 18.65	+04 02.3	9.502	8.619	+0.46	-2.4	20.6	25.2
Dec. 7	16 23.24	+03 40.9	9.551	8.688	+0.45	-1.9	20.6	27.4
Dec. 17	16 27.71	+03 24.4	9.577	8.757	+0.44	-1.4	20.7	31.9
Dec. 27	16 31.95	+03 12.9	9.579	8.825	+0.41	-0.9	20.7	38.0
Jan. 6	16 35.88	+03 06.0	9.561	8.894	+0.37	-0.4	20.8	45.0
Jan. 16	16 39.42	+03 03.7	9.523	8.962	+0.33	0.0	20.8	52.7
Jan. 26	16 42.48	+03 05.7	9.469	9.030	+0.28	+0.4	20.8	60.8
Feb. 5	16 44.99	+03 11.6	9.401	9.098	+0.22	+0.8	20.9	69.2
Feb. 15	16 46.88	+03 20.8	9.322	9.165	+0.15	+1.1	20.9	77.9
Feb. 25	16 48.08	+03 32.9	9.237	9.233	+0.08	+1.3	20.9	86.7
Mar. 7	16 48.57	+03 46.9	9.151	9.300	+0.01	+1.5	20.9	95.6
Mar. 17	16 48.32	+04 02.3	9.067	9.368	-0.07	+1.6	20.9	104.6
Mar. 27	16 47.32	+04 18.0	8.991	9.435	-0.14	+1.6	21.0	113.6

Comet 159P/LONEOS

Epoch = 2020 July 10.0 TT  
 T = 2018 May 21.99745 TT  
 Peri. = 4.62309 e = 0.3814606  
 Node = 55.00539 2000.0 a = 5.8565005 AU  
 Incl. = 23.46119 n = 0.06954194  
 q = 3.6224763 AU P = 14.17 years

$$m1 = 0.8 + 5 \log(\Delta) + 25.0 \log(r(t-330))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	10 57.80	+36 22.4	4.107	4.738	-0.07	+5.5	18.6	124.8
Jan. 12	10 56.27	+37 19.0	4.038	4.767	-0.25	+5.7	18.6	133.3
Jan. 22	10 53.05	+38 15.5	3.991	4.796	-0.41	+5.5	18.7	141.0
Feb. 1	10 48.33	+39 07.9	3.968	4.825	-0.54	+4.8	18.7	147.2
Feb. 11	10 42.46	+39 51.8	3.971	4.854	-0.63	+3.8	18.8	150.6
Feb. 21	10 35.89	+40 23.7	4.001	4.883	-0.67	+2.4	18.9	150.1
Mar. 2	10 29.18	+40 41.1	4.059	4.913	-0.66	+0.9	18.9	146.1
Mar. 12	10 22.89	+40 42.9	4.142	4.942	-0.59	-0.7	19.1	139.7
Mar. 22	10 17.48	+40 29.7	4.248	4.971	-0.48	-2.1	19.2	132.1
Apr. 1	10 13.33	+40 02.9	4.375	5.001	-0.34	-3.4	19.3	123.8
Apr. 11	10 10.66	+39 24.5	4.517	5.030	-0.18	-4.4	19.4	115.4
Apr. 21	10 09.52	+38 36.9	4.673	5.059	-0.03	-5.2	19.6	107.1
May 1	10 09.91	+37 42.2	4.836	5.089	+0.12	-5.8	19.7	98.8
May 11	10 11.72	+36 42.1	5.005	5.118	+0.25	-6.2	19.8	90.7
May 21	10 14.80	+35 38.4	5.174	5.147	+0.37	-6.5	20.0	82.8
May 31	10 19.00	+34 32.0	5.342	5.176	+0.48	-6.7	20.1	75.2
June 10	10 24.16	+33 24.1	5.505	5.206	+0.56	-6.9	20.2	67.7
June 20	10 30.13	+32 15.3	5.661	5.235	+0.64	-6.9	20.4	60.5
June 30	10 36.76	+31 06.2	5.806	5.264	+0.70	-6.9	20.5	53.4
July 10	10 43.94	+29 57.4	5.940	5.293	+0.74	-6.8	20.6	46.6
July 20	10 51.55	+28 49.3	6.060	5.322	+0.78	-6.8	20.7	40.0
July 30	10 59.50	+27 42.4	6.165	5.351	+0.81	-6.6	20.8	33.7
Aug. 9	11 07.68	+26 37.0	6.254	5.380	+0.83	-6.4	20.9	28.0
Aug. 19	11 16.02	+25 33.6	6.324	5.409	+0.84	-6.2	21.0	23.2
Aug. 29	11 24.46	+24 32.7	6.376	5.437	+0.85	-5.9	21.1	19.9
Sept. 8	11 32.90	+23 34.7	6.409	5.466	+0.84	-5.6	21.2	19.0
Sept. 18	11 41.30	+22 40.1	6.422	5.495	+0.83	-5.3	21.3	20.8
Sept. 28	11 49.57	+21 49.4	6.416	5.523	+0.82	-4.8	21.3	24.9
Oct. 8	11 57.65	+21 03.4	6.391	5.551	+0.79	-4.3	21.4	30.4
Oct. 18	12 05.46	+20 22.4	6.346	5.580	+0.76	-3.8	21.4	36.7
Oct. 28	12 12.92	+19 47.2	6.284	5.608	+0.72	-3.2	21.5	43.7
Nov. 7	12 19.94	+19 18.4	6.205	5.636	+0.67	-2.5	21.5	51.1
Nov. 17	12 26.43	+18 56.4	6.112	5.664	+0.62	-1.8	21.6	58.8
Nov. 27	12 32.30	+18 42.0	6.006	5.692	+0.55	-1.0	21.6	66.9
Dec. 7	12 37.42	+18 35.4	5.891	5.720	+0.47	-0.2	21.6	75.2
Dec. 17	12 41.70	+18 36.9	5.770	5.747	+0.38	+0.6	21.6	83.8
Dec. 27	12 45.02	+18 46.6	5.645	5.775	+0.28	+1.4	21.6	92.6
Jan. 6	12 47.28	+19 04.1	5.522	5.802	+0.16	+2.2	21.7	101.7
Jan. 16	12 48.39	+19 28.9	5.405	5.830	+0.05	+2.8	21.7	110.9
Jan. 26	12 48.30	+19 59.7	5.299	5.857	-0.08	+3.3	21.7	120.2
Feb. 5	12 47.00	+20 34.8	5.207	5.884	-0.20	+3.7	21.7	129.5
Feb. 15	12 44.53	+21 12.1	5.135	5.911	-0.31	+3.8	21.8	138.5
Feb. 25	12 41.01	+21 49.0	5.086	5.937	-0.40	+3.6	21.8	146.6
Mar. 7	12 36.64	+22 22.8	5.063	5.964	-0.47	+3.1	21.9	153.0
Mar. 17	12 31.69	+22 50.8	5.068	5.991	-0.52	+2.4	21.9	156.0
Mar. 27	12 26.46	+23 10.8	5.102	6.017	-0.53	+1.5	22.0	154.3

## Comet C/2016 N6 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2018 July 18.09193 TT  
 Peri. = 162.75541  
 Node = 298.99065 2000.0  
 Incl. = 105.84090  
 q = 2.6670827 AU  
 e = 0.9984179

$$m1 = 7.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	04 53.64	-55 47.9	5.529	5.743	-1.45	+2.3	18.3	97.6
Jan. 12	04 40.03	-55 16.0	5.651	5.817	-1.24	+4.2	18.4	94.8
Jan. 22	04 28.75	-54 26.9	5.781	5.891	-0.99	+5.7	18.5	91.6
Feb. 1	04 19.98	-53 25.9	5.917	5.965	-0.74	+6.6	18.6	88.0
Feb. 11	04 13.70	-52 18.1	6.055	6.039	-0.50	+7.0	18.7	84.4
Feb. 21	04 09.69	-51 07.8	6.192	6.113	-0.28	+7.0	18.8	80.8
Mar. 2	04 07.71	-49 58.5	6.327	6.186	-0.10	+6.8	18.9	77.4
Mar. 12	04 07.47	-48 53.1	6.458	6.260	+0.06	+6.2	19.0	74.2
Mar. 22	04 08.69	-47 53.6	6.581	6.334	+0.19	+5.6	19.1	71.4
Apr. 1	04 11.13	-47 01.7	6.697	6.407	+0.30	+4.7	19.2	69.0
Apr. 11	04 14.55	-46 18.7	6.802	6.480	+0.39	+3.8	19.3	67.2
Apr. 21	04 18.75	-45 45.4	6.898	6.553	+0.46	+2.8	19.4	66.0
May 1	04 23.56	-45 22.6	6.983	6.626	+0.51	+1.7	19.4	65.4
May 11	04 28.80	-45 10.6	7.056	6.699	+0.54	+0.6	19.5	65.4
May 21	04 34.34	-45 09.8	7.119	6.772	+0.56	-0.5	19.6	66.1
May 31	04 40.03	-45 20.4	7.172	6.845	+0.57	-1.7	19.6	67.3
June 10	04 45.73	-45 42.3	7.216	6.917	+0.57	-2.8	19.7	69.0
June 20	04 51.32	-46 15.5	7.251	6.989	+0.55	-3.9	19.7	71.2
June 30	04 56.67	-46 59.7	7.279	7.062	+0.52	-5.0	19.8	73.7
July 10	05 01.63	-47 54.6	7.302	7.134	+0.47	-6.0	19.9	76.5
July 20	05 06.05	-48 59.4	7.321	7.206	+0.41	-7.0	19.9	79.5
July 30	05 09.77	-50 13.3	7.339	7.277	+0.33	-7.9	19.9	82.6
Aug. 9	05 12.60	-51 35.2	7.357	7.349	+0.23	-8.6	20.0	85.6
Aug. 19	05 14.37	-53 03.7	7.376	7.420	+0.11	-9.1	20.0	88.6
Aug. 29	05 14.84	-54 37.0	7.400	7.492	-0.03	-9.5	20.1	91.3
Sept. 8	05 13.79	-56 12.9	7.430	7.563	-0.20	-9.6	20.1	93.8
Sept. 18	05 11.01	-57 48.9	7.467	7.634	-0.38	-9.5	20.2	95.8
Sept. 28	05 06.26	-59 22.1	7.512	7.705	-0.59	-9.0	20.2	97.3
Oct. 8	04 59.42	-60 49.3	7.567	7.775	-0.80	-8.3	20.3	98.3
Oct. 18	04 50.44	-62 07.1	7.633	7.846	-1.01	-7.1	20.4	98.7
Oct. 28	04 39.42	-63 12.3	7.709	7.916	-1.20	-5.7	20.4	98.4
Nov. 7	04 26.72	-64 01.9	7.796	7.986	-1.34	-4.0	20.5	97.5
Nov. 17	04 12.89	-64 34.1	7.892	8.056	-1.42	-2.2	20.5	96.1
Nov. 27	03 58.66	-64 47.8	7.997	8.126	-1.41	-0.4	20.6	94.1
Dec. 7	03 44.85	-64 43.5	8.109	8.196	-1.33	+1.4	20.7	91.6
Dec. 17	03 32.17	-64 22.7	8.226	8.266	-1.18	+2.9	20.7	88.9
Dec. 27	03 21.18	-63 48.0	8.348	8.335	-0.99	+4.1	20.8	85.9
Jan. 6	03 12.19	-63 02.4	8.471	8.404	-0.78	+5.0	20.9	82.8
Jan. 16	03 05.31	-62 09.2	8.593	8.474	-0.57	+5.6	21.0	79.8
Jan. 26	03 00.49	-61 11.4	8.713	8.543	-0.37	+5.9	21.0	76.8
Feb. 5	02 57.58	-60 11.7	8.829	8.611	-0.19	+6.0	21.1	74.1
Feb. 15	02 56.36	-59 12.4	8.939	8.680	-0.04	+5.8	21.1	71.7
Feb. 25	02 56.61	-58 15.7	9.042	8.749	+0.10	+5.5	21.2	69.7
Mar. 7	02 58.10	-57 23.0	9.136	8.817	+0.21	+5.0	21.3	68.2
Mar. 17	03 00.64	-56 35.7	9.221	8.885	+0.30	+4.4	21.3	67.3
Mar. 27	03 04.01	-55 54.9	9.297	8.953	+0.38	+3.7	21.4	67.0

## Comet C/2016 M1 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2018 Aug. 10.31692 TT  
 Peri. = 209.88124  
 Node = 92.20447 2000.0  
 Incl. = 90.99863  
 q = 2.2120712 AU  
 e = 0.9995166

$$m1 = 4.3 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	06 01.88	-32 30.0	5.029	5.631	-0.91	+7.0	15.3	123.5
Jan. 12	05 53.25	-31 12.8	5.127	5.711	-0.80	+8.5	15.4	122.1
Jan. 22	05 45.80	-29 41.9	5.249	5.790	-0.67	+9.7	15.5	119.0
Feb. 1	05 39.77	-28 01.3	5.392	5.870	-0.52	+10.4	15.6	114.5
Feb. 11	05 35.25	-26 15.0	5.555	5.949	-0.37	+10.8	15.8	108.9
Feb. 21	05 32.24	-24 26.8	5.732	6.028	-0.22	+10.8	15.9	102.7
Mar. 2	05 30.66	-22 39.7	5.922	6.106	-0.08	+10.5	16.0	96.0
Mar. 12	05 30.39	-20 56.4	6.120	6.185	+0.04	+10.0	16.1	89.1
Mar. 22	05 31.29	-19 18.7	6.322	6.263	+0.15	+9.4	16.3	82.1
Apr. 1	05 33.19	-17 48.0	6.524	6.341	+0.24	+8.7	16.4	75.1
Apr. 11	05 35.95	-16 25.0	6.722	6.419	+0.32	+7.8	16.5	68.2
Apr. 21	05 39.41	-15 10.3	6.914	6.496	+0.38	+7.0	16.6	61.6
May 1	05 43.45	-14 04.1	7.096	6.574	+0.43	+6.1	16.7	55.3
May 11	05 47.92	-13 06.6	7.265	6.651	+0.47	+5.3	16.8	49.3
May 21	05 52.71	-12 17.4	7.419	6.728	+0.49	+4.5	16.9	44.0
May 31	05 57.71	-11 36.4	7.556	6.804	+0.51	+3.6	17.0	39.5
June 10	06 02.81	-11 03.5	7.675	6.881	+0.51	+2.9	17.1	36.1
June 20	06 07.93	-10 38.1	7.774	6.957	+0.51	+2.1	17.2	34.2
June 30	06 12.96	-10 20.1	7.853	7.033	+0.49	+1.4	17.2	34.0
July 10	06 17.82	-10 08.8	7.911	7.109	+0.47	+0.8	17.3	35.6
July 20	06 22.41	-10 04.0	7.949	7.185	+0.44	+0.1	17.4	38.7
July 30	06 26.66	-10 05.1	7.967	7.260	+0.40	-0.4	17.4	43.2
Aug. 9	06 30.46	-10 11.6	7.966	7.335	+0.35	-0.9	17.5	48.6
Aug. 19	06 33.75	-10 22.9	7.947	7.410	+0.30	-1.4	17.5	54.8
Aug. 29	06 36.43	-10 38.3	7.913	7.485	+0.23	-1.7	17.5	61.6
Sept. 8	06 38.42	-10 57.0	7.865	7.559	+0.16	-2.0	17.6	68.8
Sept. 18	06 39.65	-11 18.1	7.807	7.633	+0.08	-2.2	17.6	76.4
Sept. 28	06 40.05	-11 40.6	7.742	7.707	-0.01	-2.3	17.6	84.3
Oct. 8	06 39.56	-12 03.2	7.674	7.781	-0.10	-2.2	17.6	92.5
Oct. 18	06 38.16	-12 24.7	7.607	7.855	-0.19	-2.0	17.7	100.8
Oct. 28	06 35.85	-12 43.7	7.546	7.928	-0.28	-1.7	17.7	109.2
Nov. 7	06 32.66	-12 58.6	7.495	8.002	-0.36	-1.2	17.7	117.5
Nov. 17	06 28.68	-13 08.1	7.460	8.075	-0.44	-0.6	17.7	125.5
Nov. 27	06 24.03	-13 10.9	7.445	8.147	-0.49	+0.1	17.8	132.8
Dec. 7	06 18.89	-13 05.9	7.453	8.220	-0.53	+0.9	17.8	138.8
Dec. 17	06 13.47	-12 52.6	7.487	8.292	-0.55	+1.8	17.9	142.8
Dec. 27	06 08.01	-12 30.9	7.549	8.365	-0.54	+2.6	17.9	144.0
Jan. 6	06 02.73	-12 01.2	7.640	8.437	-0.51	+3.4	18.0	142.0
Jan. 16	05 57.85	-11 24.4	7.759	8.508	-0.46	+4.0	18.0	137.3
Jan. 26	05 53.56	-10 41.8	7.904	8.580	-0.39	+4.5	18.1	130.8
Feb. 5	05 49.98	-09 54.8	8.072	8.651	-0.31	+4.9	18.2	123.2
Feb. 15	05 47.21	-09 05.0	8.260	8.723	-0.23	+5.1	18.3	115.0
Feb. 25	05 45.29	-08 13.9	8.462	8.794	-0.14	+5.1	18.4	106.4
Mar. 7	05 44.22	-07 22.7	8.675	8.864	-0.06	+5.1	18.5	97.8
Mar. 17	05 43.97	-06 32.8	8.893	8.935	+0.02	+4.9	18.6	89.2
Mar. 27	05 44.49	-05 44.9	9.113	9.006	+0.09	+4.6	18.6	80.7

Comet C/2018 L2 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2018 Dec. 2.65996 TT  
 Peri. = 56.26026  
 Node = 243.02289 2000.0  
 Incl. = 67.40853  
 q = 1.7122986 AU  
 e = 0.9933070

$$m_1 = 5.6 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	02 30.64	+33 55.4	4.163	4.777	-0.12	-9.8	18.9	123.5
Jan. 12	02 30.27	+32 22.9	4.387	4.865	+0.06	-8.5	19.1	113.6
Jan. 22	02 31.51	+31 03.7	4.625	4.954	+0.20	-7.2	19.3	103.8
Feb. 1	02 34.14	+29 57.7	4.872	5.041	+0.33	-5.9	19.6	94.2
Feb. 11	02 37.93	+29 04.0	5.121	5.128	+0.44	-4.8	19.8	84.9
Feb. 21	02 42.69	+28 21.1	5.370	5.215	+0.52	-3.7	20.0	75.8
Mar. 2	02 48.24	+27 47.7	5.612	5.302	+0.59	-2.9	20.2	66.9
Mar. 12	02 54.40	+27 22.2	5.845	5.388	+0.65	-2.2	20.4	58.2
Mar. 22	03 01.05	+27 03.3	6.066	5.474	+0.69	-1.6	20.6	49.7
Apr. 1	03 08.07	+26 49.6	6.270	5.559	+0.72	-1.1	20.8	41.3
Apr. 11	03 15.32	+26 40.0	6.456	5.644	+0.73	-0.8	20.9	33.2
Apr. 21	03 22.72	+26 33.4	6.622	5.729	+0.74	-0.5	21.1	25.2
May 1	03 30.17	+26 29.1	6.766	5.813	+0.74	-0.3	21.2	17.4
May 11	03 37.57	+26 26.2	6.888	5.897	+0.73	-0.2	21.3	10.4
May 21	03 44.85	+26 24.0	6.985	5.981	+0.72	-0.2	21.5	6.4
May 31	03 51.93	+26 22.1	7.059	6.064	+0.69	-0.2	21.6	10.2
June 10	03 58.70	+26 20.0	7.109	6.147	+0.66	-0.2	21.7	17.3
June 20	04 05.10	+26 17.2	7.135	6.229	+0.62	-0.3	21.8	25.1
June 30	04 11.03	+26 13.6	7.139	6.311	+0.56	-0.4	21.9	33.1
July 10	04 16.41	+26 08.7	7.121	6.393	+0.50	-0.6	21.9	41.3
July 20	04 21.16	+26 02.5	7.085	6.475	+0.44	-0.7	22.0	49.8
July 30	04 25.16	+25 54.5	7.031	6.556	+0.36	-0.9	.	58.4
Aug. 9	04 28.35	+25 44.7	6.963	6.637	+0.27	-1.1	.	67.2
Aug. 19	04 30.62	+25 32.8	6.884	6.717	+0.17	-1.3	.	76.3
Aug. 29	04 31.91	+25 18.7	6.798	6.797	+0.07	-1.6	.	85.7
Sept. 8	04 32.16	+25 01.9	6.710	6.877	-0.03	-1.8	.	95.4
Sept. 18	04 31.33	+24 42.5	6.624	6.957	-0.14	-2.1	.	105.3
Sept. 28	04 29.41	+24 20.1	6.545	7.036	-0.25	-2.4	.	115.6
Oct. 8	04 26.46	+23 54.5	6.480	7.115	-0.35	-2.7	.	126.1
Oct. 18	04 22.57	+23 25.9	6.433	7.194	-0.44	-3.0	.	137.0
Oct. 28	04 17.89	+22 54.4	6.410	7.272	-0.50	-3.3	.	148.1
Nov. 7	04 12.65	+22 20.4	6.414	7.350	-0.55	-3.5	.	159.4
Nov. 17	04 07.08	+21 44.7	6.450	7.428	-0.56	-3.6	.	170.8
Nov. 27	04 01.48	+21 08.1	6.519	7.505	-0.55	-3.7	.	177.6
Dec. 7	03 56.12	+20 31.8	6.622	7.582	-0.51	-3.6	.	166.1
Dec. 17	03 51.24	+19 57.0	6.758	7.659	-0.45	-3.4	.	154.7
Dec. 27	03 47.06	+19 24.7	6.924	7.736	-0.37	-3.1	.	143.5
Jan. 6	03 43.71	+18 55.7	7.115	7.812	-0.29	-2.7	.	132.4
Jan. 16	03 41.28	+18 30.7	7.329	7.888	-0.19	-2.3	.	121.6
Jan. 26	03 39.81	+18 09.8	7.559	7.964	-0.09	-1.9	.	111.0
Feb. 5	03 39.29	+17 53.2	7.799	8.040	0.00	-1.4	.	100.6
Feb. 15	03 39.66	+17 40.5	8.045	8.115	+0.08	-1.1	.	90.5
Feb. 25	03 40.87	+17 31.4	8.291	8.190	+0.16	-0.7	.	80.7
Mar. 7	03 42.81	+17 25.5	8.532	8.265	+0.23	-0.4	.	71.1
Mar. 17	03 45.41	+17 22.1	8.764	8.339	+0.29	-0.2	.	61.7
Mar. 27	03 48.57	+17 20.8	8.982	8.413	+0.34	0.0	.	52.6

## Comet C/2018 A3 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2019 Jan. 12.73678 TT  
 Peri. = 86.40694  
 Node = 194.29317 2000.0  
 Incl. = 139.55065  
 q = 3.2759178 AU  
 e = 0.9933301

$$m1 = 8.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	00 57.59	+27 12.1	4.293	4.608	-0.23	-11.9	17.8	102.5
Jan. 12	00 56.10	+25 22.5	4.531	4.669	-0.05	-9.8	18.0	91.9
Jan. 22	00 56.25	+23 52.6	4.773	4.730	+0.09	-8.0	18.1	81.6
Feb. 1	00 57.72	+22 40.3	5.012	4.792	+0.21	-6.3	18.3	71.6
Feb. 11	01 00.21	+21 43.4	5.242	4.855	+0.30	-4.9	18.5	61.9
Feb. 21	01 03.49	+20 59.6	5.458	4.918	+0.36	-3.7	18.6	52.4
Mar. 2	01 07.36	+20 26.7	5.657	4.981	+0.41	-2.8	18.7	43.2
Mar. 12	01 11.65	+20 02.6	5.834	5.045	+0.45	-2.0	18.9	34.3
Mar. 22	01 16.21	+19 45.7	5.988	5.109	+0.47	-1.4	19.0	25.8
Apr. 1	01 20.90	+19 34.3	6.116	5.173	+0.47	-0.9	19.1	17.8
Apr. 11	01 25.59	+19 27.0	6.217	5.238	+0.47	-0.6	19.2	11.3
Apr. 21	01 30.19	+19 22.6	6.291	5.303	+0.45	-0.3	19.2	9.7
May 1	01 34.58	+19 19.8	6.336	5.368	+0.42	-0.2	19.3	14.7
May 11	01 38.64	+19 17.7	6.355	5.433	+0.39	-0.2	19.4	22.2
May 21	01 42.29	+19 15.3	6.347	5.499	+0.34	-0.3	19.4	30.5
May 31	01 45.40	+19 11.7	6.315	5.565	+0.28	-0.5	19.5	39.1
June 10	01 47.87	+19 05.9	6.261	5.631	+0.21	-0.7	19.5	47.9
June 20	01 49.58	+18 57.0	6.186	5.697	+0.13	-1.1	19.5	57.0
June 30	01 50.43	+18 44.1	6.096	5.763	+0.03	-1.6	19.5	66.3
July 10	01 50.30	+18 26.2	5.993	5.829	-0.07	-2.1	19.5	75.9
July 20	01 49.11	+18 02.4	5.883	5.896	-0.18	-2.7	19.6	85.7
July 30	01 46.76	+17 31.7	5.771	5.962	-0.30	-3.5	19.6	95.9
Aug. 9	01 43.22	+16 53.3	5.662	6.029	-0.42	-4.3	19.6	106.5
Aug. 19	01 38.50	+16 06.6	5.563	6.095	-0.54	-5.1	19.6	117.4
Aug. 29	01 32.65	+15 11.3	5.481	6.162	-0.64	-6.0	19.6	128.6
Sept. 8	01 25.82	+14 07.7	5.421	6.229	-0.73	-6.8	19.6	140.2
Sept. 18	01 18.23	+12 56.8	5.391	6.296	-0.79	-7.4	19.6	152.0
Sept. 28	01 10.16	+11 40.2	5.393	6.362	-0.82	-7.9	19.7	164.0
Oct. 8	01 01.95	+10 20.4	5.433	6.429	-0.82	-8.1	19.8	175.2
Oct. 18	00 53.94	+09 00.1	5.511	6.496	-0.78	-7.9	19.8	170.6
Oct. 28	00 46.47	+07 42.2	5.627	6.563	-0.71	-7.6	19.9	158.8
Nov. 7	00 39.79	+06 29.3	5.778	6.630	-0.62	-6.9	20.0	146.9
Nov. 17	00 34.11	+05 23.3	5.960	6.697	-0.51	-6.1	20.1	135.1
Nov. 27	00 29.55	+04 25.8	6.167	6.764	-0.39	-5.3	20.3	123.6
Dec. 7	00 26.14	+03 37.3	6.394	6.830	-0.28	-4.4	20.4	112.4
Dec. 17	00 23.87	+02 57.8	6.634	6.897	-0.17	-3.5	20.5	101.4
Dec. 27	00 22.67	+02 27.0	6.881	6.964	-0.06	-2.6	20.6	90.8
Jan. 6	00 22.46	+02 04.1	7.128	7.031	+0.03	-1.9	20.7	80.4
Jan. 16	00 23.12	+01 48.3	7.369	7.097	+0.11	-1.2	20.8	70.2
Jan. 26	00 24.53	+01 38.5	7.600	7.164	+0.18	-0.7	21.0	60.3
Feb. 5	00 26.57	+01 33.8	7.816	7.230	+0.23	-0.2	21.1	50.6
Feb. 15	00 29.13	+01 33.1	8.012	7.297	+0.28	+0.1	21.2	41.1
Feb. 25	00 32.09	+01 35.5	8.187	7.363	+0.31	+0.4	21.2	31.7
Mar. 7	00 35.34	+01 40.0	8.337	7.430	+0.34	+0.5	21.3	22.5
Mar. 17	00 38.79	+01 45.9	8.460	7.496	+0.35	+0.6	21.4	13.5
Mar. 27	00 42.32	+01 52.2	8.556	7.562	+0.35	+0.6	21.4	4.9

## Comet C/2017 B3 (LINEAR)

Epoch = 2020 July 10.0 TT  
 T = 2019 Feb. 2.63716 TT  
 Peri. = 284.78335  
 Node = 2.17958 2000.0  
 Incl. = 54.17355  
 q = 3.9221387 AU  
 e = 1.0018726

$$m_1 = 6.1 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	23 04.80	-24 40.2	5.285	4.843	+0.52	+11.4	16.6	58.5
Jan. 12	23 10.26	-22 48.0	5.458	4.892	+0.58	+11.0	16.7	50.5
Jan. 22	23 16.26	-20 59.2	5.619	4.941	+0.62	+10.7	16.8	42.7
Feb. 1	23 22.67	-19 13.9	5.766	4.991	+0.66	+10.3	16.9	35.0
Feb. 11	23 29.35	-17 32.1	5.896	5.042	+0.68	+10.0	17.0	27.6
Feb. 21	23 36.19	-15 54.0	6.008	5.093	+0.69	+9.6	17.1	20.5
Mar. 2	23 43.11	-14 19.5	6.100	5.145	+0.69	+9.2	17.1	14.4
Mar. 12	23 49.99	-12 48.7	6.171	5.198	+0.68	+8.9	17.2	10.8
Mar. 22	23 56.77	-11 21.7	6.221	5.251	+0.67	+8.5	17.3	12.2
Apr. 1	00 03.35	-09 58.7	6.250	5.305	+0.64	+8.1	17.3	17.4
Apr. 11	00 09.65	-08 39.6	6.258	5.359	+0.61	+7.7	17.4	24.2
Apr. 21	00 15.60	-07 24.8	6.246	5.414	+0.57	+7.3	17.4	31.5
May 1	00 21.12	-06 14.2	6.214	5.469	+0.52	+6.8	17.4	39.1
May 11	00 26.11	-05 08.1	6.164	5.525	+0.47	+6.4	17.5	47.0
May 21	00 30.49	-04 06.5	6.099	5.581	+0.40	+5.9	17.5	55.0
May 31	00 34.18	-03 09.8	6.019	5.637	+0.33	+5.4	17.5	63.3
June 10	00 37.09	-02 18.0	5.929	5.694	+0.24	+4.9	17.5	71.8
June 20	00 39.12	-01 31.3	5.830	5.751	+0.15	+4.4	17.5	80.5
June 30	00 40.20	+00 49.8	5.728	5.808	+0.05	+3.9	17.5	89.5
July 10	00 40.25	+00 13.6	5.625	5.866	-0.05	+3.3	17.5	98.7
July 20	00 39.23	+00 17.2	5.526	5.924	-0.16	+2.8	17.5	108.3
July 30	00 37.11	+00 42.8	5.436	5.983	-0.27	+2.3	17.5	118.2
Aug. 9	00 33.94	+01 03.2	5.360	6.041	-0.37	+1.8	17.6	128.3
Aug. 19	00 29.77	+01 18.8	5.302	6.100	-0.47	+1.3	17.6	138.8
Aug. 29	00 24.77	+01 30.1	5.267	6.159	-0.54	+0.9	17.6	149.5
Sept. 8	00 19.13	+01 38.1	5.260	6.218	-0.59	+0.6	17.6	160.5
Sept. 18	00 13.12	+01 43.6	5.282	6.278	-0.61	+0.5	17.7	171.6
Sept. 28	00 07.03	+01 47.7	5.336	6.337	-0.60	+0.4	17.8	177.1
Oct. 8	00 01.16	+01 51.8	5.423	6.397	-0.56	+0.4	17.8	166.0
Oct. 18	23 55.78	+01 56.9	5.541	6.457	-0.50	+0.6	17.9	154.9
Oct. 28	23 51.14	+02 04.1	5.688	6.517	-0.42	+0.9	18.0	144.0
Nov. 7	23 47.40	+02 14.4	5.860	6.577	-0.32	+1.2	18.1	133.2
Nov. 17	23 44.65	+02 28.3	6.053	6.638	-0.22	+1.6	18.2	122.6
Nov. 27	23 42.96	+02 46.4	6.263	6.698	-0.11	+2.0	18.3	112.2
Dec. 7	23 42.29	+03 08.7	6.484	6.759	-0.01	+2.5	18.5	102.1
Dec. 17	23 42.60	+03 35.3	6.711	6.820	+0.08	+2.9	18.6	92.2
Dec. 27	23 43.82	+04 06.1	6.939	6.881	+0.17	+3.3	18.7	82.6
Jan. 6	23 45.84	+04 40.9	7.163	6.942	+0.24	+3.7	18.8	73.1
Jan. 16	23 48.57	+05 19.3	7.380	7.003	+0.31	+4.0	18.9	63.9
Jan. 26	23 51.90	+06 01.1	7.585	7.064	+0.36	+4.3	19.0	54.8
Feb. 5	23 55.71	+06 45.9	7.775	7.125	+0.40	+4.6	19.1	46.0
Feb. 15	23 59.91	+07 33.2	7.946	7.186	+0.44	+4.9	19.2	37.3
Feb. 25	00 04.40	+08 22.7	8.098	7.247	+0.46	+5.0	19.2	28.9
Mar. 7	00 09.08	+09 13.9	8.228	7.309	+0.48	+5.2	19.3	20.8
Mar. 17	00 13.87	+10 06.5	8.334	7.370	+0.48	+5.3	19.4	13.4
Mar. 27	00 18.67	+11 00.1	8.416	7.431	+0.48	+5.4	19.4	8.6

## Comet C/2010 U3 (Boattini)

Epoch = 2020 July 10.0 TT  
 T = 2019 Feb. 26.12115 TT  
 Peri. = 88.07704  
 Node = 43.04279 2000.0  
 Incl. = 55.51669  
 q = 8.4451593 AU  
 e = 0.9967566

$$m_1 = 8.3 + 5 \log(\Delta) + 5.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .9			m	'		°
Jan. 2	13 27.48	+52 41.9	8.378	8.641	+0.28	+2.8	17.6	102.3
Jan. 12	13 29.75	+53 11.9	8.308	8.653	+0.16	+3.2	17.6	107.4
Jan. 22	13 30.79	+53 45.0	8.247	8.666	+0.03	+3.4	17.6	112.2
Feb. 1	13 30.52	+54 19.4	8.198	8.680	-0.10	+3.4	17.6	116.3
Feb. 11	13 28.92	+54 52.7	8.163	8.693	-0.23	+3.2	17.6	119.7
Feb. 21	13 26.04	+55 22.6	8.143	8.707	-0.36	+2.7	17.6	122.0
Mar. 2	13 21.97	+55 46.7	8.141	8.722	-0.46	+2.0	17.6	123.1
Mar. 12	13 16.93	+56 02.8	8.155	8.737	-0.55	+1.1	17.6	123.0
Mar. 22	13 11.20	+56 09.0	8.187	8.752	-0.60	0.0	17.6	121.7
Apr. 1	13 05.09	+56 04.2	8.236	8.767	-0.62	-1.1	17.6	119.2
Apr. 11	12 58.98	+55 47.7	8.301	8.783	-0.60	-2.3	17.6	115.8
Apr. 21	12 53.21	+55 19.7	8.381	8.800	-0.55	-3.4	17.6	111.5
May 1	12 48.07	+54 40.7	8.473	8.816	-0.47	-4.5	17.7	106.7
May 11	12 43.80	+53 52.0	8.576	8.833	-0.37	-5.4	17.7	101.5
May 21	12 40.52	+52 55.0	8.687	8.850	-0.27	-6.1	17.7	96.0
May 31	12 38.32	+51 51.2	8.804	8.868	-0.16	-6.7	17.8	90.3
June 10	12 37.20	+50 42.3	8.924	8.886	-0.05	-7.1	17.8	84.6
June 20	12 37.12	+49 29.7	9.045	8.904	+0.05	-7.4	17.8	78.8
June 30	12 38.01	+48 14.9	9.164	8.923	+0.14	-7.6	17.9	73.2
July 10	12 39.79	+46 59.1	9.280	8.942	+0.22	-7.6	17.9	67.6
July 20	12 42.36	+45 43.4	9.388	8.961	+0.30	-7.5	17.9	62.3
July 30	12 45.61	+44 28.8	9.489	8.981	+0.36	-7.4	18.0	57.3
Aug. 9	12 49.46	+43 16.1	9.579	9.001	+0.41	-7.1	18.0	52.7
Aug. 19	12 53.80	+42 06.2	9.657	9.021	+0.46	-6.8	18.0	48.7
Aug. 29	12 58.55	+40 59.6	9.722	9.042	+0.49	-6.4	18.0	45.5
Sept. 8	13 03.61	+39 57.1	9.771	9.063	+0.52	-6.0	18.0	43.2
Sept. 18	13 08.92	+38 59.1	9.806	9.084	+0.54	-5.5	18.0	42.0
Sept. 28	13 14.37	+38 06.3	9.824	9.105	+0.55	-5.0	18.1	42.1
Oct. 8	13 19.90	+37 19.0	9.825	9.127	+0.55	-4.4	18.1	43.6
Oct. 18	13 25.42	+36 37.7	9.810	9.149	+0.55	-3.8	18.1	46.3
Oct. 28	13 30.86	+36 02.9	9.779	9.172	+0.54	-3.1	18.1	50.0
Nov. 7	13 36.11	+35 34.7	9.732	9.195	+0.51	-2.4	18.1	54.7
Nov. 17	13 41.12	+35 13.5	9.672	9.218	+0.48	-1.7	18.1	60.0
Nov. 27	13 45.77	+34 59.4	9.599	9.241	+0.44	-1.0	18.0	65.9
Dec. 7	13 49.99	+34 52.4	9.516	9.264	+0.39	-0.3	18.0	72.3
Dec. 17	13 53.68	+34 52.3	9.425	9.288	+0.34	+0.4	18.0	79.0
Dec. 27	13 56.75	+34 58.8	9.330	9.312	+0.27	+1.0	18.0	85.9
Jan. 6	13 59.11	+35 11.2	9.233	9.337	+0.19	+1.5	18.0	93.0
Jan. 16	14 00.70	+35 28.7	9.138	9.362	+0.11	+2.0	18.0	100.1
Jan. 26	14 01.44	+35 50.1	9.049	9.387	+0.03	+2.3	17.9	107.2
Feb. 5	14 01.30	+36 14.1	8.969	9.412	-0.06	+2.5	17.9	113.9
Feb. 15	14 00.26	+36 38.9	8.901	9.437	-0.15	+2.5	17.9	120.3
Feb. 25	13 58.36	+37 02.9	8.848	9.463	-0.24	+2.3	17.9	125.9
Mar. 7	13 55.67	+37 24.1	8.815	9.489	-0.31	+1.9	17.9	130.5
Mar. 17	13 52.28	+37 40.7	8.801	9.515	-0.37	+1.3	17.9	133.7
Mar. 27	13 48.36	+37 51.0	8.809	9.542	-0.41	+0.6	17.9	135.1

## Comet 29P/Schwassmann-Wachmann

Epoch = 2020 July 10.0 TT  
 T = 2019 Mar. 14.34631 TT  
 Peri. = 48.26388 e = 0.0440710  
 Node = 312.37558 2000.0 a = 6.0331214 AU  
 Incl. = 9.36683 n = 0.06651062  
 q = 5.7672357 AU P = 14.82 years

$$m_1 = 0.0 + 5 \log(\Delta) + 0.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	00 29.10	+12 52.2	5.682	5.784	+0.30	+0.5	.	91.0
Jan. 12	00 32.54	+13 00.6	5.843	5.785	+0.39	+1.2	.	81.8
Jan. 22	00 36.87	+13 15.5	6.001	5.786	+0.48	+1.8	.	72.8
Feb. 1	00 41.99	+13 36.5	6.151	5.787	+0.55	+2.4	.	64.0
Feb. 11	00 47.80	+14 02.9	6.291	5.789	+0.61	+2.9	.	55.5
Feb. 21	00 54.20	+14 34.0	6.417	5.790	+0.67	+3.4	.	47.1
Mar. 2	01 01.08	+15 09.3	6.528	5.791	+0.71	+3.7	.	39.0
Mar. 12	01 08.36	+15 47.9	6.621	5.793	+0.75	+4.0	.	31.1
Mar. 22	01 15.95	+16 29.2	6.694	5.794	+0.77	+4.3	.	23.5
Apr. 1	01 23.77	+17 12.7	6.748	5.795	+0.79	+4.4	.	16.3
Apr. 11	01 31.74	+17 57.6	6.781	5.797	+0.80	+4.6	.	10.2
Apr. 21	01 39.79	+18 43.5	6.792	5.798	+0.81	+4.6	.	7.9
May 1	01 47.84	+19 29.9	6.783	5.800	+0.80	+4.6	.	11.8
May 11	01 55.81	+20 16.2	6.752	5.802	+0.79	+4.6	.	18.2
May 21	02 03.63	+21 02.2	6.702	5.803	+0.77	+4.6	.	25.3
May 31	02 11.22	+21 47.3	6.632	5.805	+0.74	+4.5	.	32.7
June 10	02 18.49	+22 31.2	6.545	5.806	+0.71	+4.3	.	40.2
June 20	02 25.35	+23 13.7	6.441	5.808	+0.66	+4.2	.	47.9
June 30	02 31.71	+23 54.4	6.322	5.810	+0.60	+4.0	.	55.7
July 10	02 37.46	+24 32.9	6.191	5.812	+0.54	+3.7	.	63.6
July 20	02 42.49	+25 09.0	6.051	5.813	+0.46	+3.5	.	71.8
July 30	02 46.69	+25 42.3	5.902	5.815	+0.37	+3.2	.	80.1
Aug. 9	02 49.96	+26 12.4	5.750	5.817	+0.27	+2.8	.	88.7
Aug. 19	02 52.18	+26 38.7	5.598	5.819	+0.16	+2.4	.	97.6
Aug. 29	02 53.26	+27 00.7	5.449	5.821	+0.04	+1.9	.	106.7
Sept. 8	02 53.15	+27 17.8	5.308	5.823	-0.08	+1.4	.	116.2
Sept. 18	02 51.84	+27 29.2	5.179	5.825	-0.20	+0.8	.	125.9
Sept. 28	02 49.37	+27 34.3	5.066	5.827	-0.31	+0.1	.	135.8
Oct. 8	02 45.88	+27 32.6	4.975	5.829	-0.40	-0.6	.	145.9
Oct. 18	02 41.55	+27 23.9	4.908	5.831	-0.47	-1.3	.	155.8
Oct. 28	02 36.69	+27 08.4	4.869	5.833	-0.50	-1.9	.	164.6
Nov. 7	02 31.63	+26 47.2	4.860	5.835	-0.50	-2.4	.	168.7
Nov. 17	02 26.72	+26 21.5	4.882	5.837	-0.47	-2.7	.	163.7
Nov. 27	02 22.33	+25 53.3	4.933	5.839	-0.40	-2.9	.	154.5
Dec. 7	02 18.75	+25 24.6	5.013	5.842	-0.31	-2.8	.	144.3
Dec. 17	02 16.19	+24 57.5	5.118	5.844	-0.19	-2.5	.	133.9
Dec. 27	02 14.79	+24 33.8	5.243	5.846	-0.07	-2.1	.	123.7
Jan. 6	02 14.63	+24 14.8	5.385	5.848	+0.05	-1.6	.	113.6
Jan. 16	02 15.69	+24 01.3	5.539	5.851	+0.17	-1.0	.	103.7
Jan. 26	02 17.93	+23 53.7	5.699	5.853	+0.29	-0.4	.	94.1
Feb. 5	02 21.26	+23 52.0	5.861	5.855	+0.39	+0.1	.	84.8
Feb. 15	02 25.60	+23 56.0	6.021	5.858	+0.48	+0.7	.	75.8
Feb. 25	02 30.83	+24 05.1	6.175	5.860	+0.57	+1.2	.	67.0
Mar. 7	02 36.84	+24 18.6	6.320	5.862	+0.64	+1.6	.	58.5
Mar. 17	02 43.53	+24 36.1	6.452	5.865	+0.70	+1.9	.	50.2
Mar. 27	02 50.80	+24 56.6	6.570	5.867	+0.75	+2.2	.	42.1

Comet 78P/Gehrels

Epoch = 2020 July 10.0 TT  
 T = 2019 Apr. 2.64719 TT  
 Peri. = 192.65276 e = 0.4617066  
 Node = 210.53370 2000.0 a = 3.7396424 AU  
 Incl. = 6.24902 n = 0.13628842  
 q = 2.0130248 AU P = 7.23 years

$$m_1 = 5.1 + 5 \log(\Delta) + 20.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	09 36.13	+05 20.8	2.101	2.886	-0.44	+0.5	15.9	135.6
Jan. 12	09 30.79	+05 32.4	2.061	2.933	-0.64	+2.0	16.0	146.7
Jan. 22	09 23.75	+05 58.5	2.044	2.979	-0.77	+3.3	16.1	158.0
Feb. 1	09 15.73	+06 36.4	2.054	3.025	-0.82	+4.3	16.3	168.1
Feb. 11	09 07.61	+07 21.9	2.094	3.071	-0.78	+4.8	16.5	170.3
Feb. 21	09 00.24	+08 10.4	2.164	3.118	-0.67	+4.8	16.7	161.6
Mar. 2	08 54.31	+08 57.3	2.261	3.163	-0.49	+4.5	16.9	150.8
Mar. 12	08 50.30	+09 39.3	2.383	3.209	-0.29	+3.8	17.1	140.1
Mar. 22	08 48.40	+10 13.9	2.526	3.254	-0.07	+3.0	17.4	129.7
Apr. 1	08 48.60	+10 39.9	2.685	3.300	+0.13	+2.1	17.6	119.9
Apr. 11	08 50.79	+10 56.9	2.857	3.344	+0.32	+1.2	17.9	110.6
Apr. 21	08 54.71	+11 04.8	3.037	3.389	+0.48	+0.3	18.1	101.8
May 1	09 00.15	+11 04.0	3.222	3.433	+0.62	-0.5	18.4	93.4
May 11	09 06.86	+10 54.9	3.409	3.477	+0.73	-1.3	18.6	85.4
May 21	09 14.60	+10 38.2	3.594	3.521	+0.82	-2.1	18.8	77.7
May 31	09 23.19	+10 14.3	3.776	3.564	+0.90	-2.8	19.0	70.3
June 10	09 32.45	+09 43.9	3.951	3.606	+0.96	-3.4	19.2	63.1
June 20	09 42.22	+09 07.7	4.118	3.648	+1.00	-3.9	19.4	56.0
June 30	09 52.38	+08 26.2	4.275	3.690	+1.03	-4.4	19.6	49.1
July 10	10 02.82	+07 40.0	4.421	3.732	+1.06	-4.9	19.8	42.3
July 20	10 13.46	+06 49.8	4.553	3.773	+1.07	-5.2	19.9	35.5
July 30	10 24.22	+05 56.0	4.671	3.813	+1.08	-5.5	20.1	28.8
Aug. 9	10 35.01	+04 59.4	4.773	3.853	+1.08	-5.8	20.2	22.2
Aug. 19	10 45.80	+04 00.4	4.858	3.893	+1.08	-6.0	20.3	15.6
Aug. 29	10 56.51	+02 59.6	4.926	3.932	+1.07	-6.1	20.5	9.1
Sept. 8	11 07.10	+01 57.8	4.975	3.970	+1.05	-6.2	20.6	3.7
Sept. 18	11 17.51	+00 55.4	5.006	4.008	+1.03	-6.2	20.7	6.3
Sept. 28	11 27.69	+00 06.9	5.017	4.046	+1.00	-6.2	20.7	12.8
Oct. 8	11 37.56	-01 08.5	5.009	4.083	+0.97	-6.1	20.8	19.8
Oct. 18	11 47.07	-02 08.8	4.982	4.120	+0.93	-5.9	20.9	27.1
Oct. 28	11 56.14	-03 07.0	4.936	4.156	+0.88	-5.7	20.9	34.5
Nov. 7	12 04.68	-04 02.4	4.873	4.191	+0.82	-5.4	21.0	42.2
Nov. 17	12 12.60	-04 54.3	4.793	4.227	+0.75	-5.0	21.0	50.0
Nov. 27	12 19.78	-05 41.9	4.698	4.261	+0.67	-4.5	21.1	58.2
Dec. 7	12 26.10	-06 24.3	4.591	4.295	+0.58	-3.9	21.1	66.6
Dec. 17	12 31.45	-07 00.8	4.473	4.329	+0.47	-3.3	21.1	75.3
Dec. 27	12 35.67	-07 30.3	4.349	4.362	+0.35	-2.5	21.1	84.3
Jan. 6	12 38.63	-07 51.9	4.221	4.395	+0.22	-1.7	21.1	93.6
Jan. 16	12 40.22	-08 04.8	4.095	4.427	+0.08	-0.8	21.1	103.3
Jan. 26	12 40.35	-08 08.2	3.974	4.458	-0.07	+0.2	21.1	113.5
Feb. 5	12 38.98	-08 01.6	3.864	4.489	-0.22	+1.2	21.1	123.9
Feb. 15	12 36.15	-07 44.8	3.770	4.520	-0.36	+2.2	21.1	134.8
Feb. 25	12 32.02	-07 18.3	3.696	4.550	-0.48	+3.2	21.1	145.9
Mar. 7	12 26.83	-06 43.1	3.648	4.580	-0.56	+3.9	21.1	157.3
Mar. 17	12 20.94	-06 01.4	3.629	4.609	-0.61	+4.4	21.2	168.6
Mar. 27	12 14.77	-05 15.7	3.641	4.637	-0.61	+4.7	21.2	176.5

Comet 261P/Larson

Epoch = 2020 July 10.0 TT  
 T = 2019 June 18.73941 TT  
 Peri. = 67.12755 e = 0.4230234  
 Node = 291.16194 2000.0 a = 3.4894504 AU  
 Incl. = 6.07619 n = 0.15120583  
 q = 2.0133312 AU P = 6.52 years

$$m1 = 11.4 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	03 04.91	+23 32.7	1.755	2.497	+0.25	-3.1	18.6	129.4
Jan. 12	03 08.62	+23 07.4	1.899	2.538	+0.51	-1.8	18.9	120.0
Jan. 22	03 14.70	+22 54.3	2.055	2.579	+0.73	-0.7	19.1	111.2
Feb. 1	03 22.82	+22 51.6	2.219	2.621	+0.91	+0.2	19.4	102.9
Feb. 11	03 32.65	+22 57.0	2.390	2.663	+1.06	+0.9	19.7	95.0
Feb. 21	03 43.89	+23 08.2	2.563	2.706	+1.19	+1.4	19.9	87.4
Mar. 2	03 56.29	+23 23.0	2.737	2.748	+1.30	+1.6	20.2	80.2
Mar. 12	04 09.63	+23 39.5	2.910	2.791	+1.38	+1.7	20.4	73.3
Mar. 22	04 23.72	+23 55.8	3.079	2.834	+1.44	+1.6	20.6	66.6
Apr. 1	04 38.40	+24 10.6	3.243	2.877	+1.50	+1.4	20.8	60.0
Apr. 11	04 53.54	+24 22.9	3.401	2.920	+1.53	+1.0	21.0	53.6
Apr. 21	05 09.00	+24 31.5	3.550	2.963	+1.56	+0.6	21.2	47.4
May 1	05 24.68	+24 35.9	3.690	3.006	+1.58	+0.2	21.4	41.2
May 11	05 40.47	+24 35.5	3.819	3.048	+1.58	-0.3	21.6	35.1
May 21	05 56.29	+24 30.1	3.936	3.091	+1.58	-0.8	21.7	29.0
May 31	06 12.05	+24 19.4	4.041	3.133	+1.57	-1.4	21.9	23.0
June 10	06 27.67	+24 03.5	4.132	3.175	+1.55	-1.9	22.0	17.0
June 20	06 43.08	+23 42.5	4.208	3.217	+1.53	-2.4	.	11.0
June 30	06 58.22	+23 16.5	4.270	3.258	+1.50	-2.9	.	5.0
July 10	07 13.01	+22 45.9	4.315	3.299	+1.46	-3.3	.	1.2
July 20	07 27.40	+22 11.2	4.345	3.340	+1.41	-3.7	.	7.3
July 30	07 41.33	+21 32.7	4.358	3.380	+1.36	-4.0	.	13.6
Aug. 9	07 54.73	+20 51.1	4.355	3.420	+1.31	-4.3	.	19.9
Aug. 19	08 07.55	+20 06.9	4.336	3.459	+1.25	-4.5	.	26.5
Aug. 29	08 19.71	+19 21.0	4.300	3.498	+1.18	-4.7	.	33.1
Sept. 8	08 31.15	+18 34.0	4.249	3.537	+1.10	-4.7	.	40.0
Sept. 18	08 41.79	+17 46.8	4.183	3.575	+1.02	-4.7	.	47.1
Sept. 28	08 51.51	+17 00.3	4.102	3.613	+0.92	-4.6	.	54.5
Oct. 8	09 00.23	+16 15.5	4.010	3.650	+0.81	-4.3	.	62.1
Oct. 18	09 07.83	+15 33.4	3.906	3.687	+0.69	-4.0	.	70.0
Oct. 28	09 14.15	+14 55.1	3.795	3.723	+0.56	-3.6	.	78.3
Nov. 7	09 19.07	+14 21.9	3.678	3.759	+0.41	-3.0	.	87.0
Nov. 17	09 22.43	+13 54.8	3.558	3.794	+0.24	-2.3	.	96.2
Nov. 27	09 24.08	+13 34.8	3.441	3.829	+0.07	-1.6	.	105.8
Dec. 7	09 23.92	+13 22.8	3.330	3.864	-0.12	-0.7	.	115.9
Dec. 17	09 21.90	+13 19.2	3.231	3.897	-0.30	+0.1	.	126.5
Dec. 27	09 18.05	+13 24.1	3.148	3.931	-0.48	+0.9	.	137.6
Jan. 6	09 12.58	+13 36.5	3.087	3.963	-0.63	+1.6	.	149.1
Jan. 16	09 05.80	+13 55.1	3.053	3.996	-0.73	+2.1	.	160.8
Jan. 26	08 58.22	+14 17.7	3.049	4.027	-0.78	+2.4	.	172.5
Feb. 5	08 50.43	+14 41.8	3.076	4.058	-0.77	+2.4	.	174.1
Feb. 15	08 43.06	+15 05.2	3.136	4.089	-0.69	+2.2	.	162.7
Feb. 25	08 36.65	+15 25.9	3.225	4.119	-0.57	+1.9	.	151.1
Mar. 7	08 31.63	+15 42.4	3.340	4.149	-0.42	+1.4	.	139.9
Mar. 17	08 28.25	+15 54.0	3.478	4.178	-0.24	+0.9	.	129.1
Mar. 27	08 26.61	+16 00.3	3.634	4.206	-0.07	+0.3	.	118.8

Comet C/2019 K5 (Young)

Epoch = 2020 July 10.0 TT  
 T = 2019 June 22.80069 TT  
 Peri. = 174.94021  
 Node = 177.17573 2000.0  
 Incl. = 15.31450  
 q = 2.0351406 AU  
 e = 0.9868631

$$m_1 = 9.5 + 5 \log(\Delta) + 15.0 \log(r(t-50))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	03 09.89	+00 38.0	2.370	3.012	+0.24	+4.9	17.7	122.3
Jan. 12	03 13.05	+00 14.7	2.561	3.091	+0.41	+5.6	18.0	113.8
Jan. 22	03 17.80	+01 13.4	2.764	3.172	+0.56	+6.1	18.4	105.5
Feb. 1	03 23.96	+02 15.4	2.974	3.254	+0.69	+6.3	18.7	97.6
Feb. 11	03 31.33	+03 18.4	3.189	3.336	+0.79	+6.3	19.0	89.9
Feb. 21	03 39.69	+04 20.5	3.406	3.418	+0.89	+6.1	19.3	82.4
Mar. 2	03 48.90	+05 20.5	3.623	3.502	+0.96	+5.8	19.6	75.1
Mar. 12	03 58.78	+06 17.1	3.837	3.585	+1.02	+5.4	19.9	68.0
Mar. 22	04 09.20	+07 09.6	4.046	3.669	+1.07	+5.0	20.2	61.0
Apr. 1	04 20.03	+07 57.4	4.249	3.753	+1.10	+4.5	20.5	54.2
Apr. 11	04 31.17	+08 39.8	4.442	3.837	+1.13	+3.9	20.7	47.6
Apr. 21	04 42.50	+09 16.8	4.624	3.922	+1.14	+3.4	21.0	41.0
May 1	04 53.94	+09 47.9	4.794	4.006	+1.15	+2.8	21.2	34.6
May 11	05 05.41	+10 13.2	4.950	4.090	+1.14	+2.2	21.4	28.5
May 21	05 16.82	+10 32.7	5.091	4.175	+1.14	+1.6	21.6	22.6
May 31	05 28.11	+10 46.3	5.216	4.259	+1.12	+1.0	21.8	17.4
June 10	05 39.19	+10 54.2	5.324	4.343	+1.09	+0.5	22.0	13.6
June 20	05 49.99	+10 56.6	5.414	4.428	+1.06	-0.1	.	12.5
June 30	06 00.46	+10 53.7	5.486	4.512	+1.02	-0.6	.	15.0
July 10	06 10.50	+10 45.9	5.539	4.595	+0.98	-1.0	.	19.7
July 20	06 20.07	+10 33.5	5.575	4.679	+0.93	-1.5	.	25.6
July 30	06 29.06	+10 16.9	5.591	4.763	+0.87	-1.9	.	32.2
Aug. 9	06 37.42	+09 56.5	5.591	4.846	+0.80	-2.2	.	39.1
Aug. 19	06 45.06	+09 32.8	5.573	4.929	+0.72	-2.5	.	46.3
Aug. 29	06 51.89	+09 06.4	5.540	5.012	+0.64	-2.8	.	53.9
Sept. 8	06 57.83	+08 38.0	5.494	5.095	+0.54	-2.9	.	61.7
Sept. 18	07 02.78	+08 08.2	5.436	5.177	+0.44	-3.0	.	69.9
Sept. 28	07 06.66	+07 37.8	5.369	5.259	+0.33	-3.0	.	78.4
Oct. 8	07 09.39	+07 07.7	5.297	5.341	+0.21	-3.0	.	87.1
Oct. 18	07 10.91	+06 38.8	5.223	5.423	+0.08	-2.8	.	96.2
Oct. 28	07 11.16	+06 12.2	5.153	5.504	-0.04	-2.5	.	105.7
Nov. 7	07 10.15	+05 48.9	5.089	5.586	-0.17	-2.1	.	115.4
Nov. 17	07 07.93	+05 29.9	5.038	5.667	-0.29	-1.6	.	125.3
Nov. 27	07 04.61	+05 16.1	5.004	5.747	-0.39	-1.1	.	135.3
Dec. 7	07 00.38	+05 08.2	4.993	5.828	-0.46	-0.4	.	145.1
Dec. 17	06 55.48	+05 06.7	5.007	5.908	-0.52	+0.2	.	154.1
Dec. 27	06 50.22	+05 11.6	5.050	5.988	-0.53	+0.8	.	160.8
Jan. 6	06 44.94	+05 22.6	5.124	6.067	-0.52	+1.4	.	162.0
Jan. 16	06 39.95	+05 38.9	5.229	6.146	-0.47	+1.9	.	156.9
Jan. 26	06 35.55	+05 59.7	5.364	6.226	-0.40	+2.3	.	148.6
Feb. 5	06 31.97	+06 23.6	5.526	6.304	-0.31	+2.5	.	139.1
Feb. 15	06 29.37	+06 49.5	5.711	6.383	-0.20	+2.7	.	129.3
Feb. 25	06 27.83	+07 16.3	5.915	6.461	-0.09	+2.7	.	119.6
Mar. 7	06 27.37	+07 42.8	6.134	6.539	+0.01	+2.6	.	109.9
Mar. 17	06 27.96	+08 08.3	6.363	6.617	+0.11	+2.5	.	100.5
Mar. 27	06 29.54	+08 31.9	6.598	6.694	+0.21	+2.2	.	91.3

Comet C/2018 X2 (Fitzsimmons)

Epoch = 2020 July 10.0 TT  
 T = 2019 July 8.51815 TT  
 Peri. = 162.05969  
 Node = 340.82887 2000.0  
 Incl. = 23.06950  
 q = 2.1262728 AU  
 e = 0.9858527

$$m1 = 11.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	14 15.56	-28 51.9	3.285	2.927	+1.17	-13.0	18.2	60.5
Jan. 12	14 26.66	-30 58.8	3.239	3.002	+1.04	-12.4	18.3	67.4
Jan. 22	14 36.34	-33 00.0	3.188	3.078	+0.88	-11.8	18.4	74.7
Feb. 1	14 44.33	-34 55.3	3.132	3.155	+0.70	-11.2	18.5	82.3
Feb. 11	14 50.39	-36 44.3	3.076	3.233	+0.49	-10.5	18.5	90.2
Feb. 21	14 54.26	-38 26.1	3.020	3.312	+0.26	-9.7	18.6	98.3
Mar. 2	14 55.71	-39 59.0	2.969	3.391	+0.01	-8.7	18.7	106.8
Mar. 12	14 54.63	-41 20.9	2.927	3.471	-0.25	-7.5	18.7	115.4
Mar. 22	14 51.04	-42 28.9	2.896	3.552	-0.49	-5.9	18.8	124.1
Apr. 1	14 45.16	-43 19.9	2.881	3.633	-0.70	-4.0	18.9	132.6
Apr. 11	14 37.52	-43 51.2	2.886	3.715	-0.84	-2.0	19.0	140.5
Apr. 21	14 28.81	-44 01.6	2.914	3.797	-0.90	+0.1	19.1	147.0
May 1	14 19.91	-43 51.7	2.966	3.879	-0.87	+2.0	19.2	151.1
May 11	14 11.65	-43 24.4	3.045	3.961	-0.76	+3.5	19.4	151.4
May 21	14 04.70	-42 44.2	3.148	4.044	-0.60	+4.5	19.6	148.2
May 31	13 59.53	-41 56.1	3.277	4.126	-0.41	+5.0	19.7	142.3
June 10	13 56.34	-41 05.6	3.427	4.209	-0.21	+5.0	19.9	135.2
June 20	13 55.15	-40 16.6	3.597	4.291	-0.01	+4.7	20.1	127.4
June 30	13 55.86	-39 32.4	3.784	4.374	+0.17	+4.1	20.3	119.4
July 10	13 58.29	-38 55.0	3.984	4.456	+0.33	+3.3	20.5	111.4
July 20	14 02.24	-38 25.3	4.193	4.538	+0.47	+2.5	20.7	103.4
July 30	14 07.52	-38 03.6	4.410	4.621	+0.59	+1.7	20.9	95.6
Aug. 9	14 13.93	-37 49.9	4.629	4.703	+0.70	+1.0	21.1	87.9
Aug. 19	14 21.31	-37 43.4	4.849	4.785	+0.79	+0.3	21.2	80.4
Aug. 29	14 29.51	-37 43.6	5.066	4.867	+0.86	-0.4	21.4	72.9
Sept. 8	14 38.39	-37 49.7	5.278	4.948	+0.92	-0.9	21.6	65.6
Sept. 18	14 47.85	-38 00.8	5.483	5.030	+0.97	-1.4	21.7	58.4
Sept. 28	14 57.78	-38 16.1	5.677	5.111	+1.01	-1.7	21.9	51.4
Oct. 8	15 08.07	-38 35.0	5.858	5.192	+1.05	-2.1	22.0	44.5
Oct. 18	15 18.65	-38 56.8	6.025	5.273	+1.07	-2.3	.	37.8
Oct. 28	15 29.43	-39 20.9	6.175	5.354	+1.08	-2.5	.	31.6
Nov. 7	15 40.30	-39 46.7	6.308	5.434	+1.09	-2.7	.	26.0
Nov. 17	15 51.20	-40 14.0	6.421	5.515	+1.09	-2.8	.	21.8
Nov. 27	16 02.02	-40 42.4	6.514	5.595	+1.07	-2.9	.	19.7
Dec. 7	16 12.66	-41 11.7	6.586	5.675	+1.05	-3.0	.	20.6
Dec. 17	16 23.03	-41 41.7	6.637	5.754	+1.02	-3.0	.	24.3
Dec. 27	16 33.01	-42 12.4	6.667	5.834	+0.97	-3.1	.	29.7
Jan. 6	16 42.49	-42 43.7	6.677	5.913	+0.92	-3.2	.	36.2
Jan. 16	16 51.35	-43 15.9	6.668	5.992	+0.85	-3.3	.	43.4
Jan. 26	16 59.45	-43 48.9	6.642	6.070	+0.76	-3.3	.	51.0
Feb. 5	17 06.68	-44 22.7	6.599	6.148	+0.67	-3.4	.	58.9
Feb. 15	17 12.89	-44 57.5	6.544	6.227	+0.56	-3.5	.	67.1
Feb. 25	17 17.94	-45 33.1	6.480	6.305	+0.44	-3.6	.	75.5
Mar. 7	17 21.72	-46 09.2	6.408	6.382	+0.30	-3.6	.	84.0
Mar. 17	17 24.10	-46 45.4	6.335	6.460	+0.16	-3.6	.	92.8
Mar. 27	17 24.99	-47 20.9	6.262	6.537	+0.01	-3.5	.	101.6

Comet C/2018 A6 (Gibbs)

Epoch = 2020 July 10.0 TT  
 T = 2019 July 14.32660 TT  
 Peri. = 264.55157 e = 0.8033097  
 Node = 340.38245 2000.0 a = 15.3452590 AU  
 Incl. = 76.95971 n = 0.01639618  
 q = 3.0182636 AU P = 60.11 years

$$m1 = 4.3 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	22 08.37	-58 58.0	3.913	3.373	+1.38	+21.0	15.2	50.4
Jan. 12	22 21.72	-55 34.2	4.017	3.411	+1.28	+19.6	15.3	46.2
Jan. 22	22 34.16	-52 24.3	4.114	3.452	+1.20	+18.2	15.4	42.4
Feb. 1	22 45.87	-49 28.0	4.203	3.494	+1.13	+16.9	15.6	39.1
Feb. 11	22 56.92	-46 45.2	4.280	3.537	+1.07	+15.6	15.7	36.6
Feb. 21	23 07.36	-44 15.5	4.344	3.582	+1.01	+14.3	15.8	35.2
Mar. 2	23 17.20	-41 58.7	4.392	3.628	+0.95	+13.0	15.9	35.2
Mar. 12	23 26.44	-39 54.4	4.424	3.674	+0.89	+11.8	16.0	36.6
Mar. 22	23 35.05	-38 02.3	4.440	3.722	+0.82	+10.5	16.1	39.3
Apr. 1	23 42.97	-36 22.5	4.437	3.771	+0.75	+9.3	16.2	43.2
Apr. 11	23 50.15	-34 54.7	4.418	3.821	+0.67	+8.1	16.3	48.0
Apr. 21	23 56.51	-33 38.9	4.382	3.872	+0.59	+6.9	16.3	53.6
May 1	00 01.94	-32 35.2	4.331	3.923	+0.49	+5.7	16.4	59.9
May 11	00 06.33	-31 43.5	4.266	3.976	+0.38	+4.5	16.4	66.7
May 21	00 09.54	-31 03.8	4.189	4.029	+0.25	+3.3	16.5	73.9
May 31	00 11.41	-30 35.8	4.104	4.082	+0.11	+2.2	16.5	81.7
June 10	00 11.78	-30 19.2	4.012	4.136	-0.05	+1.1	16.6	89.8
June 20	00 10.46	-30 12.9	3.920	4.191	-0.23	+0.1	16.6	98.4
June 30	00 07.29	-30 15.7	3.830	4.246	-0.42	-0.7	16.6	107.4
July 10	00 02.14	-30 25.3	3.748	4.302	-0.63	-1.2	16.7	116.7
July 20	23 54.98	-30 38.8	3.679	4.358	-0.83	-1.4	16.7	126.3
July 30	23 45.87	-30 52.4	3.629	4.415	-1.01	-1.2	16.8	135.9
Aug. 9	23 35.08	-31 01.7	3.604	4.471	-1.16	-0.5	16.8	144.9
Aug. 19	23 23.05	-31 02.6	3.607	4.529	-1.25	+0.5	16.9	152.5
Aug. 29	23 10.39	-30 51.8	3.642	4.586	-1.27	+1.8	17.0	156.6
Sept. 8	22 57.81	-30 27.1	3.710	4.644	-1.23	+3.2	17.2	155.2
Sept. 18	22 46.00	-29 48.6	3.812	4.702	-1.12	+4.6	17.3	149.0
Sept. 28	22 35.52	-28 57.5	3.945	4.760	-0.96	+5.7	17.4	140.4
Oct. 8	22 26.77	-27 56.2	4.105	4.818	-0.77	+6.6	17.6	130.8
Oct. 18	22 19.93	-26 47.4	4.289	4.877	-0.58	+7.2	17.8	120.9
Oct. 28	22 15.03	-25 33.5	4.491	4.936	-0.39	+7.6	18.0	111.0
Nov. 7	22 11.98	-24 16.7	4.706	4.994	-0.21	+7.8	18.1	101.2
Nov. 17	22 10.61	-22 58.3	4.929	5.053	-0.05	+7.9	18.3	91.6
Nov. 27	22 10.71	-21 39.4	5.153	5.112	+0.08	+7.9	18.5	82.1
Dec. 7	22 12.08	-20 20.7	5.376	5.171	+0.20	+7.9	18.7	72.8
Dec. 17	22 14.51	-19 02.4	5.591	5.230	+0.29	+7.8	18.8	63.7
Dec. 27	22 17.81	-17 44.9	5.795	5.290	+0.37	+7.7	19.0	54.8
Jan. 6	22 21.79	-16 28.2	5.985	5.349	+0.43	+7.6	19.1	46.0
Jan. 16	22 26.30	-15 12.4	6.158	5.408	+0.47	+7.5	19.2	37.2
Jan. 26	22 31.19	-13 57.6	6.311	5.467	+0.50	+7.4	19.4	28.6
Feb. 5	22 36.32	-12 43.9	6.442	5.526	+0.52	+7.3	19.5	20.1
Feb. 15	22 41.59	-11 31.4	6.549	5.586	+0.53	+7.2	19.6	11.7
Feb. 25	22 46.88	-10 20.2	6.632	5.645	+0.53	+7.0	19.7	3.8
Mar. 7	22 52.08	-09 10.5	6.690	5.704	+0.51	+6.9	19.8	5.8
Mar. 17	22 57.10	-08 02.5	6.724	5.763	+0.49	+6.7	19.8	14.0
Mar. 27	23 01.84	-06 56.3	6.733	5.822	+0.46	+6.5	19.9	22.3

## Comet C/2019 K8 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2019 July 21.30512 TT  
 Peri. = 85.36640  
 Node = 291.04422 2000.0  
 Incl. = 93.22374  
 q = 3.1951647 AU  
 e = 0.9983312

$$m_1 = 10.4 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	14 24.65	+74 54.4	3.158	3.559	-1.33	+21.2	18.4	106.1
Jan. 12	14 03.33	+78 30.1	3.148	3.601	-3.44	+21.6	18.5	109.7
Jan. 22	13 09.31	+81 55.3	3.162	3.645	-8.65	+17.9	18.5	111.9
Feb. 1	11 04.16	+84 00.2	3.201	3.691	-16.57	+3.2	18.6	112.4
Feb. 11	08 31.58	+83 00.2	3.268	3.738	-11.26	-15.4	18.7	111.1
Feb. 21	07 13.50	+79 48.8	3.363	3.787	-4.54	-22.1	18.8	108.0
Mar. 2	06 42.83	+76 00.5	3.483	3.837	-1.73	-23.2	18.9	103.5
Mar. 12	06 31.80	+72 10.9	3.625	3.888	-0.51	-22.5	19.1	97.9
Mar. 22	06 29.76	+68 32.5	3.785	3.941	+0.10	-21.0	19.2	91.6
Apr. 1	06 32.42	+65 09.7	3.958	3.995	+0.44	-19.3	19.4	84.9
Apr. 11	06 37.74	+62 04.0	4.140	4.050	+0.63	-17.6	19.6	77.9
Apr. 21	06 44.66	+59 15.0	4.325	4.106	+0.75	-16.0	19.7	70.8
May 1	06 52.57	+56 41.8	4.510	4.162	+0.83	-14.5	19.9	63.7
May 11	07 01.06	+54 22.8	4.690	4.220	+0.87	-13.2	20.0	56.7
May 21	07 09.90	+52 16.4	4.862	4.279	+0.89	-12.0	20.1	49.8
May 31	07 18.89	+50 21.2	5.023	4.339	+0.90	-11.0	20.3	43.1
June 10	07 27.88	+48 35.9	5.169	4.399	+0.89	-10.0	20.4	36.9
June 20	07 36.76	+46 59.4	5.299	4.460	+0.88	-9.2	20.5	31.1
June 30	07 45.45	+45 30.8	5.410	4.521	+0.85	-8.5	20.6	26.4
July 10	07 53.85	+44 09.3	5.501	4.584	+0.82	-7.8	20.7	23.2
July 20	08 01.89	+42 54.3	5.571	4.646	+0.78	-7.2	20.8	22.3
July 30	08 09.48	+41 45.4	5.619	4.710	+0.73	-6.6	20.9	24.0
Aug. 9	08 16.54	+40 42.5	5.645	4.773	+0.67	-6.0	20.9	28.0
Aug. 19	08 22.98	+39 45.4	5.648	4.837	+0.61	-5.4	21.0	33.6
Aug. 29	08 28.71	+38 53.9	5.630	4.902	+0.53	-4.8	21.1	40.2
Sept. 8	08 33.62	+38 08.3	5.592	4.967	+0.44	-4.2	21.1	47.5
Sept. 18	08 37.59	+37 28.4	5.535	5.032	+0.34	-3.7	21.1	55.4
Sept. 28	08 40.48	+36 54.4	5.462	5.098	+0.23	-3.1	21.2	63.7
Oct. 8	08 42.17	+36 26.2	5.375	5.164	+0.10	-2.5	21.2	72.5
Oct. 18	08 42.50	+36 03.7	5.279	5.230	-0.05	-2.0	21.2	81.7
Oct. 28	08 41.31	+35 46.4	5.178	5.296	-0.21	-1.5	21.2	91.4
Nov. 7	08 38.50	+35 33.5	5.077	5.363	-0.37	-1.1	21.2	101.5
Nov. 17	08 33.98	+35 23.9	4.982	5.430	-0.55	-0.9	21.2	112.0
Nov. 27	08 27.73	+35 15.7	4.899	5.497	-0.72	-0.8	21.3	122.8
Dec. 7	08 19.85	+35 07.0	4.834	5.564	-0.87	-1.0	21.3	134.0
Dec. 17	08 10.57	+34 55.3	4.795	5.631	-0.99	-1.4	21.3	145.2
Dec. 27	08 00.24	+34 38.6	4.786	5.699	-1.07	-2.0	21.4	156.1
Jan. 6	07 49.38	+34 15.3	4.810	5.766	-1.10	-2.7	21.4	165.1
Jan. 16	07 38.53	+33 44.6	4.871	5.834	-1.06	-3.5	21.5	166.9
Jan. 26	07 28.25	+33 07.0	4.969	5.901	-0.98	-4.1	21.6	159.6
Feb. 5	07 19.01	+32 23.6	5.101	5.969	-0.85	-4.6	21.7	149.2
Feb. 15	07 11.15	+31 36.3	5.264	6.037	-0.70	-4.9	21.8	138.2
Feb. 25	07 04.87	+30 46.8	5.454	6.105	-0.54	-5.0	21.9	127.3
Mar. 7	07 00.21	+29 56.9	5.665	6.173	-0.38	-5.0	.	116.5
Mar. 17	06 57.14	+29 07.6	5.891	6.241	-0.22	-4.9	.	106.1
Mar. 27	06 55.56	+28 19.7	6.126	6.309	-0.08	-4.7	.	96.0

## Comet C/2020 A3 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2019 July 28.95285 TT  
 Peri. = 271.10974  
 Node = 120.38622 2000.0  
 Incl. = 146.77533  
 q = 5.8380480 AU  
 e = 1.0239856

$$m1 = 7.2 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	12 24.72	-37 00.8	6.028	5.946	-0.47	-2.3	18.8	80.5
Jan. 12	12 19.32	-37 20.6	5.878	5.960	-0.63	-1.6	18.8	90.0
Jan. 22	12 12.24	-37 31.8	5.730	5.975	-0.80	-0.5	18.8	99.7
Feb. 1	12 03.51	-37 31.0	5.590	5.991	-0.96	+0.9	18.7	109.5
Feb. 11	11 53.27	-37 15.2	5.466	6.007	-1.10	+2.5	18.7	119.0
Feb. 21	11 41.84	-36 41.9	5.364	6.025	-1.19	+4.4	18.6	128.1
Mar. 2	11 29.64	-35 49.3	5.290	6.043	-1.24	+6.3	18.6	136.1
Mar. 12	11 17.25	-34 37.6	5.248	6.061	-1.23	+8.2	18.6	141.9
Mar. 22	11 05.21	-33 08.7	5.242	6.081	-1.16	+9.7	18.6	144.5
Apr. 1	10 54.06	-31 26.1	5.273	6.101	-1.05	+10.8	18.7	143.0
Apr. 11	10 44.17	-29 34.8	5.341	6.122	-0.91	+11.4	18.7	138.0
Apr. 21	10 35.80	-27 39.8	5.441	6.144	-0.75	+11.5	18.8	130.7
May 1	10 29.05	-25 46.1	5.571	6.167	-0.59	+11.1	18.8	122.2
May 11	10 23.91	-23 57.6	5.724	6.190	-0.43	+10.4	18.9	113.1
May 21	10 20.27	-22 17.4	5.895	6.214	-0.29	+9.5	19.0	103.8
May 31	10 18.00	-20 47.3	6.077	6.239	-0.16	+8.4	19.1	94.5
June 10	10 16.93	-19 28.2	6.265	6.264	-0.05	+7.3	19.2	85.3
June 20	10 16.89	-18 20.4	6.452	6.290	+0.05	+6.2	19.2	76.3
June 30	10 17.72	-17 23.8	6.635	6.317	+0.12	+5.1	19.3	67.5
July 10	10 19.24	-16 37.7	6.807	6.344	+0.19	+4.1	19.4	59.0
July 20	10 21.33	-16 01.5	6.965	6.372	+0.23	+3.1	19.5	50.8
July 30	10 23.84	-15 34.2	7.106	6.400	+0.27	+2.3	19.5	43.0
Aug. 9	10 26.65	-15 15.1	7.226	6.429	+0.29	+1.5	19.6	35.6
Aug. 19	10 29.64	-15 03.1	7.324	6.459	+0.30	+0.8	19.6	29.2
Aug. 29	10 32.70	-14 57.6	7.396	6.490	+0.30	+0.2	19.7	24.3
Sept. 8	10 35.71	-14 57.4	7.443	6.521	+0.29	-0.2	19.7	22.0
Sept. 18	10 38.57	-15 01.7	7.464	6.552	+0.27	-0.7	19.7	23.2
Sept. 28	10 41.18	-15 09.7	7.458	6.584	+0.24	-1.0	19.7	27.4
Oct. 8	10 43.41	-15 20.4	7.426	6.617	+0.20	-1.2	19.8	33.6
Oct. 18	10 45.17	-15 32.8	7.369	6.650	+0.14	-1.3	19.8	41.0
Oct. 28	10 46.32	-15 46.0	7.290	6.683	+0.08	-1.3	19.8	49.2
Nov. 7	10 46.76	-15 58.7	7.190	6.718	0.00	-1.2	19.8	58.0
Nov. 17	10 46.37	-16 09.8	7.074	6.752	-0.09	-1.0	19.7	67.2
Nov. 27	10 45.03	-16 17.9	6.946	6.787	-0.19	-0.6	19.7	76.7
Dec. 7	10 42.67	-16 21.5	6.811	6.823	-0.30	-0.1	19.7	86.5
Dec. 17	10 39.22	-16 19.2	6.674	6.859	-0.41	+0.6	19.7	96.7
Dec. 27	10 34.63	-16 09.3	6.543	6.896	-0.52	+1.5	19.7	107.1
Jan. 6	10 28.97	-15 50.5	6.422	6.933	-0.62	+2.4	19.6	117.6
Jan. 16	10 22.31	-15 21.5	6.320	6.970	-0.71	+3.5	19.6	128.1
Jan. 26	10 14.83	-14 41.9	6.243	7.008	-0.78	+4.6	19.6	138.2
Feb. 5	10 06.79	-13 51.5	6.195	7.046	-0.82	+5.6	19.6	147.4
Feb. 15	09 58.47	-12 51.4	6.181	7.085	-0.83	+6.5	19.7	154.3
Feb. 25	09 50.22	-11 43.1	6.204	7.124	-0.81	+7.2	19.7	156.6
Mar. 7	09 42.35	-10 29.0	6.264	7.163	-0.76	+7.6	19.7	153.1
Mar. 17	09 35.14	-09 11.9	6.360	7.203	-0.68	+7.8	19.8	145.6
Mar. 27	09 28.80	-07 54.5	6.489	7.243	-0.58	+7.7	19.9	136.3

## Comet C/2018 D04 (Lemmon)

Epoch = 2020 July 10.0 TT  
 T = 2019 Aug. 18.35569 TT  
 Peri. = 175.96052 e = 0.9066333  
 Node = 251.13160 2000.0 a = 25.7684421 AU  
 Incl. = 160.47412 n = 0.00753480  
 q = 2.4059144 AU P = 130.81 years

$$m1 = 10.8 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	01 00.77	-08 11.2	2.616	2.794	-0.88	-3.1	17.4	90.0
Jan. 12	00 53.67	-08 33.6	2.878	2.847	-0.52	-1.3	17.6	78.3
Jan. 22	00 49.70	-08 41.0	3.133	2.902	-0.26	-0.1	17.9	67.5
Feb. 1	00 48.10	-08 38.6	3.374	2.959	-0.06	+0.6	18.2	57.2
Feb. 11	00 48.22	-08 30.4	3.594	3.017	+0.09	+1.0	18.4	47.6
Feb. 21	00 49.63	-08 19.2	3.791	3.078	+0.20	+1.2	18.6	38.4
Mar. 2	00 51.95	-08 06.9	3.962	3.140	+0.27	+1.2	18.8	29.7
Mar. 12	00 54.91	-07 55.5	4.104	3.203	+0.32	+1.0	18.9	21.8
Mar. 22	00 58.27	-07 46.4	4.217	3.268	+0.35	+0.7	19.1	15.6
Apr. 1	01 01.83	-07 40.8	4.299	3.334	+0.36	+0.3	19.2	13.2
Apr. 11	01 05.40	-07 40.2	4.350	3.400	+0.35	-0.2	19.3	16.3
Apr. 21	01 08.84	-07 45.6	4.372	3.468	+0.33	-0.9	19.4	22.8
May 1	01 11.96	-07 58.3	4.366	3.536	+0.29	-1.7	19.5	30.7
May 11	01 14.60	-08 19.8	4.333	3.606	+0.23	-2.7	19.6	39.1
May 21	01 16.59	-08 51.2	4.275	3.675	+0.16	-3.8	19.6	48.0
May 31	01 17.73	-09 34.2	4.197	3.746	+0.06	-5.0	19.7	57.2
June 10	01 17.81	-10 30.1	4.103	3.816	-0.06	-6.3	19.7	66.7
June 20	01 16.60	-11 40.1	3.996	3.888	-0.20	-7.8	19.7	76.5
June 30	01 13.85	-13 05.3	3.884	3.959	-0.37	-9.4	19.7	86.8
July 10	01 09.29	-14 46.0	3.771	4.031	-0.56	-10.9	19.7	97.4
July 20	01 02.68	-16 41.6	3.667	4.103	-0.78	-12.3	19.8	108.4
July 30	00 53.83	-18 49.8	3.578	4.175	-1.01	-13.4	19.8	119.7
Aug. 9	00 42.67	-21 06.0	3.514	4.248	-1.24	-13.8	19.8	131.0
Aug. 19	00 29.30	-23 23.9	3.481	4.320	-1.45	-13.6	19.9	141.7
Aug. 29	00 14.08	-25 35.2	3.485	4.393	-1.60	-12.4	19.9	150.6
Sept. 8	23 57.67	-27 31.7	3.532	4.466	-1.68	-10.6	20.0	155.0
Sept. 18	23 40.90	-29 06.7	3.622	4.539	-1.66	-8.1	20.2	152.8
Sept. 28	23 24.70	-30 16.6	3.753	4.611	-1.55	-5.6	20.3	145.3
Oct. 8	23 09.92	-31 01.3	3.920	4.684	-1.38	-3.2	20.5	135.4
Oct. 18	22 57.13	-31 23.5	4.118	4.757	-1.15	-1.1	20.6	124.8
Oct. 28	22 46.65	-31 27.0	4.340	4.830	-0.92	+0.5	20.8	114.0
Nov. 7	22 38.54	-31 16.4	4.577	4.902	-0.68	+1.7	21.0	103.4
Nov. 17	22 32.70	-30 55.5	4.824	4.975	-0.47	+2.5	21.2	93.0
Nov. 27	22 28.91	-30 27.7	5.073	5.048	-0.28	+3.1	21.4	82.9
Dec. 7	22 26.89	-29 55.5	5.318	5.120	-0.11	+3.4	21.5	73.1
Dec. 17	22 26.38	-29 20.8	5.554	5.192	+0.02	+3.5	21.7	63.6
Dec. 27	22 27.11	-28 45.2	5.776	5.264	+0.13	+3.6	21.8	54.4
Jan. 6	22 28.83	-28 09.8	5.979	5.336	+0.22	+3.5	22.0	45.5
Jan. 16	22 31.34	-27 35.5	6.162	5.408	+0.29	+3.3	.	37.0
Jan. 26	22 34.43	-27 03.1	6.320	5.480	+0.33	+3.1	.	29.0
Feb. 5	22 37.92	-26 33.2	6.452	5.551	+0.37	+2.8	.	22.1
Feb. 15	22 41.67	-26 06.5	6.557	5.623	+0.38	+2.5	.	17.4
Feb. 25	22 45.52	-25 43.6	6.634	5.694	+0.39	+2.1	.	16.8
Mar. 7	22 49.33	-25 25.1	6.683	5.765	+0.38	+1.6	.	20.6
Mar. 17	22 53.00	-25 11.7	6.705	5.836	+0.35	+1.0	.	27.0
Mar. 27	22 56.38	-25 04.0	6.700	5.907	+0.32	+0.4	.	34.6

## Comet C/2018 W2 (Africano)

Epoch = 2020 July 10.0 TT  
 T = 2019 Sept. 5.71036 TT  
 Peri. = 157.97500  
 Node = 181.85375 2000.0  
 Incl. = 116.61690  
 q = 1.4547406 AU  
 e = 1.0005821

$$m1 = 10.8 + 5 \log(\Delta) + 7.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	22 02.36	-46 16.2	2.748	2.176	+1.03	-2.9	15.5	45.5
Jan. 12	22 13.11	-46 45.0	2.918	2.272	+1.13	-2.9	15.8	41.1
Jan. 22	22 24.80	-47 15.1	3.063	2.369	+1.21	-3.2	16.0	38.2
Feb. 1	22 37.28	-47 48.7	3.184	2.468	+1.29	-3.6	16.3	36.9
Feb. 11	22 50.45	-48 28.1	3.279	2.567	+1.35	-4.3	16.5	37.5
Feb. 21	23 04.25	-49 14.9	3.353	2.668	+1.41	-5.2	16.6	39.7
Mar. 2	23 18.67	-50 11.2	3.404	2.768	+1.47	-6.2	16.8	43.3
Mar. 12	23 33.70	-51 18.6	3.438	2.869	+1.54	-7.4	16.9	48.0
Mar. 22	23 49.39	-52 38.7	3.455	2.970	+1.61	-8.8	17.0	53.4
Apr. 1	00 05.84	-54 13.0	3.460	3.071	+1.69	-10.3	17.1	59.2
Apr. 11	00 23.16	-56 02.5	3.456	3.172	+1.79	-11.8	17.3	65.4
Apr. 21	00 41.56	-58 07.6	3.447	3.272	+1.91	-13.4	17.3	71.6
May 1	01 01.34	-60 28.2	3.438	3.372	+2.07	-14.9	17.4	77.8
May 11	01 22.88	-63 03.0	3.434	3.472	+2.27	-16.2	17.5	83.7
May 21	01 46.81	-65 49.4	3.439	3.571	+2.56	-17.1	17.6	89.2
May 31	02 14.01	-68 43.6	3.457	3.670	+2.95	-17.6	17.7	94.0
June 10	02 45.82	-71 39.8	3.490	3.769	+3.51	-17.5	17.8	98.0
June 20	03 24.28	-74 30.7	3.543	3.867	+4.32	-16.5	18.0	100.9
June 30	04 12.29	-77 07.0	3.616	3.964	+5.46	-14.4	18.1	102.6
July 10	05 13.26	-79 16.7	3.710	4.061	+6.92	-11.0	18.2	103.0
July 20	06 28.88	-80 46.5	3.824	4.158	+8.25	-6.3	18.4	102.1
July 30	07 53.99	-81 26.7	3.956	4.254	+8.57	-1.3	18.5	100.1
Aug. 9	09 16.25	-81 19.7	4.104	4.349	+7.62	+2.8	18.7	97.2
Aug. 19	10 25.95	-80 40.8	4.265	4.444	+6.17	+4.9	18.8	93.6
Aug. 29	11 21.63	-79 47.3	4.435	4.538	+4.90	+5.6	19.0	89.4
Sept. 8	12 06.22	-78 51.3	4.611	4.632	+3.98	+5.4	19.1	84.9
Sept. 18	12 43.07	-77 59.9	4.790	4.726	+3.36	+4.7	19.3	80.3
Sept. 28	13 14.63	-77 16.5	4.968	4.819	+2.93	+3.8	19.4	75.7
Oct. 8	13 42.56	-76 42.4	5.142	4.911	+2.64	+2.9	19.5	71.1
Oct. 18	14 07.97	-76 18.1	5.310	5.003	+2.43	+1.9	19.7	66.9
Oct. 28	14 31.56	-76 03.3	5.468	5.094	+2.28	+1.0	19.8	63.0
Nov. 7	14 53.78	-75 57.7	5.614	5.185	+2.16	+0.1	19.9	59.7
Nov. 17	15 14.96	-76 00.8	5.747	5.276	+2.07	-0.8	20.0	57.1
Nov. 27	15 35.27	-76 12.0	5.866	5.366	+1.99	-1.6	20.1	55.3
Dec. 7	15 54.79	-76 30.9	5.969	5.455	+1.91	-2.3	20.2	54.4
Dec. 17	16 13.56	-76 57.3	6.056	5.544	+1.83	-3.0	20.3	54.6
Dec. 27	16 31.52	-77 30.8	6.126	5.633	+1.75	-3.7	20.4	55.8
Jan. 6	16 48.55	-78 11.4	6.181	5.721	+1.65	-4.4	20.4	58.0
Jan. 16	17 04.45	-78 59.0	6.221	5.809	+1.51	-5.1	20.5	61.0
Jan. 26	17 18.83	-79 53.6	6.248	5.896	+1.34	-5.8	20.6	64.7
Feb. 5	17 31.13	-80 55.1	6.264	5.983	+1.08	-6.5	20.6	69.0
Feb. 15	17 40.35	-82 03.3	6.270	6.069	+0.69	-7.2	20.7	73.8
Feb. 25	17 44.55	-83 17.5	6.270	6.155	+0.02	-7.7	20.7	78.8
Mar. 7	17 39.80	-84 36.3	6.267	6.240	-1.25	-8.0	20.7	83.9
Mar. 17	17 16.73	-85 56.0	6.263	6.326	-4.03	-7.7	20.8	89.1
Mar. 27	16 12.10	-87 04.9	6.262	6.410	-10.21	-5.3	20.8	94.1

Comet 260P/McNaught

Epoch = 2020 July 10.0 TT  
 T = 2019 Sept. 9.98036 TT  
 Peri. = 18.40008 e = 0.6089127  
 Node = 349.34679 2000.0 a = 3.6221971 AU  
 Incl. = 15.05291 n = 0.14297034  
 q = 1.4165953 AU P = 6.89 years

$$m1 = 11.0 + 5 \log(\Delta) + 15.0 \log(r(t-15))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	02 48.44	+43 35.7	1.107	1.874	+1.31	-8.5	15.0	127.4
Jan. 12	03 02.50	+42 15.8	1.239	1.940	+1.51	-7.4	15.4	121.2
Jan. 22	03 18.30	+41 07.1	1.383	2.007	+1.66	-6.3	15.9	114.9
Feb. 1	03 35.36	+40 08.9	1.538	2.075	+1.76	-5.3	16.4	108.7
Feb. 11	03 53.31	+39 19.3	1.702	2.144	+1.83	-4.6	16.8	102.5
Feb. 21	04 11.85	+38 35.9	1.874	2.213	+1.88	-4.1	17.2	96.3
Mar. 2	04 30.77	+37 56.8	2.051	2.282	+1.91	-3.7	17.6	90.3
Mar. 12	04 49.90	+37 20.0	2.233	2.352	+1.92	-3.6	18.0	84.3
Mar. 22	05 09.09	+36 44.0	2.417	2.421	+1.92	-3.6	18.4	78.3
Apr. 1	05 28.23	+36 07.4	2.602	2.490	+1.91	-3.7	18.7	72.4
Apr. 11	05 47.23	+35 29.2	2.785	2.558	+1.89	-3.9	19.1	66.6
Apr. 21	06 06.00	+34 48.7	2.965	2.626	+1.86	-4.2	19.4	60.8
May 1	06 24.49	+34 05.4	3.141	2.694	+1.83	-4.5	19.7	55.1
May 11	06 42.62	+33 19.2	3.310	2.760	+1.79	-4.8	20.0	49.3
May 21	07 00.35	+32 29.8	3.472	2.827	+1.75	-5.1	20.2	43.6
May 31	07 17.66	+31 37.3	3.624	2.892	+1.71	-5.4	20.5	37.9
June 10	07 34.50	+30 42.0	3.765	2.957	+1.66	-5.7	20.7	32.2
June 20	07 50.85	+29 44.0	3.895	3.020	+1.61	-5.9	20.9	26.6
June 30	08 06.71	+28 43.8	4.011	3.084	+1.56	-6.1	21.1	21.0
July 10	08 22.03	+27 41.7	4.113	3.146	+1.50	-6.3	21.3	15.6
July 20	08 36.83	+26 38.1	4.200	3.207	+1.45	-6.4	21.5	10.7
July 30	08 51.07	+25 33.7	4.271	3.268	+1.39	-6.5	21.7	7.7
Aug. 9	09 04.74	+24 29.0	4.325	3.328	+1.34	-6.5	21.8	9.0
Aug. 19	09 17.83	+23 24.5	4.362	3.387	+1.28	-6.4	22.0	13.6
Aug. 29	09 30.30	+22 20.9	4.381	3.445	+1.21	-6.3	.	19.4
Sept. 8	09 42.11	+21 19.0	4.382	3.502	+1.14	-6.1	.	25.8
Sept. 18	09 53.24	+20 19.3	4.365	3.558	+1.07	-5.8	.	32.4
Sept. 28	10 03.62	+19 22.8	4.332	3.614	+0.99	-5.4	.	39.4
Oct. 8	10 13.18	+18 30.2	4.281	3.669	+0.91	-5.0	.	46.7
Oct. 18	10 21.84	+17 42.5	4.215	3.723	+0.81	-4.5	.	54.3
Oct. 28	10 29.51	+17 00.6	4.136	3.776	+0.71	-3.8	.	62.2
Nov. 7	10 36.05	+16 25.5	4.044	3.828	+0.59	-3.1	.	70.4
Nov. 17	10 41.35	+15 58.0	3.944	3.879	+0.46	-2.3	.	79.1
Nov. 27	10 45.26	+15 39.1	3.837	3.930	+0.31	-1.4	.	88.1
Dec. 7	10 47.62	+15 29.5	3.729	3.980	+0.15	-0.4	.	97.6
Dec. 17	10 48.31	+15 29.5	3.622	4.029	-0.03	+0.5	.	107.5
Dec. 27	10 47.22	+15 39.2	3.524	4.077	-0.21	+1.5	.	117.9
Jan. 6	10 44.32	+15 57.6	3.438	4.125	-0.39	+2.3	.	128.7
Jan. 16	10 39.69	+16 23.5	3.370	4.171	-0.55	+2.9	.	139.9
Jan. 26	10 33.51	+16 54.3	3.327	4.217	-0.69	+3.2	.	151.4
Feb. 5	10 26.15	+17 26.9	3.311	4.262	-0.78	+3.2	.	162.7
Feb. 15	10 18.11	+17 58.1	3.326	4.307	-0.82	+2.9	.	172.2
Feb. 25	10 09.95	+18 24.8	3.374	4.350	-0.80	+2.3	.	169.3
Mar. 7	10 02.26	+18 44.6	3.453	4.393	-0.72	+1.5	.	158.8
Mar. 17	09 55.53	+18 56.1	3.563	4.435	-0.60	+0.7	.	147.7
Mar. 27	09 50.14	+18 58.9	3.698	4.477	-0.46	-0.2	.	136.7

## Comet 384P/Kowalski

Epoch = 2020 July 10.0 TT  
 T = 2019 Oct. 11.41576 TT  
 Peri. = 37.64103 e = 0.6153496  
 Node = 354.22696 2000.0 a = 2.9017128 AU  
 Incl. = 7.28191 n = 0.19939875  
 q = 1.1161450 AU P = 4.94 years

$$m_1 = 19.1 + 5 \log(\Delta) + 7.5 \log(r(t-30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	07 27.32	+41 39.8	0.540	1.501	-1.62	-9.9	18.6	159.5
Jan. 12	07 12.78	+39 50.3	0.613	1.577	-1.21	-11.9	19.0	161.6
Jan. 22	07 02.92	+37 47.7	0.705	1.654	-0.70	-12.4	19.5	156.5
Feb. 1	06 58.28	+35 45.5	0.815	1.733	-0.19	-11.8	20.0	148.3
Feb. 11	06 58.38	+33 52.0	0.943	1.811	+0.24	-10.7	20.5	139.6
Feb. 21	07 02.31	+32 09.5	1.087	1.890	+0.57	-9.6	20.9	131.1
Mar. 2	07 09.23	+30 37.4	1.244	1.968	+0.83	-8.7	21.4	123.0
Mar. 12	07 18.40	+29 13.6	1.413	2.046	+1.01	-8.0	21.8	115.3
Mar. 22	07 29.19	+27 55.6	1.591	2.123	+1.15	-7.6	.	108.0
Apr. 1	07 41.18	+26 41.2	1.777	2.199	+1.25	-7.3	.	101.0
Apr. 11	07 54.01	+25 28.8	1.967	2.274	+1.32	-7.2	.	94.3
Apr. 21	08 07.40	+24 16.8	2.161	2.347	+1.36	-7.2	.	87.8
May 1	08 21.16	+23 04.4	2.356	2.420	+1.39	-7.3	.	81.4
May 11	08 35.13	+21 50.9	2.551	2.491	+1.40	-7.4	.	75.1
May 21	08 49.19	+20 36.0	2.743	2.561	+1.41	-7.6	.	69.0
May 31	09 03.26	+19 19.3	2.931	2.629	+1.40	-7.8	.	62.9
June 10	09 17.25	+18 00.9	3.113	2.696	+1.39	-7.9	.	56.9
June 20	09 31.13	+16 40.9	3.288	2.762	+1.38	-8.1	.	50.9
June 30	09 44.86	+15 19.4	3.453	2.826	+1.36	-8.2	.	44.9
July 10	09 58.41	+13 56.6	3.608	2.889	+1.34	-8.3	.	39.0
July 20	10 11.74	+12 32.8	3.752	2.951	+1.32	-8.4	.	32.9
July 30	10 24.86	+11 08.4	3.882	3.012	+1.30	-8.5	.	26.9
Aug. 9	10 37.74	+09 43.6	3.997	3.071	+1.27	-8.5	.	20.8
Aug. 19	10 50.36	+08 18.8	4.097	3.128	+1.25	-8.5	.	14.6
Aug. 29	11 02.70	+06 54.4	4.181	3.185	+1.22	-8.4	.	8.3
Sept. 8	11 14.75	+05 30.9	4.247	3.240	+1.19	-8.3	.	2.0
Sept. 18	11 26.48	+04 08.6	4.295	3.294	+1.15	-8.1	.	4.6
Sept. 28	11 37.85	+02 48.0	4.324	3.347	+1.12	-7.9	.	11.2
Oct. 8	11 48.82	+01 29.7	4.334	3.399	+1.07	-7.7	.	18.0
Oct. 18	11 59.35	+00 14.2	4.326	3.449	+1.03	-7.4	.	25.0
Oct. 28	12 09.36	+00 58.1	4.298	3.498	+0.97	-7.0	.	32.2
Nov. 7	12 18.78	-02 06.5	4.253	3.546	+0.91	-6.6	.	39.6
Nov. 17	12 27.52	-03 10.4	4.190	3.593	+0.83	-6.1	.	47.2
Nov. 27	12 35.45	-04 09.1	4.111	3.639	+0.74	-5.6	.	55.1
Dec. 7	12 42.45	-05 01.9	4.019	3.683	+0.64	-4.9	.	63.3
Dec. 17	12 48.38	-05 48.0	3.914	3.727	+0.53	-4.2	.	71.8
Dec. 27	12 53.08	-06 26.7	3.801	3.769	+0.39	-3.4	.	80.7
Jan. 6	12 56.37	-06 57.1	3.682	3.810	+0.25	-2.5	.	89.9
Jan. 16	12 58.09	-07 18.2	3.562	3.851	+0.08	-1.6	.	99.6
Jan. 26	12 58.10	-07 29.4	3.446	3.890	-0.10	-0.5	.	109.7
Feb. 5	12 56.32	-07 29.9	3.338	3.928	-0.28	+0.5	.	120.2
Feb. 15	12 52.74	-07 19.4	3.244	3.965	-0.45	+1.6	.	131.2
Feb. 25	12 47.48	-06 58.3	3.169	4.001	-0.61	+2.7	.	142.6
Mar. 7	12 40.82	-06 27.7	3.118	4.036	-0.73	+3.5	.	154.4
Mar. 17	12 33.17	-05 49.4	3.097	4.070	-0.80	+4.1	.	166.3
Mar. 27	12 25.06	-05 06.6	3.106	4.103	-0.81	+4.4	.	177.3

## Comet 76P/West-Kohoutek-Ikemura

Epoch = 2020 July 10.0 TT  
 T = 2019 Oct. 26.10877 TT  
 Peri. = 0.00195 e = 0.5381204  
 Node = 84.12366 2000.0 a = 3.4741054 AU  
 Incl. = 30.45676 n = 0.15220874  
 q = 1.6046184 AU P = 6.48 years

$$m_1 = 13.8 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	' .		°
Jan. 2	10 40.15	+47 03.5	0.951	1.738	+1.13	+29.0	17.3	128.0
Jan. 12	10 49.09	+51 42.8	0.964	1.777	+0.58	+26.3	17.5	131.6
Jan. 22	10 52.13	+55 46.8	0.996	1.819	-0.05	+21.7	17.7	133.5
Feb. 1	10 48.90	+58 57.4	1.044	1.865	-0.64	+15.6	18.0	133.5
Feb. 11	10 40.54	+61 02.0	1.108	1.913	-1.03	+8.6	18.2	131.9
Feb. 21	10 29.53	+61 56.9	1.186	1.964	-1.12	+1.7	18.6	128.9
Mar. 2	10 19.07	+61 46.4	1.277	2.017	-0.90	-4.2	18.9	125.1
Mar. 12	10 11.74	+60 42.1	1.378	2.071	-0.51	-8.8	19.2	120.8
Mar. 22	10 08.58	+58 57.8	1.490	2.127	-0.08	-12.2	19.6	116.1
Apr. 1	10 09.55	+56 45.4	1.611	2.183	+0.30	-14.4	19.9	111.3
Apr. 11	10 14.01	+54 14.9	1.741	2.241	+0.60	-15.8	20.3	106.4
Apr. 21	10 21.12	+51 33.2	1.877	2.299	+0.83	-16.6	20.6	101.5
May 1	10 30.20	+48 45.0	2.019	2.358	+0.99	-17.0	20.9	96.6
May 11	10 40.67	+45 54.1	2.166	2.416	+1.10	-17.1	21.2	91.7
May 21	10 52.09	+43 02.8	2.317	2.475	+1.18	-17.1	21.5	86.7
May 31	11 04.17	+40 12.6	2.472	2.534	+1.24	-16.9	21.8	81.8
June 10	11 16.69	+37 25.1	2.628	2.593	+1.27	-16.6	.	76.9
June 20	11 29.49	+34 41.0	2.784	2.651	+1.29	-16.2	.	71.9
June 30	11 42.47	+32 01.0	2.940	2.710	+1.31	-15.7	.	67.0
July 10	11 55.55	+29 25.7	3.094	2.768	+1.31	-15.3	.	62.0
July 20	12 08.69	+26 55.5	3.245	2.825	+1.32	-14.7	.	57.1
July 30	12 21.85	+24 30.8	3.391	2.882	+1.32	-14.2	.	52.1
Aug. 9	12 35.01	+22 11.9	3.532	2.939	+1.31	-13.6	.	47.2
Aug. 19	12 48.14	+19 59.0	3.664	2.995	+1.31	-12.9	.	42.3
Aug. 29	13 01.24	+17 52.5	3.788	3.050	+1.31	-12.3	.	37.5
Sept. 8	13 14.27	+15 52.7	3.902	3.105	+1.30	-11.6	.	32.9
Sept. 18	13 27.25	+13 59.8	4.005	3.159	+1.29	-10.9	.	28.6
Sept. 28	13 40.13	+12 14.0	4.095	3.212	+1.28	-10.2	.	24.8
Oct. 8	13 52.89	+10 35.8	4.171	3.265	+1.27	-9.4	.	21.9
Oct. 18	14 05.51	+09 05.4	4.232	3.317	+1.25	-8.6	.	20.5
Oct. 28	14 17.93	+07 43.1	4.278	3.369	+1.23	-7.8	.	20.9
Nov. 7	14 30.11	+06 29.2	4.308	3.420	+1.20	-6.9	.	23.2
Nov. 17	14 41.99	+05 23.9	4.321	3.470	+1.17	-6.0	.	27.1
Nov. 27	14 53.50	+04 27.7	4.317	3.519	+1.13	-5.1	.	32.0
Dec. 7	15 04.55	+03 40.5	4.297	3.568	+1.08	-4.2	.	37.7
Dec. 17	15 15.04	+03 02.8	4.260	3.616	+1.01	-3.3	.	43.9
Dec. 27	15 24.87	+02 34.5	4.207	3.663	+0.94	-2.3	.	50.6
Jan. 6	15 33.89	+02 15.6	4.141	3.710	+0.85	-1.4	.	57.7
Jan. 16	15 41.99	+02 06.2	4.062	3.755	+0.75	-0.4	.	65.1
Jan. 26	15 48.99	+02 05.9	3.972	3.800	+0.63	+0.5	.	72.8
Feb. 5	15 54.75	+02 14.3	3.875	3.845	+0.50	+1.3	.	80.9
Feb. 15	15 59.10	+02 30.8	3.773	3.888	+0.35	+2.1	.	89.3
Feb. 25	16 01.88	+02 54.3	3.670	3.931	+0.19	+2.7	.	98.0
Mar. 7	16 02.95	+03 23.5	3.570	3.973	+0.01	+3.2	.	106.9
Mar. 17	16 02.23	+03 56.7	3.476	4.015	-0.17	+3.4	.	116.1
Mar. 27	15 59.67	+04 31.3	3.395	4.056	-0.35	+3.4	.	125.4

## Comet 68P/Klemola

Epoch = 2020 July 10.0 TT  
 T = 2019 Nov. 9.06438 TT  
 Peri. = 153.07434 e = 0.6375535  
 Node = 175.07924 2000.0 a = 4.9496604 AU  
 Incl. = 11.11045 n = 0.08950370  
 q = 1.7939871 AU P = 11.01 years

$$m_1 = 10.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	22 14.66	-10 58.5	2.335	1.876	+2.57	+9.7	15.1	50.9
Jan. 12	22 40.03	-09 17.1	2.436	1.908	+2.50	+10.6	15.2	47.1
Jan. 22	23 04.76	-07 28.1	2.540	1.944	+2.44	+11.2	15.4	43.3
Feb. 1	23 28.84	-05 34.4	2.645	1.985	+2.37	+11.5	15.6	39.4
Feb. 11	23 52.24	-03 38.4	2.750	2.028	+2.30	+11.6	15.8	35.4
Feb. 21	00 15.00	-01 42.6	2.855	2.075	+2.24	+11.5	15.9	31.4
Mar. 2	00 37.16	+00 11.3	2.958	2.125	+2.18	+11.2	16.1	27.2
Mar. 12	00 58.74	+02 01.4	3.057	2.178	+2.13	+10.7	16.3	23.0
Mar. 22	01 19.79	+03 46.4	3.153	2.232	+2.08	+10.2	16.5	18.8
Apr. 1	01 40.32	+05 25.1	3.242	2.289	+2.03	+9.5	16.7	14.5
Apr. 11	02 00.35	+06 56.5	3.325	2.347	+1.98	+8.7	16.8	10.4
Apr. 21	02 19.90	+08 19.9	3.401	2.406	+1.93	+7.9	17.0	6.9
May 1	02 38.96	+09 34.9	3.467	2.467	+1.88	+7.0	17.1	5.6
May 11	02 57.51	+10 41.0	3.524	2.528	+1.83	+6.1	17.3	8.0
May 21	03 15.55	+11 37.9	3.571	2.590	+1.77	+5.2	17.4	12.2
May 31	03 33.02	+12 25.7	3.606	2.653	+1.71	+4.3	17.5	17.0
June 10	03 49.89	+13 04.2	3.630	2.717	+1.65	+3.4	17.6	22.2
June 20	04 06.09	+13 33.7	3.641	2.780	+1.58	+2.5	17.7	27.6
June 30	04 21.57	+13 54.3	3.639	2.844	+1.50	+1.6	17.8	33.2
July 10	04 36.23	+14 06.4	3.626	2.908	+1.42	+0.8	17.9	39.1
July 20	04 50.01	+14 10.5	3.599	2.972	+1.32	0.0	18.0	45.2
July 30	05 02.78	+14 06.8	3.561	3.036	+1.22	-0.8	18.1	51.6
Aug. 9	05 14.43	+13 56.2	3.511	3.100	+1.10	-1.4	18.1	58.2
Aug. 19	05 24.86	+13 39.1	3.451	3.163	+0.97	-2.0	18.2	65.2
Aug. 29	05 33.89	+13 16.4	3.382	3.227	+0.82	-2.6	18.2	72.6
Sept. 8	05 41.40	+12 48.8	3.306	3.290	+0.66	-3.0	18.3	80.3
Sept. 18	05 47.23	+12 17.3	3.226	3.353	+0.48	-3.3	18.3	88.5
Sept. 28	05 51.20	+11 42.9	3.144	3.416	+0.29	-3.5	18.3	97.1
Oct. 8	05 53.21	+11 07.0	3.064	3.478	+0.09	-3.6	18.3	106.2
Oct. 18	05 53.15	+10 30.7	2.991	3.540	-0.12	-3.6	18.4	115.8
Oct. 28	05 51.02	+09 55.9	2.928	3.601	-0.32	-3.3	18.4	125.8
Nov. 7	05 46.93	+09 24.0	2.882	3.662	-0.51	-3.0	18.4	136.2
Nov. 17	05 41.14	+08 56.9	2.857	3.723	-0.66	-2.4	18.5	146.7
Nov. 27	05 34.08	+08 36.2	2.857	3.783	-0.75	-1.7	18.6	156.6
Dec. 7	05 26.32	+08 23.2	2.886	3.843	-0.79	-0.8	18.6	163.9
Dec. 17	05 18.50	+08 18.6	2.946	3.902	-0.76	0.0	18.8	164.2
Dec. 27	05 11.26	+08 22.6	3.036	3.961	-0.67	+0.9	18.9	157.1
Jan. 6	05 05.13	+08 34.5	3.155	4.019	-0.54	+1.6	19.0	147.5
Jan. 16	05 00.47	+08 53.4	3.300	4.077	-0.38	+2.2	19.2	137.2
Jan. 26	04 57.50	+09 17.8	3.466	4.134	-0.20	+2.7	19.4	127.0
Feb. 5	04 56.27	+09 46.3	3.649	4.191	-0.03	+3.0	19.5	117.0
Feb. 15	04 56.73	+10 17.3	3.845	4.247	+0.14	+3.2	19.7	107.4
Feb. 25	04 58.76	+10 49.6	4.049	4.303	+0.28	+3.2	19.9	98.1
Mar. 7	05 02.21	+11 21.9	4.257	4.358	+0.42	+3.2	20.0	89.2
Mar. 17	05 06.89	+11 53.3	4.464	4.413	+0.53	+3.1	20.2	80.6
Mar. 27	05 12.64	+12 22.9	4.668	4.467	+0.63	+2.8	20.3	72.3

## Comet C/2018 N2 (ASASSN)

Epoch = 2020 July 10.0 TT  
 T = 2019 Nov. 10.95921 TT  
 Peri. = 24.39732  
 Node = 25.25385 2000.0  
 Incl. = 77.52841  
 q = 3.1246402 AU  
 e = 1.0000965

$$m1 = 3.6 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	23 29.57	+39 46.2	2.993	3.165	-0.07	+2.9	12.2	90.9
Jan. 12	23 29.93	+40 22.1	3.142	3.182	+0.16	+4.4	12.4	83.4
Jan. 22	23 32.47	+41 12.8	3.285	3.202	+0.36	+5.9	12.5	76.5
Feb. 1	23 36.80	+42 18.5	3.419	3.224	+0.52	+7.4	12.6	70.4
Feb. 11	23 42.60	+43 39.0	3.543	3.250	+0.65	+8.8	12.7	64.9
Feb. 21	23 49.64	+45 13.6	3.656	3.277	+0.77	+10.2	12.9	60.1
Mar. 2	23 57.74	+47 01.8	3.755	3.308	+0.86	+11.5	13.0	56.2
Mar. 12	00 06.76	+49 02.9	3.842	3.340	+0.95	+12.8	13.1	53.0
Mar. 22	00 16.64	+51 16.0	3.917	3.375	+1.03	+14.0	13.2	50.7
Apr. 1	00 27.32	+53 40.7	3.980	3.412	+1.11	+15.1	13.3	49.2
Apr. 11	00 38.82	+56 16.1	4.032	3.452	+1.20	+16.1	13.4	48.6
Apr. 21	00 51.22	+59 01.3	4.074	3.493	+1.29	+17.0	13.4	48.7
May 1	01 04.67	+61 55.5	4.107	3.536	+1.41	+17.9	13.5	49.5
May 11	01 19.41	+64 57.6	4.134	3.581	+1.56	+18.6	13.6	50.7
May 21	01 35.93	+68 06.3	4.156	3.628	+1.78	+19.2	13.7	52.4
May 31	01 55.03	+71 20.0	4.174	3.676	+2.10	+19.6	13.8	54.3
June 10	02 18.23	+74 36.3	4.191	3.726	+2.65	+19.7	13.9	56.4
June 20	02 48.72	+77 52.0	4.206	3.778	+3.67	+19.3	13.9	58.6
June 30	03 33.71	+81 00.4	4.223	3.830	+5.84	+18.0	14.0	60.7
July 10	04 51.70	+83 45.4	4.242	3.884	+10.96	+13.9	14.1	62.8
July 20	07 16.80	+85 20.4	4.264	3.939	+18.11	+2.5	14.2	64.8
July 30	10 05.98	+84 40.1	4.290	3.996	+13.31	-10.7	14.3	66.6
Aug. 9	11 46.88	+82 24.6	4.319	4.053	+6.97	-15.8	14.4	68.2
Aug. 19	12 42.14	+79 39.6	4.352	4.111	+4.20	-17.0	14.5	69.7
Aug. 29	13 17.79	+76 50.2	4.389	4.171	+2.96	-16.8	14.6	71.0
Sept. 8	13 44.22	+74 05.6	4.429	4.231	+2.33	-16.0	14.7	72.2
Sept. 18	14 05.77	+71 30.2	4.472	4.292	+1.97	-14.9	14.8	73.2
Sept. 28	14 24.41	+69 06.8	4.517	4.353	+1.75	-13.6	14.9	74.3
Oct. 8	14 41.15	+66 57.3	4.562	4.415	+1.59	-12.1	15.0	75.3
Oct. 18	14 56.56	+65 03.1	4.608	4.478	+1.48	-10.5	15.1	76.3
Oct. 28	15 10.93	+63 25.4	4.653	4.542	+1.39	-8.8	15.2	77.4
Nov. 7	15 24.41	+62 04.9	4.697	4.606	+1.30	-7.1	15.3	78.7
Nov. 17	15 37.09	+61 02.3	4.739	4.670	+1.22	-5.3	15.3	80.0
Nov. 27	15 48.94	+60 17.8	4.779	4.735	+1.14	-3.4	15.4	81.5
Dec. 7	15 59.92	+59 51.5	4.816	4.801	+1.05	-1.6	15.5	83.2
Dec. 17	16 09.93	+59 43.1	4.851	4.867	+0.94	+0.1	15.6	85.1
Dec. 27	16 18.82	+59 52.3	4.885	4.933	+0.82	+1.8	15.7	87.0
Jan. 6	16 26.38	+60 17.9	4.917	4.999	+0.68	+3.4	15.8	89.1
Jan. 16	16 32.38	+60 58.8	4.950	5.066	+0.50	+4.9	15.9	91.1
Jan. 26	16 36.50	+61 53.1	4.983	5.133	+0.29	+6.1	16.0	93.2
Feb. 5	16 38.36	+62 58.3	5.019	5.200	+0.05	+7.0	16.1	95.1
Feb. 15	16 37.54	+64 11.4	5.058	5.268	-0.25	+7.6	16.1	96.8
Feb. 25	16 33.54	+65 28.5	5.103	5.335	-0.59	+7.7	16.2	98.2
Mar. 7	16 25.88	+66 44.5	5.154	5.403	-0.98	+7.4	16.3	99.3
Mar. 17	16 14.20	+67 54.1	5.213	5.471	-1.40	+6.4	16.4	99.8
Mar. 27	15 58.43	+68 50.9	5.280	5.540	-1.79	+4.7	16.5	99.9

## Comet 155P/Shoemaker

Epoch = 2020 July 10.0 TT  
 T = 2019 Nov. 14.99039 TT  
 Peri. = 14.65490 e = 0.7264050  
 Node = 97.19763 2000.0 a = 6.5854632 AU  
 Incl. = 6.39591 n = 0.05832095  
 q = 1.8017498 AU P = 16.90 years

$$m_1 = 10.3 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	11 14.29	+11 41.4	1.227	1.876	+1.06	+0.1	14.8	115.7
Jan. 12	11 23.35	+11 51.6	1.178	1.908	+0.71	+2.2	14.9	123.7
Jan. 22	11 28.87	+12 22.5	1.140	1.946	+0.35	+4.2	14.9	132.6
Feb. 1	11 30.73	+13 11.4	1.116	1.989	-0.01	+5.7	15.0	142.3
Feb. 11	11 29.27	+14 11.6	1.109	2.035	-0.31	+6.3	15.2	152.4
Feb. 21	11 25.18	+15 14.0	1.122	2.086	-0.52	+6.0	15.3	162.2
Mar. 2	11 19.55	+16 08.3	1.159	2.140	-0.60	+4.6	15.6	168.8
Mar. 12	11 13.71	+16 45.9	1.219	2.196	-0.55	+2.6	15.9	166.0
Mar. 22	11 08.82	+17 02.4	1.303	2.256	-0.40	+0.4	16.2	157.5
Apr. 1	11 05.72	+16 56.9	1.409	2.317	-0.19	-1.7	16.5	147.9
Apr. 11	11 04.82	+16 31.3	1.535	2.380	+0.04	-3.5	16.9	138.6
Apr. 21	11 06.17	+15 49.1	1.678	2.445	+0.25	-5.0	17.2	129.7
May 1	11 09.62	+14 53.6	1.835	2.512	+0.45	-6.2	17.6	121.4
May 11	11 14.88	+13 47.7	2.005	2.579	+0.61	-7.0	18.0	113.5
May 21	11 21.64	+12 34.3	2.184	2.648	+0.75	-7.7	18.3	106.0
May 31	11 29.64	+11 15.0	2.371	2.717	+0.86	-8.2	18.7	98.8
June 10	11 38.61	+09 51.5	2.562	2.786	+0.94	-8.5	19.0	91.9
June 20	11 48.36	+08 25.3	2.757	2.856	+1.01	-8.7	19.3	85.1
June 30	11 58.71	+06 57.1	2.953	2.927	+1.06	-8.9	19.6	78.6
July 10	12 09.54	+05 27.9	3.148	2.998	+1.10	-8.9	19.9	72.2
July 20	12 20.73	+03 58.5	3.341	3.068	+1.14	-8.9	20.2	65.8
July 30	12 32.21	+02 29.4	3.529	3.139	+1.16	-8.9	20.5	59.5
Aug. 9	12 43.89	+01 01.3	3.712	3.210	+1.18	-8.7	20.7	53.3
Aug. 19	12 55.74	+00 25.3	3.886	3.281	+1.19	-8.6	21.0	47.0
Aug. 29	13 07.71	-01 50.0	4.051	3.351	+1.20	-8.3	21.2	40.7
Sept. 8	13 19.74	-03 12.2	4.205	3.422	+1.21	-8.1	21.4	34.4
Sept. 18	13 31.80	-04 31.7	4.347	3.492	+1.21	-7.8	21.6	28.0
Sept. 28	13 43.85	-05 47.9	4.474	3.562	+1.20	-7.4	21.8	21.6
Oct. 8	13 55.84	-07 00.4	4.586	3.631	+1.19	-7.0	22.0	15.2
Oct. 18	14 07.74	-08 09.0	4.682	3.701	+1.18	-6.6	.	9.0
Oct. 28	14 19.49	-09 13.2	4.759	3.770	+1.16	-6.2	.	4.5
Nov. 7	14 31.03	-10 12.8	4.819	3.838	+1.14	-5.7	.	7.5
Nov. 17	14 42.29	-11 07.5	4.859	3.906	+1.11	-5.2	.	13.9
Nov. 27	14 53.20	-11 57.1	4.880	3.974	+1.07	-4.7	.	20.9
Dec. 7	15 03.66	-12 41.3	4.882	4.042	+1.02	-4.1	.	28.3
Dec. 17	15 13.59	-13 20.1	4.866	4.109	+0.96	-3.6	.	35.9
Dec. 27	15 22.87	-13 53.3	4.831	4.175	+0.89	-3.0	.	43.7
Jan. 6	15 31.39	-14 20.9	4.780	4.241	+0.81	-2.5	.	51.7
Jan. 16	15 39.01	-14 43.0	4.715	4.307	+0.71	-1.9	.	59.9
Jan. 26	15 45.61	-14 59.5	4.637	4.372	+0.60	-1.4	.	68.5
Feb. 5	15 51.06	-15 10.7	4.549	4.437	+0.48	-0.8	.	77.3
Feb. 15	15 55.21	-15 16.8	4.455	4.501	+0.34	-0.3	.	86.3
Feb. 25	15 57.96	-15 17.9	4.359	4.565	+0.19	+0.2	.	95.7
Mar. 7	15 59.20	-15 14.3	4.265	4.629	+0.04	+0.6	.	105.4
Mar. 17	15 58.90	-15 06.4	4.177	4.692	-0.12	+1.0	.	115.5
Mar. 27	15 57.07	-14 54.6	4.101	4.754	-0.26	+1.4	.	125.8

Comet 160P/LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2019 Dec. 2.30765 TT  
 Peri. = 12.66219 e = 0.5261716  
 Node = 333.36553 2000.0 a = 3.7722986 AU  
 Incl. = 15.61574 n = 0.13452252  
 q = 1.7874222 AU P = 7.33 years

$$m_1 = 0.6 + 5 \log(\Delta) + 50.0 \log(r(t-20))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	22 16.55	-04 17.8	2.205	1.810	+2.27	+18.2	15.0	53.9
Jan. 12	22 39.20	-01 15.5	2.292	1.827	+2.26	+18.3	15.1	50.3
Jan. 22	23 01.83	+01 47.3	2.380	1.848	+2.26	+18.3	15.4	46.6
Feb. 1	23 24.45	+04 49.1	2.469	1.874	+2.26	+18.1	15.6	43.0
Feb. 11	23 47.03	+07 48.2	2.558	1.903	+2.26	+17.7	16.0	39.5
Feb. 21	00 09.59	+10 43.0	2.647	1.936	+2.26	+17.2	16.3	35.9
Mar. 2	00 32.17	+13 31.9	2.736	1.972	+2.26	+16.5	16.8	32.4
Mar. 12	00 54.76	+16 13.5	2.823	2.011	+2.26	+15.7	17.2	28.8
Mar. 22	01 17.38	+18 46.6	2.909	2.052	+2.26	+14.8	17.7	25.3
Apr. 1	01 40.04	+21 10.3	2.991	2.096	+2.27	+13.8	18.1	21.8
Apr. 11	02 02.72	+23 23.4	3.069	2.142	+2.27	+12.7	18.6	18.4
Apr. 21	02 25.41	+25 25.5	3.143	2.190	+2.27	+11.6	19.2	15.3
May 1	02 48.08	+27 16.0	3.211	2.239	+2.26	+10.4	19.7	12.7
May 11	03 10.67	+28 54.6	3.272	2.289	+2.25	+9.2	20.2	11.0
May 21	03 33.12	+30 21.2	3.326	2.341	+2.23	+8.0	20.7	11.0
May 31	03 55.35	+31 36.0	3.372	2.393	+2.21	+6.8	21.2	12.7
June 10	04 17.27	+32 39.2	3.408	2.446	+2.17	+5.7	21.7	15.7
June 20	04 38.78	+33 31.4	3.435	2.500	+2.12	+4.6	.	19.5
June 30	04 59.76	+34 13.4	3.451	2.554	+2.07	+3.7	.	23.8
July 10	05 20.11	+34 46.0	3.456	2.609	+2.00	+2.8	.	28.6
July 20	05 39.71	+35 10.4	3.449	2.663	+1.91	+2.0	.	33.6
July 30	05 58.43	+35 27.9	3.431	2.718	+1.82	+1.4	.	39.0
Aug. 9	06 16.16	+35 39.6	3.402	2.773	+1.71	+0.9	.	44.6
Aug. 19	06 32.79	+35 47.3	3.360	2.828	+1.60	+0.6	.	50.6
Aug. 29	06 48.15	+35 52.4	3.308	2.882	+1.46	+0.4	.	56.8
Sept. 8	07 02.12	+35 56.6	3.245	2.937	+1.31	+0.4	.	63.4
Sept. 18	07 14.54	+36 01.4	3.174	2.991	+1.15	+0.6	.	70.4
Sept. 28	07 25.21	+36 08.6	3.094	3.045	+0.96	+0.9	.	77.8
Oct. 8	07 33.95	+36 19.4	3.009	3.098	+0.76	+1.3	.	85.7
Oct. 18	07 40.53	+36 35.1	2.921	3.151	+0.53	+1.9	.	94.0
Oct. 28	07 44.68	+36 56.3	2.834	3.204	+0.27	+2.4	.	102.8
Nov. 7	07 46.21	+37 22.6	2.751	3.257	0.00	+2.9	.	112.1
Nov. 17	07 44.91	+37 52.8	2.677	3.308	-0.29	+3.2	.	122.0
Nov. 27	07 40.74	+38 24.3	2.617	3.360	-0.57	+3.1	.	132.2
Dec. 7	07 33.86	+38 53.1	2.575	3.411	-0.82	+2.6	.	142.6
Dec. 17	07 24.71	+39 14.7	2.558	3.461	-1.01	+1.6	.	152.6
Dec. 27	07 14.06	+39 24.5	2.568	3.511	-1.11	+0.2	.	160.7
Jan. 6	07 02.93	+39 20.1	2.608	3.561	-1.10	-1.3	.	163.2
Jan. 16	06 52.37	+39 01.1	2.678	3.609	-0.99	-2.6	.	158.0
Jan. 26	06 43.32	+38 29.5	2.778	3.658	-0.79	-3.7	.	149.1
Feb. 5	06 36.42	+37 48.9	2.904	3.705	-0.56	-4.4	.	139.1
Feb. 15	06 31.96	+37 02.9	3.052	3.752	-0.31	-4.8	.	128.9
Feb. 25	06 30.01	+36 14.9	3.218	3.799	-0.06	-4.8	.	119.1
Mar. 7	06 30.39	+35 26.9	3.398	3.845	+0.16	-4.7	.	109.5
Mar. 17	06 32.86	+34 40.3	3.587	3.890	+0.35	-4.6	.	100.3
Mar. 27	06 37.15	+33 55.6	3.780	3.935	+0.52	-4.4	.	91.5

## Comet C/2018 F4 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2019 Dec. 4.13866 TT  
 Peri. = 263.22169  
 Node = 26.51012 2000.0  
 Incl. = 78.09721  
 q = 3.440045 AU  
 e = 1.0015200

$$m_1 = 7.4 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	22 54.45	-82 27.7	3.773	3.450	+7.26	+23.4	15.7	63.6
Jan. 12	23 47.70	-78 23.0	3.782	3.459	+3.72	+25.3	15.7	63.6
Jan. 22	00 18.43	-74 08.6	3.801	3.470	+2.49	+25.5	15.7	63.2
Feb. 1	00 40.52	-69 55.0	3.827	3.483	+1.94	+25.1	15.7	62.5
Feb. 11	00 58.43	-65 47.9	3.860	3.499	+1.64	+24.2	15.8	61.5
Feb. 21	01 13.98	-61 50.6	3.900	3.517	+1.46	+23.1	15.8	60.3
Mar. 2	01 28.05	-58 06.0	3.943	3.537	+1.34	+21.7	15.9	59.1
Mar. 12	01 41.07	-54 36.0	3.988	3.560	+1.26	+20.1	15.9	57.8
Mar. 22	01 53.30	-51 22.0	4.032	3.584	+1.19	+18.5	16.0	56.7
Apr. 1	02 04.87	-48 25.0	4.074	3.611	+1.12	+16.7	16.0	56.0
Apr. 11	02 15.82	-45 45.6	4.112	3.640	+1.06	+15.0	16.1	55.6
Apr. 21	02 26.21	-43 23.9	4.142	3.671	+1.01	+13.2	16.1	55.7
May 1	02 36.00	-41 20.0	4.165	3.704	+0.95	+11.4	16.2	56.4
May 11	02 45.18	-39 33.8	4.178	3.738	+0.88	+9.7	16.2	57.8
May 21	02 53.68	-38 05.0	4.181	3.775	+0.81	+7.9	16.3	59.8
May 31	03 01.42	-36 53.5	4.172	3.813	+0.73	+6.2	16.3	62.6
June 10	03 08.31	-35 58.7	4.153	3.853	+0.64	+4.6	16.3	66.0
June 20	03 14.24	-35 20.2	4.123	3.894	+0.53	+3.0	16.4	70.0
June 30	03 19.05	-34 57.4	4.083	3.937	+0.41	+1.4	16.4	74.6
July 10	03 22.58	-34 49.5	4.034	3.981	+0.28	0.0	16.4	79.8
July 20	03 24.64	-34 55.2	3.980	4.027	+0.12	-1.3	16.4	85.4
July 30	03 25.02	-35 13.2	3.921	4.074	-0.06	-2.4	16.5	91.4
Aug. 9	03 23.50	-35 40.8	3.862	4.122	-0.26	-3.2	16.5	97.7
Aug. 19	03 19.88	-36 15.3	3.805	4.172	-0.48	-3.7	16.5	104.3
Aug. 29	03 14.01	-36 52.4	3.755	4.222	-0.71	-3.7	16.5	110.9
Sept. 8	03 05.84	-37 27.1	3.717	4.274	-0.94	-3.1	16.6	117.3
Sept. 18	02 55.48	-37 53.6	3.695	4.326	-1.15	-2.0	16.6	123.1
Sept. 28	02 43.26	-38 05.9	3.693	4.380	-1.30	-0.2	16.7	127.8
Oct. 8	02 29.75	-37 58.7	3.715	4.434	-1.39	+1.9	16.7	130.9
Oct. 18	02 15.70	-37 28.5	3.763	4.489	-1.40	+4.3	16.8	131.8
Oct. 28	02 01.95	-36 34.3	3.839	4.545	-1.33	+6.7	16.9	130.3
Nov. 7	01 49.27	-35 17.5	3.942	4.602	-1.19	+8.8	17.0	126.5
Nov. 17	01 38.22	-33 41.8	4.072	4.659	-1.00	+10.5	17.1	121.0
Nov. 27	01 29.16	-31 51.6	4.225	4.717	-0.79	+11.6	17.3	114.3
Dec. 7	01 22.22	-29 51.8	4.398	4.776	-0.58	+12.3	17.4	106.7
Dec. 17	01 17.33	-27 46.7	4.586	4.835	-0.38	+12.7	17.6	98.8
Dec. 27	01 14.35	-25 39.8	4.784	4.895	-0.20	+12.7	17.7	90.6
Jan. 6	01 13.07	-23 33.8	4.989	4.955	-0.04	+12.5	17.8	82.3
Jan. 16	01 13.25	-21 30.5	5.195	5.015	+0.09	+12.1	18.0	74.1
Jan. 26	01 14.67	-19 31.2	5.398	5.077	+0.20	+11.7	18.1	65.9
Feb. 5	01 17.11	-17 36.7	5.594	5.138	+0.29	+11.2	18.2	57.9
Feb. 15	01 20.39	-15 47.4	5.780	5.200	+0.37	+10.6	18.4	50.0
Feb. 25	01 24.33	-14 03.6	5.952	5.262	+0.42	+10.1	18.5	42.3
Mar. 7	01 28.77	-12 25.5	6.107	5.325	+0.47	+9.5	18.6	35.0
Mar. 17	01 33.59	-10 53.1	6.244	5.388	+0.50	+8.9	18.7	28.2
Mar. 27	01 38.66	-09 26.3	6.361	5.451	+0.52	+8.4	18.8	22.3

## Comet 2I/Borisov

Epoch = 2020 July 1 0.0 TT  
 T = 2019 Dec. 8.53758 TT  
 Peri. = 209.12659  
 Node = 308.14889 2000.0  
 Incl. = 44.05281  
 q = 2.0066252 AU  
 e = 3.3563342

$$m1 = 10.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	12 07.21	-36 47.9	1.940	2.079	+1.48	-42.7	15.1	83.8
Jan. 12	12 21.45	-43 38.2	1.966	2.148	+1.35	-38.8	15.3	86.8
Jan. 22	12 34.18	-49 46.0	2.013	2.236	+1.17	-34.2	15.5	89.7
Feb. 1	12 44.80	-55 05.6	2.076	2.341	+0.92	-29.2	15.8	92.8
Feb. 11	12 52.72	-59 34.8	2.153	2.462	+0.62	-24.2	16.1	96.1
Feb. 21	12 57.32	-63 14.0	2.240	2.594	+0.26	-19.2	16.4	99.5
Mar. 2	12 58.17	-66 04.2	2.336	2.738	-0.12	-14.4	16.7	103.2
Mar. 12	12 55.39	-68 07.2	2.439	2.890	-0.45	-9.8	17.0	107.0
Mar. 22	12 49.75	-69 25.4	2.549	3.049	-0.67	-5.5	17.4	110.8
Apr. 1	12 42.74	-70 02.1	2.668	3.214	-0.71	-1.6	17.7	114.5
Apr. 11	12 36.16	-70 02.6	2.797	3.384	-0.57	+1.7	18.0	117.9
Apr. 21	12 31.46	-69 33.4	2.937	3.558	-0.33	+4.3	18.4	120.8
May 1	12 29.53	-68 41.8	3.091	3.735	-0.03	+6.1	18.7	122.9
May 11	12 30.55	-67 34.9	3.260	3.916	+0.26	+7.3	19.0	124.1
May 21	12 34.28	-66 19.0	3.444	4.098	+0.51	+7.9	19.3	124.1
May 31	12 40.30	-64 59.2	3.644	4.283	+0.71	+8.0	19.6	123.1
June 10	12 48.15	-63 39.6	3.862	4.469	+0.87	+7.8	19.9	120.9
June 20	12 57.39	-62 23.2	4.096	4.657	+0.99	+7.4	20.2	117.8
June 30	13 07.70	-61 12.0	4.345	4.846	+1.08	+6.8	20.5	113.9
July 10	13 18.80	-60 07.5	4.608	5.036	+1.14	+6.1	20.8	109.3
July 20	13 30.47	-59 10.2	4.884	5.227	+1.19	+5.3	21.1	104.2
July 30	13 42.58	-58 20.6	5.171	5.419	+1.23	+4.5	21.4	98.7
Aug. 9	13 54.99	-57 38.5	5.466	5.611	+1.25	+3.8	21.7	93.0
Aug. 19	14 07.60	-57 03.5	5.767	5.803	+1.27	+3.1	21.9	87.1
Aug. 29	14 20.35	-56 35.4	6.071	5.996	+1.28	+2.5	.	81.0
Sept. 8	14 33.16	-56 13.6	6.375	6.189	+1.28	+1.9	.	74.9
Sept. 18	14 46.00	-55 57.4	6.678	6.383	+1.28	+1.3	.	68.7
Sept. 28	14 58.80	-55 46.4	6.976	6.576	+1.28	+0.8	.	62.7
Oct. 8	15 11.50	-55 40.1	7.266	6.769	+1.26	+0.4	.	56.7
Oct. 18	15 24.07	-55 37.8	7.546	6.962	+1.25	0.0	.	51.0
Oct. 28	15 36.45	-55 39.3	7.813	7.155	+1.22	-0.3	.	45.7
Nov. 7	15 48.56	-55 44.1	8.066	7.347	+1.19	-0.7	.	41.1
Nov. 17	16 00.34	-55 52.0	8.301	7.539	+1.16	-1.0	.	37.3
Nov. 27	16 11.73	-56 02.7	8.518	7.730	+1.11	-1.2	.	34.9
Dec. 7	16 22.63	-56 16.1	8.715	7.920	+1.06	-1.5	.	34.2
Dec. 17	16 32.97	-56 32.2	8.891	8.108	+1.00	-1.7	.	35.3
Dec. 27	16 42.64	-56 50.8	9.046	8.296	+0.93	-2.0	.	38.2
Jan. 6	16 51.55	-57 11.8	9.179	8.481	+0.84	-2.2	.	42.5
Jan. 16	16 59.58	-57 35.4	9.291	8.664	+0.75	-2.5	.	48.0
Jan. 26	17 06.62	-58 01.4	9.383	8.844	+0.64	-2.7	.	54.3
Feb. 5	17 12.55	-58 29.6	9.457	9.022	+0.53	-2.9	.	61.1
Feb. 15	17 17.24	-59 00.0	9.513	9.196	+0.40	-3.1	.	68.4
Feb. 25	17 20.57	-59 32.2	9.556	9.366	+0.25	-3.3	.	76.0
Mar. 7	17 22.41	-60 05.6	9.588	9.531	+0.10	-3.4	.	83.8
Mar. 17	17 22.65	-60 39.6	9.611	9.691	-0.07	-3.4	.	91.6
Mar. 27	17 21.20	-61 13.2	9.629	9.844	-0.24	-3.3	.	99.6

## Comet P/2019 Y3 (Catalina)

Epoch = 2020 July 1 0.0 TT  
 T = 2019 Dec. 13.46390 TT  
 Peri. = 2.29053 e = 0.6956557  
 Node = 139.37303 2000.0 a = 2.9973422 AU  
 Incl. = 24.63563 n = 0.18993263  
 q = 0.9122240 AU P = 5.19 years

$$m_1 = 18.4 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	15 06.98	-06 18.6	1.071	0.958	+4.28	+7.9	18.4	55.4
Jan. 12	15 47.54	-04 59.0	1.137	1.012	+3.78	+8.0	18.7	56.5
Jan. 22	16 23.21	-03 38.0	1.200	1.081	+3.31	+8.2	19.1	58.3
Feb. 1	16 54.25	-02 14.0	1.258	1.162	+2.86	+8.6	19.5	60.9
Feb. 11	17 20.96	+00 46.2	1.307	1.249	+2.45	+9.0	19.9	64.3
Feb. 21	17 43.68	+00 45.8	1.345	1.342	+2.06	+9.4	20.3	68.2
Mar. 2	18 02.56	+02 21.9	1.372	1.436	+1.68	+9.8	20.7	72.9
Mar. 12	18 17.74	+04 00.9	1.389	1.532	+1.32	+10.0	21.0	78.1
Mar. 22	18 29.25	+05 41.5	1.395	1.629	+0.95	+10.1	21.2	84.1
Apr. 1	18 36.99	+07 21.1	1.393	1.724	+0.56	+9.8	21.5	90.7
Apr. 11	18 40.88	+08 56.1	1.386	1.819	+0.17	+9.1	21.7	97.9
Apr. 21	18 40.82	+10 22.1	1.376	1.912	-0.23	+7.9	21.9	105.8
May 1	18 36.78	+11 32.9	1.368	2.004	-0.62	+6.0	.	114.2
May 11	18 29.03	+12 21.2	1.367	2.094	-0.96	+3.3	.	122.8
May 21	18 18.15	+12 40.4	1.378	2.182	-1.23	+0.1	.	131.3
May 31	18 05.11	+12 25.2	1.405	2.269	-1.37	-3.5	.	138.8
June 10	17 51.29	+11 34.4	1.454	2.353	-1.37	-6.9	.	144.2
June 20	17 38.04	+10 12.0	1.526	2.436	-1.25	-9.7	.	146.1
June 30	17 26.54	+08 25.2	1.622	2.517	-1.02	-11.7	.	144.1
July 10	17 17.56	+06 23.6	1.742	2.596	-0.75	-12.6	.	139.0
July 20	17 11.39	+04 15.7	1.884	2.674	-0.46	-12.9	.	132.1
July 30	17 08.06	+02 08.2	2.044	2.749	-0.18	-12.5	.	124.5
Aug. 9	17 07.35	+00 05.7	2.220	2.823	+0.06	-11.9	.	116.6
Aug. 19	17 08.96	-01 49.0	2.407	2.896	+0.28	-11.0	.	108.7
Aug. 29	17 12.59	-03 34.5	2.604	2.966	+0.46	-10.0	.	100.9
Sept. 8	17 17.92	-05 10.0	2.806	3.035	+0.62	-9.0	.	93.3
Sept. 18	17 24.69	-06 35.5	3.011	3.103	+0.75	-8.0	.	85.8
Sept. 28	17 32.66	-07 51.0	3.215	3.169	+0.85	-7.0	.	78.4
Oct. 8	17 41.62	-08 56.6	3.416	3.233	+0.94	-6.0	.	71.1
Oct. 18	17 51.37	-09 52.8	3.612	3.296	+1.01	-5.1	.	63.8
Oct. 28	18 01.79	-10 39.9	3.799	3.357	+1.07	-4.2	.	56.7
Nov. 7	18 12.69	-11 18.1	3.976	3.418	+1.11	-3.4	.	49.6
Nov. 17	18 23.98	-11 47.9	4.141	3.476	+1.15	-2.5	.	42.5
Nov. 27	18 35.53	-12 09.6	4.290	3.534	+1.16	-1.7	.	35.5
Dec. 7	18 47.21	-12 23.8	4.424	3.590	+1.17	-1.0	.	28.5
Dec. 17	18 58.94	-12 30.8	4.539	3.644	+1.17	-0.3	.	21.8
Dec. 27	19 10.62	-12 31.2	4.636	3.698	+1.16	+0.3	.	15.5
Jan. 6	19 22.14	-12 25.6	4.712	3.750	+1.14	+0.9	.	10.7
Jan. 16	19 33.42	-12 14.6	4.767	3.801	+1.11	+1.4	.	9.7
Jan. 26	19 44.37	-11 58.9	4.800	3.850	+1.07	+1.8	.	13.6
Feb. 5	19 54.90	-11 39.1	4.813	3.899	+1.03	+2.2	.	19.7
Feb. 15	20 04.92	-11 16.2	4.804	3.946	+0.97	+2.4	.	26.7
Feb. 25	20 14.34	-10 50.8	4.775	3.992	+0.91	+2.6	.	34.0
Mar. 7	20 23.07	-10 23.9	4.726	4.037	+0.83	+2.7	.	41.5
Mar. 17	20 31.01	-09 56.5	4.660	4.081	+0.75	+2.7	.	49.3
Mar. 27	20 38.06	-09 29.5	4.577	4.124	+0.65	+2.6	.	57.3

Comet 289P/Blanpain

Epoch = 2020 July 10.0 TT  
 T = 2019 Dec. 20.98721 TT  
 Peri. = 9.88401 e = 0.6854102  
 Node = 68.88828 2000.0 a = 3.0479796 AU  
 Incl. = 5.89371 n = 0.18521919  
 q = 0.9588633 AU P = 5.32 years

H = 19.6 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	V	Elong.
2020/21	h m	° ' "			m		°
Jan. 2	23 29.13	+22 20.9	0.111	0.975	+4.62 173.9	18.0	82.3
Jan. 12	01 02.87	+57 29.7	0.091	1.010	+21.41 208.0	16.9	104.7
Jan. 22	06 51.25	+68 42.5	0.118	1.063	+24.11 -84.3	16.8	129.6
Feb. 1	08 51.76	+54 34.8	0.175	1.130	+4.54 -69.6	17.4	142.8
Feb. 11	09 20.47	+45 05.7	0.248	1.206	+1.61 -44.3	18.1	149.1
Feb. 21	09 32.44	+38 47.4	0.334	1.290	+0.87 -31.4	18.8	150.6
Mar. 2	09 40.21	+34 07.7	0.432	1.378	+0.72 -24.4	19.5	148.4
Mar. 12	09 47.39	+30 24.3	0.545	1.469	+0.74 -20.1	20.2	143.8
Mar. 22	09 55.08	+27 16.4	0.671	1.561	+0.82 -17.4	20.9	138.0
Apr. 1	10 03.67	+24 31.6	0.811	1.654	+0.91 -15.5	21.4	131.7
Apr. 11	10 13.18	+22 03.0	0.964	1.746	+1.00 -14.2	22.0	125.3
Apr. 21	10 23.46	+19 45.9	1.128	1.838	+1.07 -13.2	.	118.9
May 1	10 34.41	+17 37.0	1.303	1.929	+1.13 -12.5	.	112.6
May 11	10 45.86	+15 34.3	1.486	2.018	+1.17 -12.0	.	106.4
May 21	10 57.68	+13 36.4	1.676	2.106	+1.20 -11.6	.	100.2
May 31	11 09.80	+11 42.1	1.872	2.193	+1.23 -11.3	.	94.1
June 10	11 22.14	+09 50.9	2.072	2.278	+1.24 -11.0	.	88.1
June 20	11 34.62	+08 02.4	2.274	2.361	+1.26 -10.7	.	82.2
June 30	11 47.22	+06 16.3	2.476	2.442	+1.27 -10.5	.	76.2
July 10	11 59.90	+04 32.4	2.676	2.522	+1.27 -10.3	.	70.3
July 20	12 12.63	+02 51.0	2.873	2.600	+1.28 -10.0	.	64.4
July 30	12 25.41	+01 11.8	3.065	2.677	+1.28 -9.8	.	58.4
Aug. 9	12 38.21	+00 24.8	3.250	2.752	+1.28 -9.5	.	52.4
Aug. 19	12 51.02	-01 58.8	3.426	2.825	+1.28 -9.2	.	46.4
Aug. 29	13 03.83	-03 29.9	3.592	2.896	+1.28 -8.9	.	40.3
Sept. 8	13 16.62	-04 58.0	3.746	2.967	+1.28 -8.6	.	34.1
Sept. 18	13 29.39	-06 22.7	3.887	3.035	+1.27 -8.3	.	27.9
Sept. 28	13 42.10	-07 43.9	4.012	3.102	+1.27 -7.9	.	21.6
Oct. 8	13 54.72	-09 01.2	4.121	3.168	+1.26 -7.5	.	15.2
Oct. 18	14 07.24	-10 14.4	4.213	3.232	+1.24 -7.1	.	8.7
Oct. 28	14 19.61	-11 23.3	4.287	3.295	+1.23 -6.6	.	2.9
Nov. 7	14 31.76	-12 27.6	4.341	3.356	+1.20 -6.2	.	5.7
Nov. 17	14 43.66	-13 27.1	4.375	3.416	+1.17 -5.7	.	12.4
Nov. 27	14 55.21	-14 21.6	4.390	3.475	+1.13 -5.2	.	19.4
Dec. 7	15 06.33	-15 10.9	4.384	3.532	+1.09 -4.6	.	26.7
Dec. 17	15 16.94	-15 54.9	4.359	3.588	+1.03 -4.1	.	34.2
Dec. 27	15 26.89	-16 33.6	4.315	3.643	+0.96 -3.6	.	41.9
Jan. 6	15 36.08	-17 07.0	4.254	3.696	+0.87 -3.0	.	49.8
Jan. 16	15 44.36	-17 35.1	4.177	3.749	+0.77 -2.5	.	58.0
Jan. 26	15 51.56	-17 57.9	4.086	3.800	+0.65 -2.0	.	66.4
Feb. 5	15 57.53	-18 15.5	3.984	3.850	+0.52 -1.5	.	75.1
Feb. 15	16 02.08	-18 28.2	3.875	3.899	+0.37 -1.0	.	84.1
Feb. 25	16 05.04	-18 35.8	3.761	3.946	+0.20 -0.5	.	93.4
Mar. 7	16 06.27	-18 38.6	3.648	3.993	+0.02 0.0	.	103.2
Mar. 17	16 05.64	-18 36.5	3.540	4.038	-0.17 +0.5	.	113.3
Mar. 27	16 03.10	-18 29.5	3.442	4.083	-0.36 +1.0	.	123.8

Comet C/2020 A2 (Iwamoto)

Epoch = 2020 July 10.0 TT  
 T = 2020 Jan. 8.34321 TT  
 Peri. = 68.22364  
 Node = 286.37058 2000.0  
 Incl. = 120.74809  
 q = 0.9782313 AU  
 e = 0.9999655

$$m_1 = 12.1 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	17 48.31	+01 20.5	1.734	0.984	+0.64	+36.1	13.2	28.2
Jan. 12	17 55.40	+07 59.7	1.549	0.980	+0.82	+45.4	13.0	37.9
Jan. 22	18 04.95	+16 34.8	1.344	1.006	+1.16	+60.4	12.8	48.2
Feb. 1	18 19.27	+28 16.1	1.143	1.060	+1.86	+83.7	12.6	59.2
Feb. 11	18 44.32	+44 23.1	0.983	1.136	+3.66	112.3	12.6	70.4
Feb. 21	19 44.60	+64 16.4	0.913	1.228	+11.18	118.9	12.8	80.3
Mar. 2	23 48.46	+78 07.6	0.968	1.333	+39.94	-0.7	13.3	85.7
Mar. 12	03 56.51	+69 29.7	1.134	1.445	+9.98	-72.8	14.0	85.2
Mar. 22	04 59.46	+58 28.8	1.371	1.562	+3.65	-56.2	14.7	80.9
Apr. 1	05 27.77	+50 23.3	1.642	1.682	+2.13	-40.2	15.4	74.7
Apr. 11	05 46.20	+44 32.9	1.926	1.804	+1.57	-29.5	16.1	67.8
Apr. 21	06 00.61	+40 12.1	2.212	1.927	+1.31	-22.4	16.7	60.5
May 1	06 13.03	+36 50.4	2.490	2.050	+1.17	-17.7	17.2	53.1
May 11	06 24.25	+34 08.7	2.755	2.172	+1.07	-14.5	17.7	45.6
May 21	06 34.68	+31 54.4	3.003	2.294	+1.01	-12.3	18.1	38.2
May 31	06 44.50	+29 59.5	3.232	2.416	+0.95	-10.7	18.5	30.7
June 10	06 53.78	+28 18.4	3.437	2.536	+0.90	-9.5	18.8	23.2
June 20	07 02.57	+26 47.4	3.619	2.655	+0.85	-8.7	19.1	15.6
June 30	07 10.85	+25 23.7	3.776	2.773	+0.80	-8.0	19.4	8.1
July 10	07 18.59	+24 05.4	3.906	2.890	+0.74	-7.6	19.7	1.9
July 20	07 25.74	+22 51.1	4.009	3.006	+0.68	-7.3	19.9	7.8
July 30	07 32.24	+21 39.8	4.086	3.120	+0.61	-7.0	20.1	15.7
Aug. 9	07 38.00	+20 30.8	4.136	3.234	+0.53	-6.8	20.3	23.8
Aug. 19	07 42.92	+19 23.5	4.161	3.346	+0.44	-6.6	20.4	32.1
Aug. 29	07 46.89	+18 17.8	4.161	3.458	+0.34	-6.5	20.6	40.6
Sept. 8	07 49.77	+17 13.4	4.140	3.568	+0.22	-6.4	20.7	49.5
Sept. 18	07 51.42	+16 10.2	4.099	3.677	+0.09	-6.3	20.8	58.6
Sept. 28	07 51.66	+15 08.3	4.042	3.785	-0.06	-6.1	20.9	68.2
Oct. 8	07 50.34	+14 07.8	3.974	3.893	-0.22	-6.0	21.0	78.1
Oct. 18	07 47.28	+13 09.1	3.899	3.999	-0.41	-5.8	21.1	88.5
Oct. 28	07 42.36	+12 12.5	3.824	4.104	-0.60	-5.5	21.1	99.3
Nov. 7	07 35.52	+11 18.6	3.756	4.208	-0.79	-5.2	21.2	110.6
Nov. 17	07 26.79	+10 28.0	3.701	4.312	-0.97	-4.8	21.3	122.3
Nov. 27	07 16.35	+09 41.6	3.669	4.414	-1.12	-4.4	21.4	134.3
Dec. 7	07 04.59	+09 00.3	3.665	4.516	-1.23	-3.8	21.5	146.1
Dec. 17	06 52.02	+08 25.1	3.695	4.617	-1.28	-3.2	21.6	157.0
Dec. 27	06 39.27	+07 56.5	3.763	4.717	-1.26	-2.5	21.7	164.2
Jan. 6	06 27.03	+07 35.0	3.871	4.816	-1.17	-1.8	21.9	162.1
Jan. 16	06 15.84	+07 20.5	4.017	4.915	-1.04	-1.1	22.0	153.3
Jan. 26	06 06.17	+07 12.3	4.196	5.013	-0.87	-0.5	.	142.4
Feb. 5	05 58.26	+07 09.5	4.405	5.110	-0.69	0.0	.	131.3
Feb. 15	05 52.18	+07 11.0	4.637	5.206	-0.51	+0.3	.	120.3
Feb. 25	05 47.91	+07 15.5	4.886	5.302	-0.33	+0.6	.	109.7
Mar. 7	05 45.31	+07 21.8	5.144	5.397	-0.17	+0.7	.	99.5
Mar. 17	05 44.21	+07 28.9	5.407	5.492	-0.03	+0.7	.	89.6
Mar. 27	05 44.43	+07 35.7	5.669	5.585	+0.09	+0.6	.	80.1

Comet 101P/Chernykh

Epoch = 2020 July 10.0 TT  
 T = 2020 Jan. 12.53337 TT  
 Peri. = 277.69767 e = 0.5956587  
 Node = 116.23342 2000.0 a = 5.7990124 AU  
 Incl. = 5.05305 n = 0.07057860  
 q = 2.3447802 AU P = 13.96 years

$$m_1 = 8.5 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	' .		° .
Jan. 2	00 28.73	-02 41.6	2.222	2.347	+1.32	+10.5	15.8	84.8
Jan. 12	00 42.49	+00 54.0	2.334	2.345	+1.44	+11.1	15.9	78.5
Jan. 22	00 57.38	+00 58.5	2.446	2.346	+1.54	+11.4	16.0	72.5
Feb. 1	01 13.24	+02 54.0	2.558	2.351	+1.63	+11.6	16.1	66.8
Feb. 11	01 29.91	+04 50.6	2.669	2.359	+1.71	+11.6	16.2	61.2
Feb. 21	01 47.28	+06 46.5	2.778	2.370	+1.77	+11.5	16.3	55.9
Mar. 2	02 05.26	+08 40.0	2.885	2.383	+1.83	+11.2	16.5	50.7
Mar. 12	02 23.76	+10 29.6	2.988	2.400	+1.87	+10.7	16.6	45.6
Mar. 22	02 42.69	+12 13.8	3.088	2.420	+1.91	+10.1	16.7	40.6
Apr. 1	03 01.99	+13 51.4	3.184	2.443	+1.95	+9.4	16.8	35.7
Apr. 11	03 21.57	+15 21.3	3.274	2.468	+1.97	+8.5	17.0	30.8
Apr. 21	03 41.38	+16 42.7	3.359	2.496	+1.99	+7.6	17.1	26.0
May 1	04 01.33	+17 54.7	3.438	2.526	+2.00	+6.7	17.2	21.2
May 11	04 21.34	+18 56.8	3.511	2.558	+2.00	+5.7	17.3	16.4
May 21	04 41.32	+19 48.9	3.576	2.592	+1.99	+4.6	17.5	11.6
May 31	05 01.20	+20 30.6	3.632	2.629	+1.98	+3.6	17.6	6.9
June 10	05 20.87	+21 02.3	3.681	2.667	+1.95	+2.6	17.7	2.6
June 20	05 40.25	+21 24.0	3.720	2.707	+1.92	+1.7	17.8	4.0
June 30	05 59.25	+21 36.4	3.748	2.748	+1.87	+0.7	18.0	8.8
July 10	06 17.77	+21 40.0	3.767	2.791	+1.82	-0.1	18.1	13.9
July 20	06 35.74	+21 35.6	3.775	2.835	+1.76	-0.8	18.2	19.2
July 30	06 53.07	+21 24.0	3.771	2.880	+1.69	-1.5	18.3	24.7
Aug. 9	07 09.68	+21 06.4	3.756	2.926	+1.62	-2.1	18.4	30.4
Aug. 19	07 25.49	+20 43.8	3.729	2.974	+1.53	-2.5	18.5	36.3
Aug. 29	07 40.41	+20 17.3	3.690	3.022	+1.44	-2.8	18.5	42.4
Sept. 8	07 54.35	+19 48.4	3.640	3.071	+1.34	-3.0	18.6	48.8
Sept. 18	08 07.24	+19 18.2	3.579	3.120	+1.23	-3.0	18.7	55.4
Sept. 28	08 18.94	+18 48.4	3.508	3.171	+1.10	-2.9	18.7	62.4
Oct. 8	08 29.36	+18 20.2	3.428	3.221	+0.97	-2.7	18.8	69.7
Oct. 18	08 38.36	+17 55.3	3.341	3.273	+0.82	-2.3	18.8	77.5
Oct. 28	08 45.78	+17 35.2	3.249	3.324	+0.65	-1.7	18.9	85.6
Nov. 7	08 51.50	+17 21.4	3.155	3.376	+0.47	-1.0	18.9	94.3
Nov. 17	08 55.35	+17 15.1	3.062	3.428	+0.28	-0.2	19.0	103.4
Nov. 27	08 57.20	+17 17.4	2.974	3.481	+0.07	+0.7	19.0	113.1
Dec. 7	08 57.00	+17 28.8	2.895	3.534	-0.13	+1.6	19.0	123.3
Dec. 17	08 54.75	+17 49.1	2.831	3.586	-0.33	+2.5	19.1	134.1
Dec. 27	08 50.61	+18 17.0	2.787	3.639	-0.51	+3.1	19.1	145.4
Jan. 6	08 44.92	+18 50.4	2.767	3.692	-0.64	+3.5	19.2	157.0
Jan. 16	08 38.15	+19 26.6	2.775	3.745	-0.71	+3.6	19.3	168.8
Jan. 26	08 30.96	+20 02.4	2.814	3.798	-0.72	+3.4	19.4	178.6
Feb. 5	08 24.02	+20 35.0	2.883	3.851	-0.66	+3.0	19.6	167.2
Feb. 15	08 17.94	+21 02.5	2.983	3.904	-0.54	+2.4	19.7	155.6
Feb. 25	08 13.20	+21 23.5	3.110	3.957	-0.39	+1.7	19.9	144.4
Mar. 7	08 10.11	+21 37.9	3.260	4.009	-0.21	+1.1	20.1	133.6
Mar. 17	08 08.80	+21 45.7	3.429	4.062	-0.03	+0.4	20.3	123.3
Mar. 27	08 09.24	+21 47.4	3.613	4.114	+0.14	-0.2	20.5	113.5

## Comet 114P/Wiseman-Skiff

Epoch = 2020 July 10.0 TT  
 T = 2020 Jan. 14.06618 TT  
 Peri. = 172.80175 e = 0.5547326  
 Node = 271.05921 2000.0 a = 3.5468469 AU  
 Incl. = 18.27224 n = 0.14755041  
 q = 1.5792953 AU P = 6.68 years

$$m_1 = 11.0 + 5 \log(\Delta) + 20.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	02 46.47	+25 36.1	0.795	1.584	+1.67	-20.2	14.5	125.7
Jan. 12	03 04.39	+22 29.2	0.849	1.579	+1.93	-16.8	14.6	118.9
Jan. 22	03 24.56	+19 56.4	0.915	1.581	+2.12	-13.5	14.8	112.7
Feb. 1	03 46.37	+17 54.8	0.992	1.590	+2.25	-10.6	15.0	107.1
Feb. 11	04 09.32	+16 18.9	1.077	1.605	+2.34	-8.4	15.3	102.0
Feb. 21	04 32.97	+15 02.2	1.171	1.626	+2.39	-6.8	15.6	97.3
Mar. 2	04 57.05	+13 59.0	1.272	1.652	+2.42	-5.8	15.9	92.9
Mar. 12	05 21.30	+13 03.9	1.380	1.684	+2.43	-5.2	16.2	88.8
Mar. 22	05 45.53	+12 12.6	1.493	1.721	+2.42	-5.1	16.6	84.9
Apr. 1	06 09.61	+11 21.9	1.613	1.762	+2.39	-5.2	17.0	81.2
Apr. 11	06 33.39	+10 29.0	1.736	1.806	+2.36	-5.5	17.3	77.4
Apr. 21	06 56.79	+09 32.5	1.865	1.854	+2.32	-5.9	17.7	73.8
May 1	07 19.73	+08 31.2	1.996	1.905	+2.27	-6.4	18.1	70.1
May 11	07 42.16	+07 24.4	2.131	1.958	+2.21	-7.0	18.5	66.4
May 21	08 04.04	+06 12.1	2.267	2.013	+2.16	-7.5	18.9	62.6
May 31	08 25.36	+04 54.2	2.405	2.070	+2.10	-8.1	19.2	58.8
June 10	08 46.09	+03 31.1	2.543	2.128	+2.04	-8.6	19.6	54.9
June 20	09 06.24	+02 03.3	2.680	2.187	+1.99	-9.0	19.9	50.9
June 30	09 25.85	+00 31.2	2.815	2.246	+1.93	-9.4	20.3	46.9
July 10	09 44.91	-01 04.4	2.947	2.307	+1.88	-9.7	20.6	42.8
July 20	10 03.46	-02 42.9	3.075	2.367	+1.83	-10.0	20.9	38.6
July 30	10 21.52	-04 23.7	3.198	2.428	+1.78	-10.2	21.2	34.3
Aug. 9	10 39.12	-06 06.3	3.314	2.489	+1.74	-10.3	21.5	30.1
Aug. 19	10 56.29	-07 50.0	3.423	2.550	+1.69	-10.4	21.8	25.8
Aug. 29	11 13.05	-09 34.3	3.522	2.611	+1.65	-10.4	.	21.7
Sept. 8	11 29.41	-11 18.6	3.611	2.671	+1.62	-10.4	.	17.9
Sept. 18	11 45.40	-13 02.4	3.690	2.731	+1.58	-10.3	.	14.9
Sept. 28	12 01.01	-14 45.3	3.755	2.791	+1.54	-10.2	.	13.5
Oct. 8	12 16.23	-16 26.8	3.808	2.850	+1.50	-10.1	.	14.2
Oct. 18	12 31.06	-18 06.5	3.847	2.909	+1.46	-9.9	.	17.0
Oct. 28	12 45.46	-19 43.9	3.871	2.967	+1.41	-9.6	.	21.3
Nov. 7	12 59.38	-21 18.7	3.879	3.024	+1.36	-9.3	.	26.4
Nov. 17	13 12.77	-22 50.6	3.873	3.081	+1.31	-9.0	.	32.2
Nov. 27	13 25.54	-24 19.3	3.851	3.138	+1.24	-8.7	.	38.4
Dec. 7	13 37.60	-25 44.3	3.815	3.193	+1.16	-8.3	.	44.9
Dec. 17	13 48.81	-27 05.6	3.764	3.248	+1.07	-7.9	.	51.8
Dec. 27	13 59.01	-28 22.7	3.700	3.303	+0.96	-7.5	.	59.0
Jan. 6	14 08.06	-29 35.3	3.625	3.356	+0.83	-7.0	.	66.5
Jan. 16	14 15.73	-30 43.1	3.540	3.409	+0.68	-6.5	.	74.4
Jan. 26	14 21.81	-31 45.2	3.448	3.462	+0.51	-5.9	.	82.6
Feb. 5	14 26.09	-32 40.8	3.352	3.513	+0.32	-5.2	.	91.1
Feb. 15	14 28.36	-33 28.7	3.256	3.564	+0.11	-4.3	.	100.1
Feb. 25	14 28.44	-34 07.1	3.164	3.614	-0.11	-3.2	.	109.3
Mar. 7	14 26.29	-34 33.9	3.079	3.663	-0.34	-2.0	.	118.9
Mar. 17	14 21.94	-34 46.8	3.008	3.712	-0.55	-0.4	.	128.7
Mar. 27	14 15.66	-34 43.4	2.954	3.760	-0.72	+1.3	.	138.5

## Comet P/2019 Y2 (Fuls)

Epoch = 2020 July 10.0 TT  
 T = 2020 Jan. 31.87935 TT  
 Peri. = 92.36080 e = 0.3847665  
 Node = 80.83621 2000.0 a = 3.4537526 AU  
 Incl. = 4.89622 n = 0.15355616  
 q = 2.1248643 AU P = 6.42 years

$$m1 = 12.9 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	12 43.65	+01 18.0	1.875	2.136	+1.43	-6.6	17.6	91.2
Jan. 12	12 57.26	+00 17.1	1.760	2.130	+1.28	-5.4	17.4	97.8
Jan. 22	13 09.24	+00 31.1	1.649	2.126	+1.09	-4.0	17.3	104.9
Feb. 1	13 19.19	-01 04.8	1.544	2.125	+0.87	-2.5	17.1	112.4
Feb. 11	13 26.76	-01 23.4	1.447	2.126	+0.61	-1.0	17.0	120.6
Feb. 21	13 31.58	-01 26.4	1.361	2.130	+0.32	+0.5	16.9	129.4
Mar. 2	13 33.38	-01 14.8	1.288	2.136	+0.01	+1.9	16.7	138.9
Mar. 12	13 32.15	+00 51.3	1.231	2.145	-0.28	+2.8	16.7	149.0
Mar. 22	13 28.19	+00 20.5	1.195	2.156	-0.52	+3.3	16.6	159.4
Apr. 1	13 22.21	+00 11.4	1.180	2.170	-0.67	+3.0	16.6	168.9
Apr. 11	13 15.33	+00 36.9	1.190	2.185	-0.69	+2.0	16.7	171.0
Apr. 21	13 08.75	+00 50.0	1.223	2.203	-0.60	+0.5	16.8	162.8
May 1	13 03.57	+00 46.6	1.279	2.223	-0.41	-1.3	16.9	152.7
May 11	13 00.55	+00 25.3	1.355	2.245	-0.17	-3.1	17.1	142.8
May 21	13 00.03	+00 13.0	1.450	2.268	+0.09	-4.7	17.3	133.5
May 31	13 02.05	-01 06.1	1.558	2.294	+0.34	-6.0	17.5	124.8
June 10	13 06.44	-02 11.5	1.679	2.321	+0.56	-7.1	17.7	116.8
June 20	13 12.92	-03 26.2	1.810	2.349	+0.75	-7.9	17.9	109.2
June 30	13 21.21	-04 48.1	1.947	2.379	+0.92	-8.5	18.1	102.1
July 10	13 31.04	-06 14.9	2.091	2.410	+1.06	-8.9	18.3	95.4
July 20	13 42.16	-07 44.6	2.238	2.442	+1.18	-9.1	18.5	89.0
July 30	13 54.39	-09 15.9	2.387	2.475	+1.28	-9.1	18.7	82.8
Aug. 9	14 07.55	-10 47.1	2.538	2.509	+1.36	-9.1	18.9	76.8
Aug. 19	14 21.50	-12 17.1	2.687	2.544	+1.44	-8.9	19.1	71.0
Aug. 29	14 36.16	-13 44.7	2.835	2.580	+1.50	-8.6	19.3	65.2
Sept. 8	14 51.42	-15 09.0	2.980	2.616	+1.56	-8.2	19.4	59.4
Sept. 18	15 07.20	-16 29.0	3.121	2.653	+1.60	-7.7	19.6	53.7
Sept. 28	15 23.43	-17 44.0	3.255	2.690	+1.65	-7.2	19.8	48.0
Oct. 8	15 40.05	-18 53.3	3.383	2.727	+1.68	-6.6	19.9	42.3
Oct. 18	15 56.99	-19 56.3	3.502	2.765	+1.71	-5.9	20.0	36.5
Oct. 28	16 14.18	-20 52.5	3.612	2.803	+1.73	-5.2	20.2	30.7
Nov. 7	16 31.54	-21 41.4	3.711	2.842	+1.74	-4.5	20.3	24.8
Nov. 17	16 49.00	-22 22.8	3.798	2.880	+1.75	-3.7	20.4	18.8
Nov. 27	17 06.49	-22 56.6	3.873	2.919	+1.75	-3.0	20.5	12.8
Dec. 7	17 23.90	-23 22.8	3.934	2.957	+1.73	-2.2	20.6	6.7
Dec. 17	17 41.15	-23 41.4	3.980	2.996	+1.71	-1.5	20.7	0.6
Dec. 27	17 58.15	-23 52.9	4.011	3.034	+1.68	-0.8	20.7	5.8
Jan. 6	18 14.80	-23 57.6	4.027	3.073	+1.64	-0.1	20.8	12.2
Jan. 16	18 31.00	-23 56.1	4.027	3.111	+1.59	+0.5	20.9	18.7
Jan. 26	18 46.66	-23 49.1	4.011	3.149	+1.53	+1.0	20.9	25.3
Feb. 5	19 01.67	-23 37.6	3.980	3.187	+1.46	+1.4	20.9	32.0
Feb. 15	19 15.95	-23 22.4	3.934	3.225	+1.38	+1.7	21.0	38.9
Feb. 25	19 29.38	-23 04.6	3.874	3.262	+1.29	+1.9	21.0	45.8
Mar. 7	19 41.86	-22 45.5	3.800	3.299	+1.19	+1.9	21.0	53.0
Mar. 17	19 53.30	-22 26.2	3.715	3.336	+1.08	+1.9	21.0	60.3
Mar. 27	20 03.55	-22 07.9	3.620	3.373	+0.96	+1.7	21.0	67.9

## Comet 112P/Urata-Niijima

Epoch = 2020 July 10.0 TT  
 T = 2020 Feb. 7.95913 TT  
 Peri. = 21.49710 e = 0.5897638  
 Node = 31.84673 2000.0 a = 3.5261601 AU  
 Incl. = 24.19057 n = 0.14885076  
 q = 1.4465585 AU P = 6.62 years

$$m_1 = 10.5 + 5 \log(\Delta) + 30.0 \log(r(t-30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	23 26.50	-05 28.0	1.533	1.502	+1.93	+30.2	17.7	69.4
Jan. 12	23 46.42	+00 25.5	1.576	1.476	+2.07	+30.3	17.4	65.8
Jan. 22	00 07.76	+04 37.2	1.622	1.458	+2.21	+30.2	17.1	62.5
Feb. 1	00 30.58	+09 37.1	1.670	1.449	+2.36	+29.7	16.9	59.7
Feb. 11	00 54.94	+14 30.2	1.720	1.447	+2.53	+28.8	16.8	57.2
Feb. 21	01 20.97	+19 12.0	1.774	1.454	+2.70	+27.4	16.7	55.0
Mar. 2	01 48.84	+23 37.9	1.833	1.468	+2.89	+25.5	16.6	53.0
Mar. 12	02 18.63	+27 42.6	1.896	1.491	+3.09	+23.1	16.7	51.2
Mar. 22	02 50.41	+31 20.6	1.964	1.521	+3.29	+20.2	16.8	49.6
Apr. 1	03 24.09	+34 27.2	2.038	1.557	+3.46	+16.8	17.1	47.9
Apr. 11	03 59.39	+36 58.1	2.118	1.599	+3.60	+13.0	17.3	46.3
Apr. 21	04 35.85	+38 50.3	2.204	1.646	+3.69	+9.0	17.7	44.6
May 1	05 12.86	+40 02.8	2.295	1.698	+3.70	+5.1	18.1	42.7
May 11	05 49.66	+40 36.5	2.391	1.753	+3.64	+1.3	18.5	40.7
May 21	06 25.54	+40 34.5	2.491	1.811	+3.51	-2.0	19.0	38.5
May 31	06 59.94	+40 01.0	2.593	1.872	+3.34	-4.9	19.5	36.1
June 10	07 32.44	+39 01.4	2.698	1.934	+3.14	-7.2	20.0	33.5
June 20	08 02.87	+37 40.9	2.803	1.999	+2.93	-9.0	20.5	30.8
June 30	08 31.19	+36 04.6	2.907	2.064	+2.72	-10.3	21.0	27.9
July 10	08 57.47	+34 17.0	3.008	2.130	+2.52	-11.2	21.5	25.0
July 20	09 21.89	+32 21.9	3.105	2.196	+2.35	-11.8	22.0	22.0
July 30	09 44.60	+30 22.3	3.196	2.263	+2.18	-12.1	.	19.3
Aug. 9	10 05.79	+28 21.0	3.281	2.330	+2.04	-12.2	.	16.9
Aug. 19	10 25.62	+26 19.7	3.357	2.397	+1.92	-12.1	.	15.5
Aug. 29	10 44.25	+24 20.2	3.423	2.463	+1.80	-11.8	.	15.3
Sept. 8	11 01.78	+22 23.9	3.478	2.530	+1.70	-11.4	.	16.7
Sept. 18	11 18.34	+20 31.8	3.520	2.595	+1.60	-10.9	.	19.6
Sept. 28	11 33.96	+18 45.0	3.550	2.661	+1.51	-10.4	.	23.5
Oct. 8	11 48.72	+17 04.3	3.565	2.726	+1.43	-9.7	.	28.2
Oct. 18	12 02.62	+15 30.5	3.567	2.790	+1.34	-9.0	.	33.4
Oct. 28	12 15.66	+14 04.5	3.553	2.853	+1.26	-8.1	.	39.2
Nov. 7	12 27.80	+12 47.0	3.525	2.916	+1.16	-7.3	.	45.4
Nov. 17	12 39.00	+11 38.6	3.483	2.978	+1.06	-6.3	.	52.0
Nov. 27	12 49.15	+10 40.3	3.427	3.040	+0.95	-5.3	.	59.1
Dec. 7	12 58.15	+09 52.5	3.359	3.100	+0.83	-4.2	.	66.5
Dec. 17	13 05.86	+09 15.9	3.281	3.160	+0.69	-3.0	.	74.3
Dec. 27	13 12.10	+08 51.2	3.195	3.219	+0.54	-1.8	.	82.5
Jan. 6	13 16.71	+08 38.5	3.105	3.277	+0.36	-0.6	.	91.2
Jan. 16	13 19.48	+08 37.9	3.013	3.334	+0.17	+0.6	.	100.4
Jan. 26	13 20.24	+08 49.0	2.925	3.391	-0.04	+1.7	.	110.0
Feb. 5	13 18.88	+09 10.4	2.844	3.446	-0.26	+2.6	.	120.1
Feb. 15	13 15.34	+09 40.3	2.777	3.501	-0.47	+3.3	.	130.6
Feb. 25	13 09.75	+10 15.4	2.729	3.555	-0.66	+3.6	.	141.2
Mar. 7	13 02.39	+10 51.7	2.705	3.608	-0.82	+3.5	.	151.6
Mar. 17	12 53.75	+11 24.8	2.707	3.661	-0.91	+3.0	.	160.6
Mar. 27	12 44.47	+11 50.5	2.741	3.712	-0.93	+2.0	.	164.7

Comet C/2019 K1 (ATLAS)

Epoch = 2020 July 1 0.0 TT  
 T = 2020 Feb. 12.97140 TT  
 Peri. = 265.70937  
 Node = 73.37566 2000.0  
 Incl. = 87.14881  
 q = 2.0126502 AU  
 e = 0.9999358

$$m1 = 9.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	18 07.20	-69 35.4	2.618	2.076	+5.79	-20.7	14.8	47.0
Jan. 12	19 16.45	-72 41.2	2.522	2.050	+8.45	-14.9	14.6	50.9
Jan. 22	20 53.20	-74 16.8	2.434	2.030	+10.86	-1.6	14.5	54.6
Feb. 1	22 41.99	-73 12.2	2.362	2.018	+10.23	+16.3	14.4	57.8
Feb. 11	00 12.24	-69 20.6	2.312	2.013	+7.47	+30.3	14.4	60.2
Feb. 21	01 15.79	-63 37.7	2.289	2.015	+5.17	+38.1	14.3	61.6
Mar. 2	02 00.41	-56 59.8	2.296	2.024	+3.74	+41.2	14.4	61.8
Mar. 12	02 33.59	-50 06.0	2.333	2.041	+2.88	+41.2	14.4	60.8
Mar. 22	02 59.84	-43 21.6	2.399	2.065	+2.36	+39.2	14.5	58.7
Apr. 1	03 21.74	-37 02.9	2.487	2.095	+2.01	+36.1	14.7	55.8
Apr. 11	03 40.70	-31 18.7	2.593	2.131	+1.77	+32.4	14.9	52.2
Apr. 21	03 57.62	-26 11.9	2.709	2.173	+1.60	+28.6	15.0	48.2
May 1	04 13.01	-21 42.4	2.830	2.220	+1.47	+25.0	15.2	44.1
May 11	04 27.20	-17 47.6	2.949	2.273	+1.36	+21.7	15.4	40.1
May 21	04 40.41	-14 24.0	3.063	2.329	+1.27	+18.8	15.6	36.6
May 31	04 52.75	-11 28.1	3.166	2.390	+1.19	+16.2	15.8	33.8
June 10	05 04.28	-08 56.3	3.255	2.454	+1.11	+14.0	16.0	32.0
June 20	05 15.05	-06 45.2	3.329	2.522	+1.03	+12.1	16.1	31.7
June 30	05 25.02	-04 51.9	3.384	2.592	+0.95	+10.5	16.3	33.0
July 10	05 34.16	-03 13.7	3.421	2.664	+0.87	+9.1	16.4	35.9
July 20	05 42.41	-01 48.2	3.437	2.739	+0.77	+7.9	16.6	40.1
July 30	05 49.66	+00 33.2	3.433	2.816	+0.67	+7.0	16.7	45.4
Aug. 9	05 55.80	+00 33.6	3.411	2.894	+0.55	+6.3	16.8	51.7
Aug. 19	06 00.69	+01 34.1	3.370	2.974	+0.41	+5.8	16.9	58.8
Aug. 29	06 04.13	+02 30.4	3.313	3.054	+0.26	+5.5	17.0	66.5
Sept. 8	06 05.92	+03 24.5	3.243	3.136	+0.08	+5.4	17.0	74.9
Sept. 18	06 05.83	+04 18.7	3.163	3.219	-0.12	+5.5	17.1	84.1
Sept. 28	06 03.63	+05 14.9	3.079	3.302	-0.34	+5.8	17.1	93.9
Oct. 8	05 59.11	+06 15.2	2.996	3.386	-0.59	+6.3	17.2	104.4
Oct. 18	05 52.12	+07 21.1	2.920	3.470	-0.84	+6.9	17.2	115.7
Oct. 28	05 42.66	+08 33.4	2.860	3.555	-1.08	+7.6	17.3	127.6
Nov. 7	05 30.93	+09 51.9	2.824	3.640	-1.28	+8.2	17.4	140.2
Nov. 17	05 17.40	+11 15.3	2.818	3.726	-1.43	+8.5	17.5	153.0
Nov. 27	05 02.81	+12 41.0	2.849	3.811	-1.48	+8.6	17.6	165.2
Dec. 7	04 48.08	+14 06.1	2.920	3.897	-1.44	+8.4	17.7	171.3
Dec. 17	04 34.13	+15 27.9	3.032	3.983	-1.32	+7.9	17.9	162.8
Dec. 27	04 21.76	+16 45.0	3.182	4.068	-1.13	+7.4	18.1	150.7
Jan. 6	04 11.46	+17 56.9	3.366	4.154	-0.90	+6.9	18.3	138.6
Jan. 16	04 03.49	+19 03.9	3.577	4.240	-0.67	+6.5	18.5	126.8
Jan. 26	03 57.88	+20 07.0	3.808	4.325	-0.44	+6.1	18.8	115.5
Feb. 5	03 54.46	+21 06.9	4.054	4.411	-0.23	+5.8	19.0	104.8
Feb. 15	03 53.03	+22 04.4	4.308	4.496	-0.04	+5.6	19.2	94.6
Feb. 25	03 53.34	+23 00.2	4.564	4.581	+0.12	+5.5	19.4	84.8
Mar. 7	03 55.13	+23 54.5	4.817	4.666	+0.25	+5.4	19.6	75.3
Mar. 17	03 58.16	+24 47.6	5.063	4.751	+0.36	+5.3	19.8	66.3
Mar. 27	04 02.22	+25 39.8	5.298	4.836	+0.45	+5.2	20.0	57.5

## Comet 203P/Korlevic

Epoch = 2020 July 10.0 TT  
 T = 2020 Mar. 4.94875 TT  
 Peri. = 154.85875 e = 0.3149996  
 Node = 290.34871 2000.0 a = 4.6711108 AU  
 Incl. = 2.97334 n = 0.09762787  
 q = 3.1997128 AU P = 10.10 years

$$m_1 = 5.4 + 5 \log(\Delta) + 20.0 \log(r(t-100))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	03 56.52	+22 54.0	2.394	3.218	-0.27	-2.0	17.7	140.9
Jan. 12	03 54.81	+22 36.7	2.487	3.212	-0.05	-1.4	17.8	130.3
Jan. 22	03 55.35	+22 25.9	2.598	3.208	+0.18	-0.7	17.8	120.3
Feb. 1	03 58.13	+22 22.0	2.721	3.205	+0.40	0.0	17.9	110.7
Feb. 11	04 03.03	+22 24.4	2.853	3.202	+0.60	+0.5	18.0	101.7
Feb. 21	04 09.83	+22 32.0	2.990	3.200	+0.78	+1.0	18.0	93.2
Mar. 2	04 18.33	+22 43.5	3.129	3.200	+0.94	+1.3	18.1	85.1
Mar. 12	04 28.32	+22 57.3	3.267	3.200	+1.07	+1.5	18.2	77.4
Mar. 22	04 39.59	+23 12.0	3.401	3.201	+1.19	+1.5	18.2	70.0
Apr. 1	04 51.96	+23 26.3	3.531	3.203	+1.29	+1.3	18.3	63.0
Apr. 11	05 05.24	+23 38.7	3.654	3.206	+1.37	+1.1	18.4	56.2
Apr. 21	05 19.29	+23 48.2	3.768	3.210	+1.44	+0.8	18.4	49.6
May 1	05 33.97	+23 53.9	3.873	3.214	+1.50	+0.3	18.5	43.2
May 11	05 49.13	+23 54.9	3.968	3.220	+1.54	-0.2	18.5	37.0
May 21	06 04.66	+23 50.8	4.052	3.226	+1.57	-0.7	18.5	30.9
May 31	06 20.46	+23 41.0	4.125	3.234	+1.59	-1.3	18.6	24.9
June 10	06 36.40	+23 25.3	4.185	3.242	+1.60	-1.9	18.6	19.0
June 20	06 52.40	+23 03.7	4.232	3.251	+1.60	-2.5	18.6	13.2
June 30	07 08.37	+22 36.1	4.267	3.261	+1.59	-3.1	18.7	7.3
July 10	07 24.21	+22 02.7	4.288	3.271	+1.57	-3.6	18.7	1.5
July 20	07 39.86	+21 23.9	4.295	3.283	+1.55	-4.2	18.7	4.3
July 30	07 55.24	+20 40.0	4.289	3.295	+1.52	-4.7	18.7	10.2
Aug. 9	08 10.27	+19 51.5	4.270	3.308	+1.48	-5.1	18.7	16.2
Aug. 19	08 24.90	+18 59.0	4.237	3.322	+1.44	-5.4	18.7	22.2
Aug. 29	08 39.05	+18 03.3	4.190	3.336	+1.39	-5.7	18.7	28.4
Sept. 8	08 52.65	+17 05.1	4.130	3.351	+1.33	-5.9	18.7	34.7
Sept. 18	09 05.64	+16 05.3	4.058	3.367	+1.26	-6.0	18.7	41.2
Sept. 28	09 17.92	+15 04.8	3.974	3.384	+1.19	-6.0	18.6	47.8
Oct. 8	09 29.41	+14 04.6	3.879	3.401	+1.10	-6.0	18.6	54.7
Oct. 18	09 40.01	+13 05.9	3.773	3.418	+1.01	-5.8	18.6	61.9
Oct. 28	09 49.60	+12 09.8	3.660	3.437	+0.90	-5.4	18.5	69.3
Nov. 7	09 58.05	+11 17.5	3.540	3.455	+0.78	-5.0	18.5	77.1
Nov. 17	10 05.23	+10 30.5	3.415	3.475	+0.64	-4.4	18.5	85.2
Nov. 27	10 10.96	+09 50.0	3.289	3.495	+0.49	-3.6	18.4	93.7
Dec. 7	10 15.09	+09 17.4	3.164	3.515	+0.32	-2.8	18.4	102.7
Dec. 17	10 17.49	+08 54.0	3.045	3.536	+0.14	-1.8	18.3	112.2
Dec. 27	10 18.03	+08 40.6	2.935	3.557	-0.05	-0.8	18.3	122.2
Jan. 6	10 16.71	+08 37.8	2.839	3.579	-0.23	+0.3	18.3	132.6
Jan. 16	10 13.60	+08 45.4	2.762	3.601	-0.40	+1.3	18.2	143.6
Jan. 26	10 08.94	+09 02.3	2.708	3.623	-0.54	+2.1	18.2	154.9
Feb. 5	10 03.15	+09 26.3	2.681	3.646	-0.62	+2.7	18.3	166.4
Feb. 15	09 56.75	+09 54.6	2.683	3.670	-0.65	+3.0	18.3	177.1
Feb. 25	09 50.39	+10 24.0	2.715	3.693	-0.61	+2.9	18.4	169.6
Mar. 7	09 44.67	+10 51.4	2.777	3.717	-0.52	+2.5	18.5	158.3
Mar. 17	09 40.10	+11 14.1	2.866	3.741	-0.38	+1.9	18.6	147.1
Mar. 27	09 37.04	+11 30.3	2.979	3.765	-0.21	+1.2	18.7	136.4

Comet 228P/LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2020 Mar. 10.56498 TT  
 Peri. = 115.28497 e = 0.1767307  
 Node = 30.98438 2000.0 a = 4.1733854 AU  
 Incl. = 7.91001 n = 0.11560359  
 q = 3.4358201 AU P = 8.53 years

$$m1 = 8.5 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	10 10.79	+21 45.5	2.699	3.446	-0.16	+2.8	18.7	133.1
Jan. 12	10 08.32	+22 16.9	2.602	3.443	-0.36	+3.4	18.6	143.6
Jan. 22	10 03.93	+22 52.9	2.529	3.441	-0.53	+3.7	18.6	154.1
Feb. 1	09 57.97	+23 29.7	2.481	3.439	-0.66	+3.5	18.5	164.1
Feb. 11	09 51.02	+24 02.5	2.462	3.438	-0.72	+2.9	18.5	169.6
Feb. 21	09 43.79	+24 27.4	2.473	3.437	-0.71	+1.9	18.5	164.7
Mar. 2	09 37.05	+24 41.4	2.512	3.436	-0.62	+0.7	18.5	155.0
Mar. 12	09 31.50	+24 42.9	2.578	3.436	-0.47	-0.5	18.6	144.5
Mar. 22	09 27.61	+24 32.1	2.666	3.436	-0.28	-1.7	18.7	134.2
Apr. 1	09 25.69	+24 10.0	2.774	3.437	-0.08	-2.8	18.8	124.3
Apr. 11	09 25.81	+23 38.0	2.895	3.438	+0.12	-3.7	18.9	114.8
Apr. 21	09 27.90	+22 57.5	3.027	3.440	+0.31	-4.5	19.0	105.8
May 1	09 31.80	+22 09.8	3.166	3.442	+0.48	-5.1	19.1	97.3
May 11	09 37.30	+21 15.8	3.307	3.444	+0.63	-5.7	19.2	89.2
May 21	09 44.17	+20 16.4	3.449	3.447	+0.75	-6.2	19.3	81.4
May 31	09 52.20	+19 12.0	3.589	3.450	+0.86	-6.7	19.3	74.0
June 10	10 01.19	+18 03.2	3.724	3.454	+0.95	-7.1	19.4	66.9
June 20	10 10.97	+16 50.4	3.853	3.458	+1.02	-7.5	19.5	60.0
June 30	10 21.41	+15 34.0	3.974	3.463	+1.07	-7.8	19.6	53.3
July 10	10 32.35	+14 14.5	4.085	3.468	+1.12	-8.1	19.7	46.7
July 20	10 43.70	+12 52.1	4.186	3.473	+1.15	-8.4	19.7	40.3
July 30	10 55.38	+11 27.3	4.275	3.479	+1.18	-8.6	19.8	33.9
Aug. 9	11 07.29	+10 00.6	4.351	3.486	+1.20	-8.8	19.8	27.7
Aug. 19	11 19.39	+08 32.3	4.414	3.492	+1.22	-8.9	19.9	21.5
Aug. 29	11 31.61	+07 03.1	4.463	3.499	+1.23	-9.0	19.9	15.3
Sept. 8	11 43.91	+05 33.3	4.497	3.507	+1.23	-9.0	19.9	9.3
Sept. 18	11 56.23	+04 03.6	4.516	3.514	+1.23	-9.0	20.0	4.0
Sept. 28	12 08.54	+02 34.4	4.519	3.522	+1.23	-8.9	20.0	5.2
Oct. 8	12 20.77	+01 06.4	4.507	3.531	+1.22	-8.7	20.0	11.0
Oct. 18	12 32.89	+00 20.0	4.478	3.540	+1.20	-8.5	20.0	17.4
Oct. 28	12 44.83	-01 44.1	4.434	3.549	+1.18	-8.3	20.0	23.9
Nov. 7	12 56.53	-03 05.3	4.375	3.558	+1.15	-7.9	20.0	30.7
Nov. 17	13 07.91	-04 23.0	4.301	3.568	+1.12	-7.6	20.0	37.6
Nov. 27	13 18.88	-05 36.7	4.212	3.578	+1.07	-7.1	19.9	44.6
Dec. 7	13 29.34	-06 45.8	4.111	3.589	+1.01	-6.6	19.9	51.9
Dec. 17	13 39.16	-07 49.8	3.999	3.599	+0.94	-6.1	19.9	59.4
Dec. 27	13 48.20	-08 48.1	3.876	3.610	+0.86	-5.5	19.8	67.2
Jan. 6	13 56.32	-09 40.2	3.746	3.622	+0.75	-4.9	19.8	75.2
Jan. 16	14 03.33	-10 25.7	3.611	3.633	+0.63	-4.2	19.7	83.5
Jan. 26	14 09.04	-11 04.0	3.474	3.645	+0.49	-3.4	19.6	92.1
Feb. 5	14 13.29	-11 34.9	3.337	3.657	+0.34	-2.7	19.6	101.1
Feb. 15	14 15.88	-11 58.0	3.205	3.669	+0.16	-1.9	19.5	110.5
Feb. 25	14 16.69	-12 13.0	3.082	3.681	-0.02	-1.1	19.4	120.3
Mar. 7	14 15.66	-12 19.8	2.972	3.694	-0.20	-0.2	19.4	130.5
Mar. 17	14 12.83	-12 18.7	2.879	3.707	-0.38	+0.5	19.3	141.2
Mar. 27	14 08.37	-12 10.4	2.809	3.720	-0.52	+1.2	19.3	152.2

## Comet C/2019 Y1 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2020 Mar. 15.56970 TT  
 Peri. = 57.55106  
 Node = 31.38189 2000.0  
 Incl. = 73.33882  
 q = 0.8371575 AU  
 e = 0.9956327

$$m1 = 11.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	23 40.33	-28 25.9	1.657	1.534	-0.22	+44.3	14.5	65.3
Jan. 12	23 39.49	-20 59.2	1.659	1.403	+0.06	+45.1	14.1	57.5
Jan. 22	23 41.04	-13 25.7	1.661	1.275	+0.26	+45.7	13.7	50.0
Feb. 1	23 44.20	-05 45.3	1.658	1.152	+0.38	+46.5	13.2	42.9
Feb. 11	23 48.31	+02 04.7	1.645	1.040	+0.44	+47.7	12.8	36.8
Feb. 21	23 52.91	+10 08.3	1.618	0.945	+0.48	+49.3	12.3	32.3
Mar. 2	23 57.75	+18 30.7	1.572	0.875	+0.49	+51.5	11.9	30.4
Mar. 12	00 02.88	+27 17.5	1.504	0.840	+0.55	+54.3	11.6	31.7
Mar. 22	00 09.08	+36 38.1	1.416	0.846	+0.74	+58.5	11.5	36.0
Apr. 1	00 18.19	+46 49.7	1.316	0.891	+1.20	+64.8	11.6	42.6
Apr. 11	00 34.70	+58 14.1	1.218	0.970	+2.45	+73.1	11.8	50.6
Apr. 21	01 15.11	+70 57.2	1.141	1.071	+7.48	+78.6	12.1	59.4
May 1	04 28.48	+82 13.5	1.105	1.186	+45.85	+23.6	12.5	68.2
May 11	09 57.06	+75 15.9	1.125	1.311	+11.40	-80.7	12.9	75.5
May 21	11 02.83	+61 35.2	1.207	1.440	+3.41	-79.5	13.5	80.4
May 31	11 28.37	+49 11.4	1.346	1.572	+1.86	-67.5	14.1	82.2
June 10	11 44.33	+38 54.8	1.529	1.704	+1.36	-54.8	14.7	81.4
June 20	11 56.83	+30 36.6	1.742	1.836	+1.15	-44.2	15.3	78.7
June 30	12 07.84	+23 53.7	1.975	1.968	+1.05	-36.0	15.9	74.7
July 10	12 18.12	+18 23.3	2.219	2.098	+1.00	-29.8	16.4	69.8
July 20	12 28.01	+13 47.4	2.469	2.227	+0.98	-25.2	16.9	64.4
July 30	12 37.72	+09 52.5	2.719	2.355	+0.96	-21.6	17.4	58.6
Aug. 9	12 47.29	+06 28.8	2.964	2.480	+0.95	-18.9	17.8	52.5
Aug. 19	12 56.79	+03 29.3	3.201	2.605	+0.95	-16.8	18.2	46.2
Aug. 29	13 06.23	+00 48.9	3.428	2.728	+0.94	-15.1	18.5	39.7
Sept. 8	13 15.58	-01 36.2	3.641	2.849	+0.93	-13.8	18.9	33.0
Sept. 18	13 24.83	-03 48.7	3.837	2.969	+0.92	-12.6	19.1	26.2
Sept. 28	13 33.96	-05 50.7	4.016	3.087	+0.90	-11.7	19.4	19.2
Oct. 8	13 42.92	-07 43.7	4.174	3.204	+0.88	-10.9	19.7	12.1
Oct. 18	13 51.65	-09 29.1	4.311	3.319	+0.86	-10.1	19.9	4.9
Oct. 28	14 00.10	-11 07.6	4.425	3.434	+0.83	-9.5	20.1	3.1
Nov. 7	14 08.19	-12 40.1	4.516	3.546	+0.79	-8.9	20.3	10.5
Nov. 17	14 15.83	-14 07.0	4.583	3.658	+0.74	-8.4	20.4	18.4
Nov. 27	14 22.93	-15 29.0	4.626	3.769	+0.68	-7.9	20.6	26.4
Dec. 7	14 29.36	-16 46.2	4.647	3.878	+0.60	-7.5	20.7	34.7
Dec. 17	14 35.01	-17 59.2	4.646	3.986	+0.52	-7.1	20.8	43.2
Dec. 27	14 39.71	-19 07.9	4.624	4.093	+0.41	-6.6	20.9	52.0
Jan. 6	14 43.32	-20 12.5	4.586	4.199	+0.30	-6.2	21.0	61.1
Jan. 16	14 45.68	-21 12.9	4.533	4.304	+0.16	-5.8	21.1	70.4
Jan. 26	14 46.61	-22 09.0	4.470	4.408	+0.01	-5.3	21.2	80.1
Feb. 5	14 45.98	-23 00.2	4.401	4.511	-0.15	-4.8	21.3	90.1
Feb. 15	14 43.66	-23 45.8	4.332	4.614	-0.33	-4.2	21.3	100.4
Feb. 25	14 39.59	-24 24.8	4.269	4.715	-0.50	-3.5	21.4	111.0
Mar. 7	14 33.83	-24 56.0	4.217	4.815	-0.67	-2.7	21.5	121.9
Mar. 17	14 26.50	-25 18.3	4.183	4.915	-0.81	-1.7	21.5	133.0
Mar. 27	14 17.91	-25 30.6	4.172	5.014	-0.91	-0.7	21.6	144.0

## Comet 390P/Gibbs

Epoch = 2020 July 10.0 TT  
 T = 2020 Mar. 22.23010 TT  
 Peri. = 232.33988 e = 0.7068855  
 Node = 152.27918 2000.0 a = 5.7990120 AU  
 Incl. = 18.55915 n = 0.07057860  
 q = 1.6997745 AU P = 13.96 years

$$m_1 = 10.0 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	21 38.50	-16 26.3	2.546	1.913	+2.38	+5.4	16.3	40.8
Jan. 12	22 02.74	-15 25.2	2.562	1.866	+2.47	+7.0	16.1	36.5
Jan. 22	22 27.82	-14 09.0	2.575	1.824	+2.55	+8.4	16.0	32.6
Feb. 1	22 53.61	-12 38.7	2.585	1.788	+2.61	+9.8	15.8	29.0
Feb. 11	23 19.98	-10 55.8	2.593	1.757	+2.66	+10.9	15.7	25.8
Feb. 21	23 46.83	-09 02.4	2.600	1.732	+2.71	+11.8	15.7	22.9
Mar. 2	00 14.08	-07 00.7	2.609	1.715	+2.74	+12.5	15.6	20.3
Mar. 12	00 41.62	-04 53.8	2.619	1.704	+2.77	+12.9	15.6	18.1
Mar. 22	01 09.39	-02 44.4	2.633	1.700	+2.79	+12.9	15.6	16.3
Apr. 1	01 37.31	+00 35.9	2.651	1.703	+2.80	+12.7	15.6	14.7
Apr. 11	02 05.26	+01 28.4	2.673	1.714	+2.79	+12.1	15.6	13.5
Apr. 21	02 33.17	+03 25.8	2.699	1.731	+2.78	+11.2	15.7	12.5
May 1	03 00.93	+05 13.3	2.729	1.756	+2.76	+10.1	15.8	11.9
May 11	03 28.41	+06 48.8	2.763	1.786	+2.73	+8.8	16.0	11.7
May 21	03 55.48	+08 10.7	2.800	1.822	+2.68	+7.4	16.1	12.0
May 31	04 22.03	+09 17.9	2.839	1.864	+2.62	+5.9	16.3	12.9
June 10	04 47.91	+10 09.8	2.878	1.910	+2.55	+4.4	16.5	14.2
June 20	05 13.03	+10 46.7	2.917	1.961	+2.46	+2.9	16.7	16.1
June 30	05 37.25	+11 09.1	2.953	2.015	+2.37	+1.5	16.9	18.6
July 10	06 00.50	+11 17.9	2.985	2.072	+2.27	+0.2	17.1	21.4
July 20	06 22.70	+11 14.4	3.012	2.133	+2.16	-1.0	17.3	24.8
July 30	06 43.77	+10 59.9	3.033	2.195	+2.04	-2.0	17.5	28.5
Aug. 9	07 03.67	+10 36.1	3.046	2.260	+1.92	-2.8	17.7	32.6
Aug. 19	07 22.35	+10 04.4	3.050	2.326	+1.80	-3.5	17.9	37.2
Aug. 29	07 39.75	+09 26.6	3.045	2.393	+1.67	-4.1	18.1	42.1
Sept. 8	07 55.83	+08 44.3	3.029	2.462	+1.53	-4.4	18.3	47.4
Sept. 18	08 10.54	+07 59.1	3.003	2.531	+1.39	-4.6	18.4	53.1
Sept. 28	08 23.79	+07 12.8	2.967	2.601	+1.24	-4.6	18.6	59.3
Oct. 8	08 35.50	+06 27.2	2.920	2.672	+1.08	-4.5	18.7	65.9
Oct. 18	08 45.56	+05 44.0	2.865	2.743	+0.91	-4.1	18.9	72.9
Oct. 28	08 53.84	+05 05.4	2.802	2.814	+0.72	-3.5	19.0	80.5
Nov. 7	09 00.21	+04 33.3	2.734	2.886	+0.53	-2.8	19.1	88.6
Nov. 17	09 04.51	+04 09.8	2.664	2.957	+0.31	-1.8	19.2	97.3
Nov. 27	09 06.62	+03 57.3	2.595	3.028	+0.09	-0.6	19.3	106.6
Dec. 7	09 06.47	+03 57.6	2.531	3.100	-0.14	+0.8	19.4	116.5
Dec. 17	09 04.06	+04 12.4	2.479	3.171	-0.36	+2.3	19.5	127.0
Dec. 27	08 59.57	+04 42.4	2.443	3.241	-0.55	+3.8	19.6	138.0
Jan. 6	08 53.36	+05 27.0	2.428	3.312	-0.70	+5.2	19.7	149.3
Jan. 16	08 45.97	+06 24.0	2.440	3.382	-0.78	+6.3	19.9	160.3
Jan. 26	08 38.08	+07 29.9	2.481	3.452	-0.79	+6.9	20.0	168.7
Feb. 5	08 30.46	+08 40.1	2.553	3.521	-0.72	+7.1	20.2	167.0
Feb. 15	08 23.77	+09 50.3	2.656	3.590	-0.60	+6.9	20.4	157.7
Feb. 25	08 18.53	+10 56.5	2.788	3.658	-0.43	+6.3	20.7	147.0
Mar. 7	08 15.05	+11 56.0	2.945	3.726	-0.25	+5.5	20.9	136.4
Mar. 17	08 13.43	+12 47.3	3.122	3.794	-0.06	+4.6	21.2	126.1
Mar. 27	08 13.66	+13 29.5	3.316	3.861	+0.12	+3.7	21.4	116.2

Comet C/2017 K5 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2020 Mar. 25.27015 TT  
 Peri. = 171.90798  
 Node = 102.37419 2000.0  
 Incl. = 82.25479  
 q = 7.6789689 AU  
 e = 1.0068584

$$m1 = -8.8 + 5 \log(\Delta) + 25.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .5			m	'		°
Jan. 2	18 42.05	-11 08.5	8.656	7.696	+0.52	-2.9	18.0	11.9
Jan. 12	18 47.24	-11 36.0	8.640	7.693	+0.52	-2.6	18.0	14.5
Jan. 22	18 52.34	-12 01.2	8.600	7.689	+0.50	-2.4	18.0	21.0
Feb. 1	18 57.25	-12 24.5	8.534	7.686	+0.48	-2.3	18.0	28.9
Feb. 11	19 01.86	-12 46.6	8.446	7.684	+0.44	-2.2	18.0	37.3
Feb. 21	19 06.09	-13 08.0	8.336	7.682	+0.40	-2.1	17.9	46.0
Mar. 2	19 09.83	-13 29.3	8.207	7.680	+0.34	-2.2	17.9	54.9
Mar. 12	19 12.98	-13 51.3	8.063	7.679	+0.28	-2.3	17.9	64.0
Mar. 22	19 15.47	-14 14.6	7.906	7.679	+0.21	-2.4	17.8	73.3
Apr. 1	19 17.21	-14 40.0	7.742	7.679	+0.13	-2.7	17.8	82.7
Apr. 11	19 18.12	-15 07.9	7.574	7.680	+0.04	-3.0	17.7	92.3
Apr. 21	19 18.14	-15 39.0	7.407	7.681	-0.05	-3.3	17.7	102.1
May 1	19 17.23	-16 13.6	7.247	7.682	-0.14	-3.7	17.6	112.1
May 11	19 15.39	-16 52.0	7.098	7.684	-0.24	-4.0	17.6	122.2
May 21	19 12.63	-17 34.1	6.966	7.687	-0.32	-4.4	17.6	132.6
May 31	19 09.01	-18 19.6	6.855	7.690	-0.40	-4.7	17.5	143.1
June 10	19 04.66	-19 08.0	6.770	7.694	-0.47	-5.0	17.5	153.8
June 20	18 59.72	-19 58.4	6.713	7.698	-0.52	-5.1	17.5	164.6
June 30	18 54.41	-20 50.0	6.689	7.703	-0.54	-5.2	17.5	175.3
July 10	18 48.94	-21 41.6	6.697	7.708	-0.55	-5.1	17.5	173.3
July 20	18 43.57	-22 32.4	6.738	7.713	-0.52	-5.0	17.5	162.6
July 30	18 38.54	-23 21.6	6.810	7.719	-0.48	-4.8	17.6	151.8
Aug. 9	18 34.07	-24 08.5	6.910	7.726	-0.41	-4.5	17.6	141.2
Aug. 19	18 30.32	-24 52.8	7.035	7.733	-0.33	-4.3	17.6	130.7
Aug. 29	18 27.45	-25 34.3	7.182	7.741	-0.24	-4.0	17.7	120.3
Sept. 8	18 25.54	-26 13.1	7.343	7.749	-0.14	-3.7	17.8	110.2
Sept. 18	18 24.61	-26 49.4	7.516	7.757	-0.04	-3.5	17.8	100.2
Sept. 28	18 24.69	-27 23.3	7.694	7.766	+0.06	-3.3	17.9	90.4
Oct. 8	18 25.72	-27 55.1	7.872	7.776	+0.15	-3.1	17.9	80.8
Oct. 18	18 27.66	-28 25.0	8.046	7.786	+0.24	-2.9	18.0	71.4
Oct. 28	18 30.44	-28 53.3	8.212	7.796	+0.32	-2.8	18.1	62.1
Nov. 7	18 33.96	-29 20.3	8.364	7.807	+0.39	-2.6	18.1	52.9
Nov. 17	18 38.14	-29 46.2	8.501	7.819	+0.45	-2.5	18.2	43.9
Nov. 27	18 42.87	-30 11.2	8.618	7.831	+0.50	-2.5	18.2	35.0
Dec. 7	18 48.05	-30 35.6	8.713	7.843	+0.54	-2.4	18.3	26.4
Dec. 17	18 53.58	-30 59.7	8.785	7.856	+0.57	-2.4	18.3	18.2
Dec. 27	18 59.35	-31 23.9	8.831	7.869	+0.59	-2.4	18.3	11.3
Jan. 6	19 05.26	-31 48.5	8.852	7.883	+0.59	-2.5	18.4	9.3
Jan. 16	19 11.20	-32 13.9	8.847	7.897	+0.59	-2.6	18.4	14.3
Jan. 26	19 17.07	-32 40.6	8.816	7.912	+0.58	-2.8	18.4	22.0
Feb. 5	19 22.77	-33 09.1	8.761	7.927	+0.56	-3.0	18.4	30.4
Feb. 15	19 28.19	-33 40.0	8.684	7.943	+0.52	-3.2	18.4	39.1
Feb. 25	19 33.23	-34 13.6	8.587	7.959	+0.48	-3.5	18.4	48.0
Mar. 7	19 37.77	-34 50.6	8.473	7.975	+0.42	-3.9	18.4	56.9
Mar. 17	19 41.72	-35 31.3	8.345	7.992	+0.36	-4.3	18.4	66.0
Mar. 27	19 44.96	-36 16.2	8.207	8.009	+0.28	-4.7	18.4	75.1

## Comet 392P/LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2020 Mar. 31.83374 TT  
 Peri. = 71.99270 e = 0.6828713  
 Node = 24.88504 2000.0 a = 6.1495592 AU  
 Incl. = 4.92938 n = 0.06463059  
 q = 1.9502017 AU P = 15.25 years

$$m_1 = 15.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	01 54.34	+15 32.8	1.588	2.149	+0.69	+4.8	19.3	111.2
Jan. 12	02 02.61	+16 26.3	1.655	2.110	+0.99	+6.0	19.3	103.2
Jan. 22	02 13.79	+17 31.2	1.726	2.074	+1.27	+7.0	19.4	96.0
Feb. 1	02 27.66	+18 44.9	1.800	2.042	+1.52	+7.7	19.4	89.3
Feb. 11	02 43.95	+20 04.1	1.876	2.015	+1.75	+8.1	19.4	83.3
Feb. 21	03 02.42	+21 25.4	1.952	1.992	+1.96	+8.1	19.4	77.7
Mar. 2	03 22.86	+22 45.4	2.028	1.974	+2.14	+7.8	19.5	72.6
Mar. 12	03 45.05	+24 00.5	2.105	1.961	+2.31	+7.1	19.5	67.9
Mar. 22	04 08.77	+25 07.3	2.183	1.953	+2.45	+6.1	19.6	63.5
Apr. 1	04 33.77	+26 02.9	2.261	1.950	+2.56	+4.8	19.7	59.3
Apr. 11	04 59.80	+26 44.5	2.340	1.953	+2.65	+3.3	19.8	55.4
Apr. 21	05 26.54	+27 10.2	2.421	1.961	+2.70	+1.6	19.8	51.6
May 1	05 53.73	+27 18.5	2.502	1.974	+2.73	-0.1	19.9	47.9
May 11	06 21.03	+27 08.9	2.586	1.992	+2.72	-1.9	20.1	44.3
May 21	06 48.16	+26 41.6	2.670	2.015	+2.69	-3.7	20.2	40.8
May 31	07 14.89	+25 57.3	2.756	2.043	+2.64	-5.3	20.3	37.2
June 10	07 40.97	+24 57.5	2.842	2.075	+2.57	-6.8	20.4	33.6
June 20	08 06.28	+23 43.9	2.929	2.111	+2.48	-8.0	20.6	30.0
June 30	08 30.71	+22 18.4	3.014	2.150	+2.39	-9.1	20.7	26.3
July 10	08 54.20	+20 43.2	3.098	2.193	+2.30	-10.0	20.9	22.5
July 20	09 16.72	+19 00.2	3.179	2.239	+2.20	-10.6	21.0	18.5
July 30	09 38.31	+17 11.4	3.257	2.288	+2.11	-11.1	21.2	14.5
Aug. 9	09 58.96	+15 18.7	3.330	2.339	+2.02	-11.4	21.3	10.3
Aug. 19	10 18.74	+13 23.5	3.397	2.393	+1.93	-11.6	21.4	6.1
Aug. 29	10 37.68	+11 27.3	3.456	2.448	+1.85	-11.6	21.6	2.7
Sept. 8	10 55.82	+09 31.5	3.508	2.505	+1.77	-11.5	21.7	4.7
Sept. 18	11 13.20	+07 37.2	3.550	2.563	+1.70	-11.3	21.8	9.3
Sept. 28	11 29.85	+05 45.4	3.582	2.623	+1.62	-11.0	22.0	14.4
Oct. 8	11 45.77	+03 57.0	3.602	2.684	+1.55	-10.6	.	19.8
Oct. 18	12 00.97	+02 12.8	3.611	2.746	+1.48	-10.1	.	25.5
Oct. 28	12 15.43	+00 33.8	3.607	2.808	+1.40	-9.6	.	31.5
Nov. 7	12 29.10	+00 59.6	3.591	2.871	+1.32	-9.0	.	37.7
Nov. 17	12 41.95	-02 26.5	3.561	2.935	+1.24	-8.3	.	44.2
Nov. 27	12 53.87	-03 46.5	3.519	2.999	+1.14	-7.6	.	51.1
Dec. 7	13 04.79	-04 58.7	3.465	3.063	+1.03	-6.8	.	58.2
Dec. 17	13 14.57	-06 02.8	3.401	3.128	+0.91	-5.9	.	65.7
Dec. 27	13 23.07	-06 58.1	3.328	3.193	+0.77	-5.0	.	73.6
Jan. 6	13 30.13	-07 44.1	3.248	3.258	+0.62	-4.1	.	81.9
Jan. 16	13 35.59	-08 20.3	3.163	3.322	+0.45	-3.1	.	90.6
Jan. 26	13 39.27	-08 46.2	3.078	3.387	+0.27	-2.0	.	99.8
Feb. 5	13 41.05	-09 01.5	2.997	3.452	+0.07	-0.9	.	109.4
Feb. 15	13 40.84	-09 06.0	2.923	3.517	-0.13	+0.1	.	119.6
Feb. 25	13 38.67	-08 59.8	2.862	3.581	-0.32	+1.2	.	130.2
Mar. 7	13 34.69	-08 43.9	2.818	3.645	-0.49	+2.1	.	141.2
Mar. 17	13 29.18	-08 19.7	2.798	3.709	-0.62	+2.8	.	152.6
Mar. 27	13 22.61	-07 49.3	2.803	3.773	-0.69	+3.3	.	164.2

Comet 210P/Christensen

Epoch = 2020 July 10.0 TT  
 T = 2020 Apr. 7.90030 TT  
 Peri. = 345.90772 e = 0.8332121  
 Node = 93.83566 2000.0 a = 3.1655714 AU  
 Incl. = 10.26182 n = 0.17499511  
 q = 0.5279790 AU P = 5.63 years

$$m_1 = 14.6 + 5 \log(\Delta) + 10.0 \log(r(t-10))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	20 31.07	-23 49.3	2.581	1.729	+2.15	+7.0	19.3	23.9
Jan. 12	20 53.41	-22 31.3	2.499	1.603	+2.34	+8.8	19.0	19.2
Jan. 22	21 17.73	-20 54.1	2.400	1.472	+2.55	+10.9	18.6	15.1
Feb. 1	21 44.29	-18 53.2	2.286	1.337	+2.79	+13.6	18.1	11.8
Feb. 11	22 13.42	-16 23.1	2.160	1.198	+3.07	+16.9	17.5	9.4
Feb. 21	22 45.67	-13 16.6	2.024	1.054	+3.42	+21.0	16.9	8.0
Mar. 2	23 21.76	-09 24.6	1.881	0.909	+3.86	+26.1	16.2	7.7
Mar. 12	00 02.69	-04 36.7	1.735	0.766	+4.41	+32.3	15.4	8.5
Mar. 22	00 49.73	+01 16.3	1.587	0.638	+5.09	+39.0	14.4	11.0
Apr. 1	01 44.12	+08 13.8	1.437	0.549	+5.87	+44.5	13.4	15.8
Apr. 11	02 46.33	+15 47.5	1.291	0.532	+6.65	+45.1	12.5	22.7
Apr. 21	03 56.47	+22 53.6	1.168	0.597	+7.47	+38.1	12.2	30.8
May 1	05 14.66	+28 12.3	1.095	0.714	+8.16	+23.0	12.6	39.5
May 11	06 36.80	+30 34.5	1.085	0.853	+8.08	+3.4	13.3	47.9
May 21	07 53.65	+29 50.7	1.136	0.999	+7.06	-12.6	14.2	55.0
May 31	08 58.13	+27 00.8	1.239	1.143	+5.69	-20.9	15.1	60.0
June 10	09 49.40	+23 17.6	1.379	1.284	+4.49	-23.2	15.9	62.8
June 20	10 30.07	+19 27.0	1.545	1.421	+3.60	-22.5	16.6	63.5
June 30	11 03.13	+15 48.9	1.729	1.554	+2.98	-20.8	17.3	62.7
July 10	11 30.85	+12 29.6	1.924	1.681	+2.55	-18.9	17.9	60.8
July 20	11 54.85	+09 29.1	2.125	1.804	+2.24	-17.1	18.5	57.9
July 30	12 16.22	+06 45.6	2.329	1.923	+2.02	-15.5	19.0	54.4
Aug. 9	12 35.68	+04 17.1	2.531	2.038	+1.86	-14.1	19.5	50.3
Aug. 19	12 53.74	+02 01.6	2.729	2.150	+1.74	-12.9	19.9	45.8
Aug. 29	13 10.74	+00 02.4	2.921	2.257	+1.65	-11.8	20.3	41.0
Sept. 8	13 26.91	-01 56.1	3.104	2.362	+1.58	-10.9	20.6	35.8
Sept. 18	13 42.44	-03 40.6	3.276	2.463	+1.52	-10.0	20.9	30.5
Sept. 28	13 57.44	-05 16.5	3.435	2.561	+1.47	-9.1	21.2	24.9
Oct. 8	14 11.96	-06 44.3	3.580	2.657	+1.43	-8.3	21.5	19.2
Oct. 18	14 26.07	-08 04.3	3.709	2.750	+1.39	-7.6	21.7	13.5
Oct. 28	14 39.78	-09 16.8	3.820	2.840	+1.35	-6.8	21.9	8.3
Nov. 7	14 53.07	-10 22.0	3.912	2.928	+1.31	-6.1	.	6.0
Nov. 17	15 05.93	-11 20.0	3.984	3.014	+1.26	-5.4	.	9.6
Nov. 27	15 18.30	-12 10.9	4.036	3.097	+1.21	-4.7	.	15.6
Dec. 7	15 30.12	-12 54.8	4.067	3.178	+1.15	-4.0	.	22.4
Dec. 17	15 41.32	-13 31.9	4.077	3.258	+1.08	-3.3	.	29.5
Dec. 27	15 51.79	-14 02.3	4.067	3.335	+1.00	-2.7	.	37.0
Jan. 6	16 01.41	-14 26.1	4.038	3.410	+0.91	-2.0	.	44.7
Jan. 16	16 10.08	-14 43.6	3.991	3.484	+0.81	-1.4	.	52.7
Jan. 26	16 17.61	-14 55.0	3.927	3.556	+0.69	-0.8	.	61.0
Feb. 5	16 23.87	-15 00.6	3.850	3.626	+0.55	-0.3	.	69.6
Feb. 15	16 28.70	-15 00.7	3.762	3.694	+0.40	+0.3	.	78.5
Feb. 25	16 31.90	-14 55.6	3.668	3.761	+0.23	+0.8	.	87.7
Mar. 7	16 33.34	-14 45.7	3.570	3.826	+0.04	+1.2	.	97.4
Mar. 17	16 32.88	-14 31.5	3.475	3.890	-0.15	+1.7	.	107.4
Mar. 27	16 30.45	-14 13.3	3.386	3.952	-0.35	+2.0	.	117.9

## Comet P/2005 T2 (Christensen)

Epoch = 2020 July 10.0 TT  
 T = 2020 Apr. 8.52947 TT  
 Peri. = 58.80060 e = 0.4165508  
 Node = 260.15713 2000.0 a = 3.8465440 AU  
 Incl. = 8.29284 n = 0.13064657  
 q = 2.2442630 AU P = 7.54 years

$$m_1 = 12.4 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	19 00.96	-20 08.3	3.335	2.356	-0.92 -3.1	20.6	31.3/81	4.4
Jan. 12	19 22.92	-19 12.9	3.316	2.335	-0.93 -3.6	20.5	31.7/79	3.2
Jan. 22	19 44.84	-18 05.6	3.289	2.316	-0.93 -4.0	20.5	32.1/77	7.0
Feb. 1	20 06.63	-16 46.8	3.255	2.299	-0.94 -4.5	20.4	32.3/75	11.6
Feb. 11	20 28.17	-15 17.0	3.215	2.284	-0.94 -4.9	20.3	32.4/73	16.2
Feb. 21	20 49.40	-13 37.1	3.168	2.272	-0.94 -5.2	20.2	32.4/71	20.9
Mar. 2	21 10.26	-11 48.3	3.115	2.261	-0.94 -5.6	20.2	32.3/70	25.5
Mar. 12	21 30.67	-09 51.8	3.057	2.254	-0.94 -5.9	20.1	32.1/68	30.1
Mar. 22	21 50.62	-07 48.8	2.994	2.248	-0.94 -6.1	20.1	31.8/67	34.7
Apr. 1	22 10.06	-05 40.7	2.927	2.245	-0.95 -6.3	20.0	31.4/66	39.3
Apr. 11	22 28.95	-03 29.2	2.856	2.244	-0.95 -6.4	19.9	30.8/64	43.9
Apr. 21	22 47.28	-01 15.4	2.780	2.246	-0.96 -6.5	19.9	30.2/64	48.6
May 1	23 05.00	+00 58.9	2.702	2.250	-0.97 -6.5	19.8	29.3/63	53.3
May 11	23 22.04	+03 12.5	2.620	2.257	-0.99 -6.5	19.8	28.3/62	58.2
May 21	23 38.38	+05 23.8	2.535	2.266	-1.00 -6.4	19.7	27.1/61	63.2
May 31	23 53.89	+07 31.6	2.448	2.277	-1.03 -6.3	19.7	25.6/61	68.3
June 10	00 08.48	+09 34.4	2.359	2.291	-1.06 -6.1	19.7	24.0/60	73.7
June 20	00 22.01	+11 31.0	2.268	2.307	-1.09 -6.0	19.6	22.0/59	79.3
June 30	00 34.28	+13 19.9	2.176	2.325	-1.13 -5.8	19.6	19.8/58	85.3
July 10	00 45.09	+14 59.7	2.084	2.345	-1.18 -5.7	19.5	17.2/57	91.7
July 20	00 54.19	+16 28.9	1.993	2.367	-1.24 -5.6	19.5	14.2/54	98.5
July 30	01 01.27	+17 45.6	1.905	2.390	-1.30 -5.5	19.5	10.9/51	105.8
Aug. 9	01 06.09	+18 47.8	1.823	2.416	-1.38 -5.6	19.4	7.3/43	113.7
Aug. 19	01 08.39	+19 33.0	1.748	2.443	-1.46 -5.7	19.4	3.7/19	122.2
Aug. 29	01 08.06	+19 58.6	1.684	2.471	-1.54 -6.0	19.4	2.9/299	131.4
Sept. 8	01 05.19	+20 02.6	1.635	2.501	-1.61 -6.5	19.4	5.9/262	141.1
Sept. 18	01 00.15	+19 43.6	1.605	2.532	-1.66 -7.0	19.5	9.0/250	151.2
Sept. 28	00 53.64	+19 02.9	1.596	2.564	-1.69 -7.5	19.5	11.1/243	160.9
Oct. 8	00 46.61	+18 04.4	1.613	2.598	-1.67 -7.9	19.7	11.9/236	167.6
Oct. 18	00 40.04	+16 54.9	1.656	2.632	-1.62 -8.1	19.8	11.2/230	165.4
Oct. 28	00 34.84	+15 42.6	1.725	2.667	-1.54 -8.0	20.0	9.3/221	156.9
Nov. 7	00 31.61	+14 35.3	1.819	2.703	-1.45 -7.7	20.2	6.9/205	146.8
Nov. 17	00 30.64	+13 38.8	1.935	2.740	-1.35 -7.3	20.4	4.9/175	136.8
Nov. 27	00 31.99	+12 56.6	2.069	2.777	-1.24 -6.7	20.6	5.0/132	127.1
Dec. 7	00 35.49	+12 30.1	2.218	2.815	-1.15 -6.2	20.9	7.0/105	117.7
Dec. 17	00 40.92	+12 19.0	2.379	2.854	-1.06 -5.6	21.1	9.4/92	108.9
Dec. 27	00 48.03	+12 22.1	2.549	2.893	-0.98 -5.1	21.4	11.7/85	100.4
Jan. 6	00 56.56	+12 37.4	2.723	2.932	-0.91 -4.6	21.6	13.7/81	92.3
Jan. 16	01 06.28	+13 03.2	2.900	2.971	-0.85 -4.1	21.8	15.4/78	84.5
Jan. 26	01 16.99	+13 37.4	3.076	3.011	-0.80 -3.7	22.0	16.7/77	77.0
Feb. 5	01 28.50	+14 18.2	3.249	3.051	-0.75 -3.4	.	17.8/76	69.7
Feb. 15	01 40.69	+15 03.7	3.418	3.091	-0.71 -3.0	.	18.7/75	62.6
Feb. 25	01 53.42	+15 52.6	3.580	3.131	-0.67 -2.7	.	19.4/75	55.7
Mar. 7	02 06.59	+16 43.3	3.733	3.171	-0.64 -2.4	.	19.9/75	49.0
Mar. 17	02 20.12	+17 34.6	3.876	3.212	-0.61 -2.1	.	20.2/75	42.3
Mar. 27	02 33.93	+18 25.6	4.008	3.252	-0.59 -1.8	.	20.4/76	35.8

Comet 313P/Gibbs

Epoch = 2020 July 10.0 TT  
 T = 2020 Apr. 15.20281 TT  
 Peri. = 254.61709 e = 0.2348188  
 Node = 105.97156 2000.0 a = 3.1612229 AU  
 Incl. = 10.98329 n = 0.17535631  
 q = 2.4189083 AU P = 5.62 years

$$m_1 = 14.3 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	21 24.20	-21 31.3	3.204	2.481	+1.88	+7.7	20.8	36.3
Jan. 12	21 43.05	-20 11.0	3.262	2.470	+1.89	+8.4	20.8	30.9
Jan. 22	22 02.02	-18 43.4	3.310	2.460	+1.90	+9.1	20.8	25.6
Feb. 1	22 21.06	-17 09.5	3.349	2.451	+1.90	+9.7	20.8	20.5
Feb. 11	22 40.09	-15 30.2	3.378	2.443	+1.90	+10.2	20.8	15.7
Feb. 21	22 59.08	-13 46.5	3.398	2.436	+1.90	+10.6	20.8	11.3
Mar. 2	23 17.99	-11 59.6	3.408	2.430	+1.89	+10.8	20.8	8.0
Mar. 12	23 36.81	-10 10.6	3.409	2.426	+1.88	+11.0	20.8	7.1
Mar. 22	23 55.52	-08 20.7	3.400	2.422	+1.87	+11.0	20.8	9.3
Apr. 1	00 14.12	-06 31.0	3.383	2.420	+1.85	+10.9	20.8	13.1
Apr. 11	00 32.58	-04 42.8	3.357	2.419	+1.84	+10.7	20.8	17.4
Apr. 21	00 50.92	-02 57.1	3.323	2.419	+1.83	+10.4	20.7	21.9
May 1	01 09.11	-01 15.0	3.280	2.420	+1.81	+10.0	20.7	26.5
May 11	01 27.13	+00 22.5	3.230	2.423	+1.79	+9.5	20.7	31.2
May 21	01 44.95	+01 54.5	3.172	2.426	+1.77	+8.9	20.7	36.0
May 31	02 02.53	+03 19.9	3.107	2.431	+1.74	+8.2	20.6	40.8
June 10	02 19.81	+04 38.1	3.035	2.437	+1.71	+7.4	20.6	45.7
June 20	02 36.73	+05 48.3	2.956	2.444	+1.67	+6.6	20.5	50.8
June 30	02 53.19	+06 50.0	2.872	2.452	+1.62	+5.7	20.5	56.0
July 10	03 09.06	+07 42.7	2.781	2.462	+1.55	+4.8	20.4	61.4
July 20	03 24.23	+08 26.0	2.686	2.472	+1.47	+3.8	20.4	67.0
July 30	03 38.51	+09 00.0	2.586	2.483	+1.37	+2.9	20.3	72.8
Aug. 9	03 51.72	+09 24.5	2.482	2.495	+1.25	+2.0	20.2	79.0
Aug. 19	04 03.63	+09 40.0	2.376	2.509	+1.11	+1.1	20.2	85.5
Aug. 29	04 13.98	+09 46.9	2.269	2.523	+0.94	+0.2	20.1	92.4
Sept. 8	04 22.48	+09 46.0	2.163	2.538	+0.74	-0.5	20.0	99.9
Sept. 18	04 28.84	+09 38.4	2.060	2.553	+0.51	-1.1	19.9	107.8
Sept. 28	04 32.76	+09 25.7	1.963	2.570	+0.25	-1.5	19.9	116.4
Oct. 8	04 34.00	+09 09.6	1.874	2.587	-0.03	-1.7	19.8	125.6
Oct. 18	04 32.43	+08 52.6	1.799	2.605	-0.31	-1.7	19.7	135.5
Oct. 28	04 28.13	+08 37.3	1.742	2.624	-0.57	-1.3	19.7	145.8
Nov. 7	04 21.49	+08 26.9	1.706	2.643	-0.77	-0.7	19.7	156.2
Nov. 17	04 13.19	+08 24.0	1.695	2.663	-0.88	+0.2	19.7	165.1
Nov. 27	04 04.23	+08 31.3	1.712	2.683	-0.89	+1.3	19.8	167.3
Dec. 7	03 55.70	+08 49.8	1.756	2.704	-0.79	+2.5	19.8	160.2
Dec. 17	03 48.55	+09 19.7	1.827	2.725	-0.61	+3.6	20.0	150.1
Dec. 27	03 43.50	+10 00.2	1.922	2.746	-0.37	+4.6	20.1	139.6
Jan. 6	03 40.92	+10 49.5	2.038	2.768	-0.12	+5.3	20.3	129.4
Jan. 16	03 40.90	+11 45.5	2.170	2.790	+0.14	+5.9	20.4	119.6
Jan. 26	03 43.34	+12 46.2	2.314	2.813	+0.37	+6.3	20.6	110.4
Feb. 5	03 48.02	+13 49.7	2.466	2.835	+0.58	+6.4	20.8	101.7
Feb. 15	03 54.68	+14 54.0	2.623	2.858	+0.77	+6.4	21.0	93.4
Feb. 25	04 03.07	+15 57.8	2.783	2.881	+0.92	+6.3	21.1	85.6
Mar. 7	04 12.93	+16 59.6	2.942	2.904	+1.06	+6.0	21.3	78.1
Mar. 17	04 24.05	+17 58.4	3.098	2.928	+1.17	+5.7	21.4	70.9
Mar. 27	04 36.23	+18 53.2	3.249	2.951	+1.27	+5.2	21.6	64.0

## Comet 266P/Christensen

Epoch = 2020 July 10.0 TT  
 T = 2020 Apr. 19.48153 TT  
 Peri. = 97.83925 e = 0.3394784  
 Node = 5.00281 2000.0 a = 3.5353864 AU  
 Incl. = 3.42561 n = 0.14826845  
 q = 2.3351991 AU P = 6.65 years

$$m_1 = 11.0 + 5 \log(\Delta) + 15.0 \log(r(t-40))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	03 10.20	+22 22.7	1.684	2.439	+0.02	-0.7	18.2	130.3
Jan. 12	03 11.85	+22 20.1	1.769	2.421	+0.33	+0.3	18.2	120.6
Jan. 22	03 16.50	+22 27.5	1.864	2.405	+0.62	+1.3	18.3	111.5
Feb. 1	03 23.95	+22 44.1	1.967	2.391	+0.89	+2.1	18.3	103.1
Feb. 11	03 33.90	+23 08.1	2.074	2.378	+1.12	+2.7	18.4	95.3
Feb. 21	03 46.03	+23 37.0	2.184	2.366	+1.32	+3.1	18.5	88.0
Mar. 2	04 00.08	+24 08.6	2.294	2.357	+1.50	+3.2	18.5	81.2
Mar. 12	04 15.78	+24 40.2	2.404	2.349	+1.65	+3.1	18.6	74.9
Mar. 22	04 32.88	+25 09.6	2.510	2.343	+1.78	+2.7	18.6	68.8
Apr. 1	04 51.19	+25 34.8	2.614	2.338	+1.89	+2.2	18.7	63.1
Apr. 11	05 10.48	+25 53.9	2.714	2.336	+1.98	+1.5	18.8	57.6
Apr. 21	05 30.58	+26 05.2	2.809	2.335	+2.05	+0.7	18.8	52.4
May 1	05 51.31	+26 07.7	2.899	2.336	+2.10	-0.3	18.9	47.3
May 11	06 12.48	+26 00.3	2.984	2.339	+2.14	-1.3	18.9	42.4
May 21	06 33.94	+25 42.4	3.064	2.344	+2.16	-2.4	19.0	37.6
May 31	06 55.53	+25 13.9	3.137	2.351	+2.16	-3.5	19.0	32.9
June 10	07 17.11	+24 34.6	3.204	2.359	+2.15	-4.5	19.1	28.3
June 20	07 38.57	+23 44.8	3.265	2.370	+2.13	-5.5	19.1	23.7
June 30	07 59.79	+22 45.1	3.318	2.381	+2.11	-6.5	19.2	19.1
July 10	08 20.68	+21 36.2	3.365	2.395	+2.07	-7.4	19.2	14.6
July 20	08 41.19	+20 18.8	3.404	2.410	+2.03	-8.2	19.3	10.1
July 30	09 01.27	+18 54.1	3.435	2.426	+1.98	-8.8	19.3	5.6
Aug. 9	09 20.86	+17 23.0	3.458	2.444	+1.93	-9.4	19.3	1.9
Aug. 19	09 39.95	+15 46.6	3.472	2.464	+1.88	-9.9	19.4	4.5
Aug. 29	09 58.53	+14 06.1	3.476	2.485	+1.83	-10.2	19.4	9.1
Sep. 8	10 16.57	+12 22.5	3.472	2.507	+1.78	-10.5	19.5	14.1
Sep. 18	10 34.09	+10 37.0	3.458	2.530	+1.72	-10.6	19.5	19.1
Sep. 28	10 51.04	+08 50.8	3.433	2.554	+1.66	-10.6	19.6	24.4
Oct. 8	11 07.42	+07 04.9	3.398	2.579	+1.61	-10.5	19.6	29.8
Oct. 18	11 23.22	+05 20.3	3.353	2.605	+1.54	-10.3	19.6	35.4
Oct. 28	11 38.36	+03 38.3	3.298	2.632	+1.48	-10.0	19.6	41.2
Nov. 7	11 52.82	+01 59.8	3.232	2.660	+1.41	-9.6	19.7	47.2
Nov. 17	12 06.51	+00 25.8	3.157	2.689	+1.32	-9.1	19.7	53.5
Nov. 27	12 19.33	-01 02.6	3.073	2.718	+1.23	-8.5	19.7	60.1
Dec. 7	12 31.16	-02 24.3	2.980	2.748	+1.12	-7.8	19.7	66.9
Dec. 17	12 41.86	-03 38.4	2.881	2.778	+1.00	-6.9	19.7	74.2
Dec. 27	12 51.23	-04 43.7	2.776	2.809	+0.86	-6.0	19.7	81.8
Jan. 6	12 59.08	-05 39.3	2.668	2.841	+0.69	-5.0	19.6	89.8
Jan. 16	13 05.19	-06 24.3	2.560	2.872	+0.51	-3.9	19.6	98.3
Jan. 26	13 09.32	-06 57.4	2.455	2.904	+0.30	-2.6	19.6	107.3
Feb. 5	13 11.28	-07 17.9	2.356	2.937	+0.07	-1.3	19.6	116.9
Feb. 15	13 10.95	-07 25.2	2.268	2.969	-0.16	0.0	19.6	127.1
Feb. 25	13 08.32	-07 19.3	2.194	3.002	-0.38	+1.3	19.6	137.8
Mar. 7	13 03.60	-07 01.0	2.141	3.035	-0.57	+2.4	19.6	149.0
Mar. 17	12 57.19	-06 32.2	2.111	3.068	-0.71	+3.3	19.6	160.6
Mar. 27	12 49.75	-05 56.4	2.109	3.101	-0.77	+3.8	19.7	172.5

## Comet 124P/Mrkos

Epoch = 2020 July 10.0 TT  
 T = 2020 Apr. 26.89599 TT  
 Peri. = 183.85897 e = 0.5034212  
 Node = 0.37106 2000.0 a = 3.3177766 AU  
 Incl. = 31.51317 n = 0.16309227  
 q = 1.6475375 AU P = 6.04 years

$$m_1 = 16.2 + 5 \log(\Delta) + 5.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	11 53.48	+43 59.2	1.332	1.962	+0.83	+0.2	18.3	115.1
Jan. 12	11 59.76	+44 04.2	1.214	1.916	+0.36	+0.7	18.0	121.1
Jan. 22	12 00.85	+44 11.0	1.105	1.873	-0.22	+0.4	17.8	127.3
Feb. 1	11 55.62	+44 08.6	1.007	1.832	-0.90	-1.4	17.5	133.7
Feb. 11	11 43.47	+43 38.3	0.923	1.794	-1.59	-5.5	17.3	139.9
Feb. 21	11 24.91	+42 15.1	0.856	1.760	-2.14	-12.3	17.1	145.1
Mar. 2	11 02.28	+39 33.7	0.810	1.730	-2.34	-21.1	16.9	147.6
Mar. 12	10 39.58	+35 23.6	0.787	1.704	-2.12	-29.5	16.8	145.9
Mar. 22	10 20.56	+29 59.7	0.790	1.682	-1.60	-35.3	16.8	140.5
Apr. 1	10 07.44	+23 54.6	0.817	1.666	-0.96	-37.4	16.9	132.8
Apr. 11	10 00.58	+17 43.2	0.865	1.654	-0.37	-36.5	17.0	124.6
Apr. 21	09 59.26	+11 48.9	0.931	1.648	+0.14	-34.0	17.1	116.7
May 1	10 02.52	+06 22.0	1.010	1.648	+0.54	-31.1	17.3	109.5
May 11	10 09.42	+01 23.8	1.099	1.653	+0.86	-28.3	17.5	103.2
May 21	10 19.16	-03 08.3	1.195	1.663	+1.11	-26.0	17.7	97.5
May 31	10 31.23	-07 18.9	1.295	1.679	+1.32	-24.0	17.9	92.5
June 10	10 45.18	-11 11.9	1.399	1.700	+1.49	-22.5	18.1	88.0
June 20	11 00.73	-14 50.5	1.506	1.725	+1.64	-21.2	18.3	83.9
June 30	11 17.71	-18 17.4	1.614	1.754	+1.77	-20.1	18.5	80.2
July 10	11 35.96	-21 34.1	1.724	1.788	+1.89	-19.1	18.6	76.7
July 20	11 55.43	-24 41.3	1.835	1.825	+2.01	-18.2	18.8	73.4
July 30	12 16.08	-27 39.5	1.947	1.865	+2.13	-17.3	19.0	70.2
Aug. 9	12 37.87	-30 28.2	2.059	1.908	+2.24	-16.3	19.2	67.1
Aug. 19	13 00.79	-33 06.9	2.173	1.954	+2.35	-15.3	19.3	64.0
Aug. 29	13 24.84	-35 34.6	2.288	2.002	+2.47	-14.1	19.5	60.9
Sept. 8	13 49.97	-37 50.2	2.403	2.051	+2.57	-12.8	19.7	57.7
Sept. 18	14 16.15	-39 52.2	2.519	2.102	+2.67	-11.4	19.8	54.5
Sept. 28	14 43.31	-41 39.7	2.634	2.154	+2.76	-9.9	20.0	51.3
Oct. 8	15 11.28	-43 11.3	2.748	2.207	+2.84	-8.3	20.1	47.9
Oct. 18	15 39.93	-44 26.3	2.861	2.260	+2.89	-6.6	20.3	44.5
Oct. 28	16 09.01	-45 24.1	2.971	2.315	+2.92	-4.8	20.4	41.0
Nov. 7	16 38.26	-46 04.6	3.078	2.369	+2.92	-3.1	20.5	37.5
Nov. 17	17 07.41	-46 28.0	3.180	2.424	+2.90	-1.4	20.6	34.0
Nov. 27	17 36.18	-46 35.3	3.276	2.479	+2.84	+0.1	20.7	30.7
Dec. 7	18 04.29	-46 27.7	3.365	2.534	+2.77	+1.5	20.9	27.7
Dec. 17	18 31.54	-46 06.6	3.446	2.589	+2.67	+2.8	21.0	25.1
Dec. 27	18 57.74	-45 34.1	3.518	2.644	+2.56	+3.8	21.0	23.3
Jan. 6	19 22.76	-44 52.0	3.580	2.698	+2.43	+4.7	21.1	22.6
Jan. 16	19 46.53	-44 02.4	3.630	2.752	+2.31	+5.3	21.2	23.1
Jan. 26	20 09.00	-43 07.5	3.668	2.806	+2.17	+5.7	21.3	24.9
Feb. 5	20 30.16	-42 09.2	3.694	2.859	+2.04	+5.9	21.3	27.8
Feb. 15	20 50.03	-41 09.5	3.707	2.912	+1.92	+6.0	21.4	31.6
Feb. 25	21 08.60	-40 10.1	3.706	2.964	+1.79	+5.8	21.4	36.1
Mar. 7	21 25.90	-39 12.9	3.692	3.016	+1.66	+5.5	21.4	41.2
Mar. 17	21 41.94	-38 19.4	3.664	3.067	+1.53	+5.1	21.5	46.6
Mar. 27	21 56.70	-37 31.3	3.624	3.118	+1.41	+4.5	21.5	52.4

Comet C/2017 T2 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2020 May 4.95381 TT  
 Peri. = 92.99619  
 Node = 64.37757 2000.0  
 Incl. = 57.23068  
 q = 1.6150971 AU  
 e = 0.9995546

$$m1 = 4.9 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	03 22.35	+55 21.9	1.522	2.287	-3.06	+9.0	9.4	130.5
Jan. 12	02 53.83	+56 33.9	1.544	2.201	-2.55	+5.4	9.3	119.5
Jan. 22	02 31.43	+57 19.3	1.582	2.118	-1.85	+3.9	9.2	109.0
Feb. 1	02 16.20	+57 58.7	1.627	2.038	-1.13	+4.3	9.0	99.7
Feb. 11	02 07.90	+58 48.3	1.672	1.963	-0.47	+5.9	8.9	91.5
Feb. 21	02 05.90	+59 57.3	1.712	1.893	+0.13	+8.2	8.8	84.4
Mar. 2	02 09.77	+61 31.1	1.744	1.828	+0.71	+10.8	8.7	78.6
Mar. 12	02 19.53	+63 31.7	1.764	1.770	+1.32	+13.5	8.6	74.0
Mar. 22	02 36.06	+65 58.2	1.772	1.720	+2.10	+16.0	8.5	70.6
Apr. 1	03 01.68	+68 47.3	1.768	1.679	+3.22	+17.9	8.4	68.3
Apr. 11	03 41.14	+71 48.8	1.753	1.647	+5.00	+18.1	8.3	67.2
Apr. 21	04 43.16	+74 37.2	1.731	1.626	+7.87	+14.3	8.2	67.0
May 1	06 16.88	+76 16.0	1.705	1.616	+10.98	+2.8	8.1	67.6
May 11	08 09.60	+75 23.7	1.680	1.617	+10.79	-15.5	8.1	68.8
May 21	09 44.23	+71 33.2	1.663	1.630	+7.71	-31.2	8.1	70.3
May 31	10 48.65	+65 32.7	1.660	1.653	+5.11	-40.9	8.2	71.8
June 10	11 32.18	+58 17.1	1.677	1.687	+3.58	-46.1	8.3	73.0
June 20	12 03.72	+50 25.0	1.718	1.730	+2.72	-48.0	8.5	73.5
June 30	12 28.44	+42 25.7	1.787	1.781	+2.22	-47.4	8.7	73.2
July 10	12 49.07	+34 41.2	1.882	1.841	+1.91	-45.0	8.9	71.9
July 20	13 07.19	+27 26.2	2.002	1.907	+1.71	-41.5	9.2	69.8
July 30	13 23.72	+20 48.6	2.144	1.978	+1.59	-37.6	9.5	66.8
Aug. 9	13 39.21	+14 50.9	2.303	2.055	+1.51	-33.6	9.8	63.1
Aug. 19	13 54.01	+09 31.8	2.474	2.135	+1.45	-29.9	10.2	58.9
Aug. 29	14 08.37	+04 48.0	2.653	2.219	+1.42	-26.6	10.5	54.2
Sept. 8	14 22.42	+00 35.9	2.835	2.305	+1.39	-23.6	10.8	49.1
Sept. 18	14 36.27	-03 08.6	3.017	2.394	+1.38	-21.1	11.1	43.7
Sept. 28	14 49.99	-06 29.3	3.196	2.484	+1.36	-18.9	11.4	38.0
Oct. 8	15 03.58	-09 29.4	3.367	2.576	+1.35	-17.0	11.6	32.1
Oct. 18	15 17.09	-12 11.6	3.529	2.669	+1.34	-15.3	11.9	26.0
Oct. 28	15 30.48	-14 38.3	3.679	2.763	+1.33	-13.9	12.1	19.6
Nov. 7	15 43.73	-16 51.6	3.814	2.858	+1.32	-12.7	12.4	13.1
Nov. 17	15 56.81	-18 53.4	3.933	2.953	+1.30	-11.6	12.6	6.4
Nov. 27	16 09.66	-20 45.1	4.035	3.048	+1.27	-10.7	12.8	0.6
Dec. 7	16 22.20	-22 28.2	4.118	3.144	+1.24	-9.9	12.9	7.6
Dec. 17	16 34.38	-24 04.2	4.181	3.239	+1.19	-9.2	13.1	14.8
Dec. 27	16 46.07	-25 34.2	4.224	3.335	+1.14	-8.7	13.3	22.3
Jan. 6	16 57.18	-26 59.6	4.248	3.431	+1.07	-8.3	13.4	29.9
Jan. 16	17 07.59	-28 21.6	4.253	3.526	+1.00	-8.1	13.5	37.7
Jan. 26	17 17.14	-29 41.6	4.240	3.621	+0.90	-7.9	13.6	45.7
Feb. 5	17 25.70	-31 00.7	4.211	3.716	+0.79	-7.9	13.7	53.9
Feb. 15	17 33.08	-32 20.1	4.167	3.811	+0.67	-8.0	13.8	62.4
Feb. 25	17 39.10	-33 40.8	4.113	3.905	+0.52	-8.2	13.9	71.1
Mar. 7	17 43.56	-35 03.6	4.051	4.000	+0.35	-8.4	14.0	80.0
Mar. 17	17 46.25	-36 28.9	3.985	4.093	+0.16	-8.7	14.0	89.2
Mar. 27	17 46.95	-37 56.3	3.919	4.187	-0.05	-8.8	14.1	98.6

## Comet A/2019 C1

Epoch = 2020 July 10.0 TT  
 T = 2020 May 5.73198 TT  
 Peri. = 319.19342  
 Node = 212.39375 2000.0  
 Incl. = 36.01884  
 q = 6.5812643 AU  
 e = 0.9917992

H = 8.4 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		V	Elong.
2020/21	h m	° ' .8			m	'		°
Jan. 2	10 59.70	-24 41.8	6.354	6.634	+0.08	-2.6	17.1	102.3
Jan. 12	11 00.04	-25 04.6	6.211	6.626	-0.02	-1.8	17.0	110.9
Jan. 22	10 59.46	-25 18.5	6.079	6.618	-0.11	-0.9	17.0	119.4
Feb. 1	10 58.05	-25 22.3	5.962	6.612	-0.18	+0.2	16.9	127.8
Feb. 11	10 55.95	-25 15.1	5.862	6.606	-0.24	+1.3	16.8	135.8
Feb. 21	10 53.35	-24 56.6	5.785	6.600	-0.28	+2.5	16.7	142.9
Mar. 2	10 50.49	-24 26.9	5.731	6.595	-0.29	+3.5	16.7	148.3
Mar. 12	10 47.62	-23 47.2	5.704	6.591	-0.28	+4.5	16.7	151.1
Mar. 22	10 45.01	-22 59.1	5.704	6.588	-0.24	+5.2	16.7	150.3
Apr. 1	10 42.88	-22 04.7	5.731	6.585	-0.18	+5.7	16.7	146.2
Apr. 11	10 41.43	-21 06.5	5.784	6.583	-0.10	+5.9	16.8	140.0
Apr. 21	10 40.79	-20 07.2	5.860	6.582	-0.02	+5.9	16.8	132.6
May 1	10 41.05	-19 09.1	5.958	6.581	+0.08	+5.7	16.9	124.5
May 11	10 42.25	-18 14.3	6.072	6.581	+0.17	+5.2	17.0	116.2
May 21	10 44.36	-17 24.5	6.201	6.582	+0.26	+4.7	17.0	107.9
May 31	10 47.37	-16 40.7	6.339	6.583	+0.35	+4.0	17.1	99.5
June 10	10 51.19	-16 03.8	6.484	6.585	+0.42	+3.3	17.2	91.3
June 20	10 55.76	-15 34.2	6.632	6.588	+0.50	+2.6	17.2	83.1
June 30	11 01.01	-15 11.8	6.778	6.592	+0.56	+1.8	17.2	75.2
July 10	11 06.84	-14 56.7	6.921	6.596	+0.61	+1.1	17.3	67.3
July 20	11 13.17	-14 48.4	7.056	6.600	+0.66	+0.5	17.3	59.6
July 30	11 19.93	-14 46.6	7.182	6.606	+0.70	-0.1	17.3	52.0
Aug. 9	11 27.04	-14 50.6	7.296	6.612	+0.73	-0.7	17.3	44.6
Aug. 19	11 34.43	-15 00.0	7.395	6.619	+0.75	-1.2	17.3	37.3
Aug. 29	11 42.04	-15 14.0	7.478	6.626	+0.77	-1.6	17.3	30.3
Sept. 8	11 49.78	-15 32.1	7.544	6.634	+0.78	-2.0	17.2	23.8
Sept. 18	11 57.61	-15 53.7	7.590	6.643	+0.78	-2.3	17.2	18.2
Sept. 28	12 05.45	-16 18.0	7.617	6.652	+0.78	-2.6	17.2	14.7
Oct. 8	12 13.24	-16 44.3	7.623	6.662	+0.77	-2.7	17.2	14.9
Oct. 18	12 20.91	-17 12.0	7.608	6.673	+0.76	-2.8	17.2	18.8
Oct. 28	12 28.38	-17 40.5	7.573	6.684	+0.73	-2.9	17.3	24.9
Nov. 7	12 35.58	-18 09.0	7.517	6.696	+0.70	-2.8	17.3	31.9
Nov. 17	12 42.44	-18 36.8	7.442	6.709	+0.66	-2.7	17.3	39.5
Nov. 27	12 48.86	-19 03.1	7.349	6.722	+0.62	-2.5	17.3	47.5
Dec. 7	12 54.77	-19 27.3	7.240	6.736	+0.56	-2.3	17.4	55.8
Dec. 17	13 00.06	-19 48.6	7.118	6.750	+0.49	-1.9	17.4	64.3
Dec. 27	13 04.65	-20 06.1	6.985	6.765	+0.42	-1.5	17.3	73.1
Jan. 6	13 08.47	-20 19.2	6.844	6.781	+0.34	-1.0	17.3	82.2
Jan. 16	13 11.42	-20 26.9	6.701	6.797	+0.25	-0.5	17.3	91.5
Jan. 26	13 13.47	-20 28.6	6.558	6.814	+0.15	+0.2	17.2	101.0
Feb. 5	13 14.57	-20 23.6	6.421	6.831	+0.06	+0.9	17.2	110.7
Feb. 15	13 14.75	-20 11.3	6.293	6.850	-0.03	+1.6	17.1	120.6
Feb. 25	13 14.03	-19 51.4	6.181	6.868	-0.12	+2.4	17.0	130.7
Mar. 7	13 12.53	-19 24.0	6.089	6.887	-0.19	+3.1	16.9	140.9
Mar. 17	13 10.38	-18 49.4	6.019	6.907	-0.24	+3.8	16.9	151.1
Mar. 27	13 07.79	-18 08.5	5.977	6.927	-0.28	+4.4	16.8	160.9

## Comet 87P/Bus

Epoch = 2020 July 10.0 TT  
 T = 2020 May 9.27957 TT  
 Peri. = 24.93779 e = 0.3891799  
 Node = 181.86085 2000.0 a = 3.4377482 AU  
 Incl. = 2.60252 n = 0.15462972  
 q = 2.0998457 AU P = 6.37 years

$$m_1 = 11.4 + 5 \log(\Delta) + 15.0 \log(r(t-30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	12 20.39	-03 22.8	1.996	2.297	+1.20	-7.2	18.6	94.7
Jan. 12	12 31.83	-04 29.9	1.853	2.269	+1.07	-6.1	18.3	101.9
Jan. 22	12 41.81	-05 25.6	1.716	2.244	+0.90	-4.8	18.1	109.4
Feb. 1	12 49.97	-06 07.4	1.586	2.219	+0.70	-3.3	17.8	117.4
Feb. 11	12 55.98	-06 33.2	1.467	2.197	+0.47	-1.6	17.6	126.0
Feb. 21	12 59.52	-06 41.1	1.361	2.177	+0.21	+0.3	17.3	135.3
Mar. 2	13 00.37	-06 29.7	1.270	2.159	-0.06	+2.2	17.1	145.2
Mar. 12	12 58.60	-05 59.7	1.198	2.143	-0.31	+3.9	16.9	155.8
Mar. 22	12 54.59	-05 13.9	1.147	2.130	-0.50	+5.2	16.8	167.0
Apr. 1	12 49.14	-04 18.3	1.120	2.119	-0.58	+5.8	16.7	178.2
Apr. 11	12 43.40	-03 21.5	1.116	2.110	-0.54	+5.4	16.6	169.9
Apr. 21	12 38.54	-02 32.2	1.136	2.104	-0.40	+4.2	16.6	158.7
May 1	12 35.58	-01 57.8	1.177	2.101	-0.16	+2.4	16.6	148.1
May 11	12 35.15	-01 42.9	1.236	2.100	+0.11	+0.4	16.7	138.2
May 21	12 37.46	-01 48.6	1.310	2.102	+0.38	-1.7	16.8	129.2
May 31	12 42.47	-02 14.1	1.397	2.106	+0.64	-3.6	17.0	120.9
June 10	12 49.94	-02 57.2	1.494	2.113	+0.87	-5.2	17.1	113.3
June 20	12 59.53	-03 54.8	1.599	2.122	+1.07	-6.5	17.3	106.3
June 30	13 10.97	-05 04.2	1.710	2.134	+1.23	-7.5	17.4	99.9
July 10	13 23.95	-06 22.3	1.826	2.149	+1.37	-8.2	17.6	93.8
July 20	13 38.23	-07 46.5	1.945	2.165	+1.49	-8.7	17.7	88.1
July 30	13 53.62	-09 14.5	2.068	2.184	+1.59	-8.9	17.9	82.7
Aug. 9	14 09.95	-10 44.0	2.192	2.205	+1.68	-8.9	18.1	77.4
Aug. 19	14 27.09	-12 12.9	2.317	2.228	+1.75	-8.8	18.3	72.2
Aug. 29	14 44.93	-13 39.5	2.442	2.252	+1.82	-8.5	18.4	67.2
Sept. 8	15 03.37	-15 02.2	2.567	2.279	+1.87	-8.0	18.6	62.2
Sept. 18	15 22.34	-16 19.5	2.691	2.307	+1.92	-7.4	18.8	57.2
Sept. 28	15 41.77	-17 30.2	2.812	2.336	+1.96	-6.7	18.9	52.2
Oct. 8	16 01.56	-18 33.2	2.929	2.367	+2.00	-5.8	19.1	47.2
Oct. 18	16 21.64	-19 27.6	3.043	2.399	+2.02	-4.9	19.3	42.1
Oct. 28	16 41.93	-20 12.6	3.150	2.432	+2.04	-4.0	19.4	37.0
Nov. 7	17 02.34	-20 47.8	3.252	2.466	+2.04	-3.0	19.6	31.8
Nov. 17	17 22.77	-21 12.8	3.346	2.501	+2.04	-1.9	19.7	26.6
Nov. 27	17 43.13	-21 27.5	3.431	2.537	+2.03	-0.9	19.9	21.2
Dec. 7	18 03.32	-21 32.0	3.507	2.573	+2.01	+0.1	20.0	15.8
Dec. 17	18 23.26	-21 26.6	3.572	2.610	+1.98	+1.1	20.1	10.4
Dec. 27	18 42.83	-21 11.8	3.626	2.648	+1.93	+2.0	20.3	4.9
Jan. 6	19 01.95	-20 48.1	3.668	2.686	+1.88	+2.8	20.4	2.2
Jan. 16	19 20.55	-20 16.4	3.698	2.725	+1.83	+3.6	20.5	7.2
Jan. 26	19 38.54	-19 37.7	3.714	2.763	+1.76	+4.2	20.6	13.0
Feb. 5	19 55.87	-18 52.8	3.717	2.802	+1.69	+4.8	20.7	18.9
Feb. 15	20 12.46	-18 03.0	3.706	2.841	+1.62	+5.2	20.8	25.0
Feb. 25	20 28.25	-17 09.2	3.681	2.880	+1.53	+5.5	20.9	31.2
Mar. 7	20 43.19	-16 12.8	3.644	2.919	+1.45	+5.7	20.9	37.5
Mar. 17	20 57.22	-15 15.0	3.593	2.959	+1.35	+5.8	21.0	44.0
Mar. 27	21 10.27	-14 16.9	3.531	2.998	+1.25	+5.8	21.0	50.6

## Comet A/2019 K6

Epoch = 2020 July 10.0 TT  
 T = 2020 May 20.18879 TT  
 Peri. = 187.61897  
 Node = 42.94003 2000.0  
 Incl. = 132.37401  
 q = 3.9286457 AU  
 e = 0.9974826

H = 13.0 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		V	Elong.
2020/21	h m	° ' .3			m	'		°
Jan. 2	16 11.51	-10 36.3	4.825	4.108	+0.22	-5.3	20.1	39.0
Jan. 12	16 13.35	-11 27.9	4.674	4.084	+0.14	-5.1	20.1	48.2
Jan. 22	16 14.23	-12 17.7	4.502	4.062	+0.02	-4.9	20.0	57.7
Feb. 1	16 13.86	-13 06.1	4.312	4.041	-0.12	-4.8	20.0	67.6
Feb. 11	16 11.91	-13 53.5	4.110	4.021	-0.30	-4.7	19.9	77.9
Feb. 21	16 08.00	-14 40.5	3.902	4.004	-0.51	-4.7	19.8	88.7
Mar. 2	16 01.74	-15 27.1	3.693	3.988	-0.77	-4.6	19.6	100.1
Mar. 12	15 52.74	-16 12.8	3.493	3.974	-1.06	-4.5	19.5	112.0
Mar. 22	15 40.68	-16 56.7	3.309	3.962	-1.38	-4.2	19.3	124.7
Apr. 1	15 25.40	-17 36.4	3.152	3.952	-1.70	-3.6	19.1	138.0
Apr. 11	15 07.09	-18 09.3	3.031	3.943	-1.98	-2.8	18.9	151.9
Apr. 21	14 46.38	-18 32.1	2.954	3.937	-2.17	-1.6	18.7	166.1
May 1	14 24.34	-18 42.8	2.927	3.932	-2.22	-0.4	18.5	175.7
May 11	14 02.36	-18 41.8	2.951	3.929	-2.14	+0.6	18.7	163.4
May 21	13 41.75	-18 32.0	3.024	3.929	-1.94	+1.3	18.9	149.3
May 31	13 23.54	-18 17.9	3.140	3.930	-1.66	+1.5	19.1	135.7
June 10	13 08.26	-18 04.3	3.289	3.933	-1.36	+1.2	19.3	122.8
June 20	12 56.02	-17 55.0	3.463	3.938	-1.06	+0.6	19.5	110.6
June 30	12 46.65	-17 52.5	3.653	3.945	-0.79	-0.2	19.6	99.2
July 10	12 39.83	-17 58.2	3.849	3.953	-0.56	-1.0	19.7	88.4
July 20	12 35.19	-18 12.4	4.045	3.964	-0.36	-1.9	19.8	78.2
July 30	12 32.37	-18 35.1	4.234	3.976	-0.20	-2.7	19.9	68.5
Aug. 9	12 31.02	-19 05.9	4.411	3.990	-0.07	-3.5	20.0	59.3
Aug. 19	12 30.84	-19 44.2	4.573	4.006	+0.04	-4.2	20.0	50.5
Aug. 29	12 31.59	-20 29.7	4.715	4.024	+0.12	-4.9	20.0	42.2
Sept. 8	12 33.02	-21 21.8	4.835	4.044	+0.17	-5.6	20.0	34.4
Sept. 18	12 34.94	-22 20.2	4.931	4.065	+0.21	-6.2	20.0	27.4
Sept. 28	12 37.14	-23 24.4	5.001	4.088	+0.23	-6.7	20.0	21.9
Oct. 8	12 39.45	-24 34.3	5.044	4.112	+0.23	-7.3	20.0	19.1
Oct. 18	12 41.67	-25 49.5	5.060	4.138	+0.21	-7.8	20.0	20.1
Oct. 28	12 43.63	-27 10.0	5.049	4.166	+0.17	-8.3	20.1	24.6
Nov. 7	12 45.10	-28 35.3	5.013	4.195	+0.11	-8.8	20.1	31.1
Nov. 17	12 45.86	-30 05.4	4.952	4.226	+0.03	-9.3	20.2	38.7
Nov. 27	12 45.63	-31 39.7	4.870	4.258	-0.09	-9.6	20.2	46.9
Dec. 7	12 44.14	-33 17.5	4.770	4.291	-0.23	-9.9	20.2	55.6
Dec. 17	12 41.04	-34 57.7	4.655	4.326	-0.41	-10.1	20.2	64.7
Dec. 27	12 35.95	-36 38.5	4.530	4.362	-0.63	-10.0	20.2	74.0
Jan. 6	12 28.51	-38 16.9	4.402	4.400	-0.89	-9.6	20.2	83.5
Jan. 16	12 18.34	-39 49.0	4.276	4.438	-1.18	-8.7	20.1	93.0
Jan. 26	12 05.23	-41 09.2	4.159	4.478	-1.48	-7.1	20.1	102.6
Feb. 5	11 49.18	-42 10.8	4.059	4.518	-1.76	-4.9	20.0	111.7
Feb. 15	11 30.55	-42 46.8	3.983	4.560	-1.98	-1.9	20.0	120.2
Feb. 25	11 10.19	-42 51.1	3.936	4.603	-2.09	+1.4	19.9	127.2
Mar. 7	10 49.27	-42 21.2	3.924	4.647	-2.07	+4.9	19.9	132.0
Mar. 17	10 29.12	-41 18.5	3.948	4.692	-1.93	+7.9	19.9	133.8
Mar. 27	10 10.88	-39 48.9	4.010	4.737	-1.69	+10.1	20.0	132.2

## Comet 58P/Jackson-Neujmin

Epoch = 2020 July 10.0 TT  
 T = 2020 May 25.04768 TT  
 Peri. = 200.46458 e = 0.6625154  
 Node = 159.06359 2000.0 a = 4.0818251 AU  
 Incl. = 13.10162 n = 0.11951502  
 q = 1.3775531 AU P = 8.25 years

$$m_1 = 10.8 + 5 \log(\Delta) + 22.5 \log(r(t-60))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	18 35.22	-15 16.8	3.079	2.111	+2.31	+0.2	.	8.2
Jan. 12	18 58.83	-15 09.0	2.997	2.036	+2.42	+1.5	.	10.0
Jan. 22	19 23.48	-14 47.2	2.909	1.963	+2.52	+3.0	21.7	13.0
Feb. 1	19 49.15	-14 10.2	2.817	1.891	+2.62	+4.5	21.3	16.2
Feb. 11	20 15.79	-13 17.7	2.722	1.820	+2.72	+6.1	20.9	19.3
Feb. 21	20 43.39	-12 09.1	2.627	1.752	+2.81	+7.7	20.5	22.3
Mar. 2	21 11.91	-10 44.5	2.533	1.687	+2.90	+9.3	20.1	25.0
Mar. 12	21 41.31	-09 04.7	2.442	1.626	+2.99	+10.8	19.7	27.4
Mar. 22	22 11.58	-07 10.8	2.357	1.569	+3.07	+12.1	19.3	29.5
Apr. 1	22 42.67	-05 04.9	2.279	1.518	+3.15	+13.1	18.8	31.3
Apr. 11	23 14.52	-02 49.8	2.210	1.473	+3.22	+13.9	18.4	32.9
Apr. 21	23 47.06	+00 29.1	2.150	1.436	+3.29	+14.2	17.9	34.3
May 1	00 20.16	+01 52.8	2.101	1.407	+3.34	+14.1	17.5	35.4
May 11	00 53.68	+04 11.1	2.062	1.388	+3.37	+13.5	17.1	36.5
May 21	01 27.42	+06 21.1	2.034	1.378	+3.38	+12.4	16.7	37.6
May 31	02 01.11	+08 18.3	2.014	1.379	+3.36	+10.8	16.4	38.8
June 10	02 34.47	+09 58.7	2.003	1.391	+3.31	+9.0	16.1	40.1
June 20	03 07.19	+11 19.8	1.999	1.412	+3.22	+7.0	15.8	41.7
June 30	03 38.95	+12 20.2	1.999	1.442	+3.11	+4.9	15.6	43.5
July 10	04 09.46	+12 59.4	2.001	1.481	+2.97	+2.8	15.5	45.6
July 20	04 38.46	+13 18.3	2.004	1.527	+2.81	+0.8	15.4	48.1
July 30	05 05.72	+13 18.6	2.006	1.579	+2.62	-0.9	15.5	51.1
Aug. 9	05 31.07	+13 02.2	2.004	1.637	+2.43	-2.4	15.5	54.4
Aug. 19	05 54.39	+12 31.8	1.998	1.699	+2.21	-3.7	15.7	58.2
Aug. 29	06 15.55	+11 49.9	1.985	1.765	+1.99	-4.7	15.9	62.6
Sept. 8	06 34.44	+10 59.1	1.966	1.833	+1.76	-5.5	16.1	67.4
Sept. 18	06 50.96	+10 02.1	1.941	1.904	+1.52	-5.9	16.4	72.8
Sept. 28	07 04.98	+09 01.6	1.908	1.977	+1.26	-6.1	16.7	78.9
Oct. 8	07 16.35	+08 00.2	1.870	2.050	+0.99	-6.1	17.0	85.5
Oct. 18	07 24.89	+07 00.7	1.827	2.125	+0.69	-5.7	17.3	92.9
Oct. 28	07 30.41	+06 06.2	1.783	2.200	+0.38	-5.0	17.6	101.0
Nov. 7	07 32.75	+05 20.0	1.739	2.275	+0.06	-4.0	17.9	109.8
Nov. 17	07 31.82	+04 45.4	1.701	2.350	-0.27	-2.7	18.2	119.4
Nov. 27	07 27.69	+04 25.8	1.673	2.425	-0.58	-1.0	18.6	129.7
Dec. 7	07 20.72	+04 23.9	1.661	2.500	-0.83	+0.8	18.9	140.4
Dec. 17	07 11.58	+04 40.7	1.670	2.575	-1.00	+2.7	19.3	150.9
Dec. 27	07 01.25	+05 15.6	1.704	2.649	-1.05	+4.4	19.7	159.8
Jan. 6	06 50.90	+06 05.4	1.766	2.722	-0.99	+5.6	20.1	163.1
Jan. 16	06 41.60	+07 05.7	1.858	2.795	-0.84	+6.4	20.5	158.2
Jan. 26	06 34.22	+08 11.6	1.977	2.867	-0.61	+6.7	20.9	149.2
Feb. 5	06 29.22	+09 18.5	2.120	2.938	-0.36	+6.6	21.4	139.3
Feb. 15	06 26.75	+10 23.1	2.285	3.009	-0.11	+6.2	21.8	129.3
Feb. 25	06 26.74	+11 23.0	2.466	3.079	+0.13	+5.7	.	119.7
Mar. 7	06 28.95	+12 16.7	2.661	3.148	+0.33	+5.0	.	110.5
Mar. 17	06 33.10	+13 03.6	2.864	3.216	+0.51	+4.3	.	101.7
Mar. 27	06 38.90	+13 43.2	3.072	3.284	+0.66	+3.5	.	93.3

## Comet C/2019 Y4 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2020 May 30.76029 TT  
 Peri. = 177.49936  
 Node = 120.53677 2000.0  
 Incl. = 45.34934  
 q = 0.2513591 AU  
 e = 0.9994800

$$m1 = 12.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	11 46.70	+31 48.0	2.325	2.871	+0.48	+14.4	18.4	114.1
Jan. 12	11 50.61	+34 30.3	2.078	2.732	+0.27	+18.7	18.0	122.3
Jan. 22	11 52.07	+37 58.6	1.849	2.591	-0.03	+23.6	17.5	129.7
Feb. 1	11 49.94	+42 17.9	1.645	2.445	-0.47	+28.8	17.0	135.3
Feb. 11	11 42.51	+47 27.3	1.468	2.296	-1.13	+33.4	16.4	137.7
Feb. 21	11 26.97	+53 15.3	1.324	2.143	-2.15	+36.0	15.9	135.2
Mar. 2	10 58.98	+59 11.7	1.214	1.984	-3.69	+34.2	15.4	128.0
Mar. 12	10 13.23	+64 23.9	1.134	1.820	-5.71	+26.2	14.9	117.4
Mar. 22	09 07.75	+67 45.7	1.080	1.649	-7.36	+11.9	14.3	105.1
Apr. 1	07 53.15	+68 32.5	1.042	1.471	-7.21	-3.7	13.8	92.2
Apr. 11	06 47.33	+67 02.0	1.010	1.284	-5.72	-14.6	13.1	79.3
Apr. 21	05 56.66	+64 03.4	0.972	1.085	-4.39	-21.5	12.3	66.6
May 1	05 15.85	+59 56.8	0.920	0.874	-3.87	-29.5	11.2	53.7
May 11	04 36.50	+53 47.7	0.851	0.646	-4.11	-49.9	9.7	39.4
May 21	03 54.60	+41 53.3	0.786	0.405	-3.89	107.6	7.6	21.7
May 31	03 38.40	+19 26.4	0.877	0.251	+2.78	124.9	5.7	12.8
June 10	04 23.17	+07 28.6	1.194	0.416	+4.77	-28.4	8.6	19.7
June 20	05 05.39	+04 36.6	1.472	0.657	+3.59	-9.1	11.0	22.3
June 30	05 37.36	+03 28.7	1.704	0.884	+2.78	-5.0	12.6	24.3
July 10	06 02.53	+02 44.2	1.903	1.095	+2.24	-4.1	13.8	26.7
July 20	06 23.04	+02 03.5	2.073	1.293	+1.85	-4.1	14.7	29.7
July 30	06 40.09	+01 20.6	2.215	1.479	+1.54	-4.5	15.4	33.6
Aug. 9	06 54.34	+00 33.6	2.331	1.657	+1.29	-4.9	16.0	38.2
Aug. 19	07 06.21	+00 17.7	2.423	1.828	+1.06	-5.4	16.5	43.5
Aug. 29	07 15.88	-01 13.1	2.491	1.991	+0.85	-5.7	17.0	49.6
Sept. 8	07 23.43	-02 11.9	2.539	2.150	+0.64	-6.0	17.3	56.3
Sept. 18	07 28.85	-03 13.0	2.566	2.303	+0.42	-6.2	17.7	63.6
Sept. 28	07 32.06	-04 15.3	2.578	2.452	+0.20	-6.2	18.0	71.5
Oct. 8	07 32.95	-05 16.7	2.577	2.597	-0.04	-6.0	18.2	80.0
Oct. 18	07 31.39	-06 15.3	2.567	2.739	-0.30	-5.6	18.4	89.1
Oct. 28	07 27.28	-07 07.9	2.555	2.877	-0.55	-4.8	18.6	98.7
Nov. 7	07 20.64	-07 51.2	2.545	3.012	-0.80	-3.7	18.8	108.7
Nov. 17	07 11.60	-08 21.3	2.546	3.145	-1.02	-2.1	19.0	118.9
Nov. 27	07 00.55	-08 34.5	2.563	3.275	-1.19	-0.3	19.2	129.0
Dec. 7	06 48.09	-08 28.2	2.603	3.403	-1.29	+1.7	19.4	138.4
Dec. 17	06 35.03	-08 01.6	2.671	3.529	-1.31	+3.8	19.6	145.8
Dec. 27	06 22.25	-07 15.9	2.771	3.652	-1.23	+5.5	19.8	149.4
Jan. 6	06 10.55	-06 14.8	2.904	3.774	-1.09	+6.8	20.1	148.0
Jan. 16	06 00.54	-05 02.7	3.067	3.894	-0.89	+7.6	20.3	142.4
Jan. 26	05 52.57	-03 44.4	3.260	4.012	-0.68	+8.0	20.6	134.5
Feb. 5	05 46.77	-02 24.3	3.476	4.128	-0.46	+8.0	20.9	125.5
Feb. 15	05 43.09	-01 05.5	3.712	4.243	-0.26	+7.7	21.1	116.3
Feb. 25	05 41.36	+00 09.6	3.962	4.357	-0.07	+7.2	21.4	107.1
Mar. 7	05 41.36	+01 19.5	4.222	4.469	+0.09	+6.7	21.6	98.0
Mar. 17	05 42.85	+02 23.3	4.485	4.580	+0.22	+6.0	21.9	89.1
Mar. 27	05 45.61	+03 20.5	4.749	4.689	+0.34	+5.4	.	80.5

Comet 36P/Whipple

Epoch = 2020 July 10.0 TT  
 T = 2020 May 31.64466 TT  
 Peri. = 200.77348 e = 0.2684736  
 Node = 181.86278 2000.0 a = 4.1305774 AU  
 Incl. = 9.95245 n = 0.11740536  
 q = 3.0216264 AU P = 8.39 years

$$m1 = 6.6 + 5 \log(\Delta) + 20.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	m1	Elong.
2020/21	h m	° ' .			m		°
Jan. 2	22 30.63	-07 40.5	3.563	3.117	+1.25 +5.1	19.2	55.7
Jan. 12	22 43.44	-06 45.9	3.663	3.105	+1.31 +5.8	19.3	48.8
Jan. 22	22 56.80	-05 44.7	3.753	3.094	+1.36 +6.4	19.3	42.1
Feb. 1	23 10.62	-04 38.0	3.831	3.084	+1.40 +6.9	19.3	35.5
Feb. 11	23 24.81	-03 26.7	3.898	3.074	+1.44 +7.3	19.3	29.1
Feb. 21	23 39.28	-02 11.8	3.952	3.065	+1.46 +7.7	19.3	22.8
Mar. 2	23 53.99	+00 54.3	3.993	3.057	+1.48 +7.9	19.3	16.7
Mar. 12	00 08.87	+00 24.9	4.021	3.050	+1.50 +8.0	19.3	10.6
Mar. 22	00 23.89	+01 44.7	4.035	3.043	+1.51 +8.0	19.3	4.7
Apr. 1	00 39.00	+03 04.3	4.036	3.038	+1.51 +7.9	19.3	1.7
Apr. 11	00 54.16	+04 22.7	4.024	3.033	+1.52 +7.7	19.3	7.3
Apr. 21	01 09.35	+05 38.9	3.999	3.029	+1.52 +7.5	19.2	13.0
May 1	01 24.52	+06 52.2	3.962	3.026	+1.51 +7.1	19.2	18.8
May 11	01 39.62	+08 01.7	3.913	3.023	+1.51 +6.7	19.2	24.6
May 21	01 54.62	+09 06.6	3.852	3.022	+1.49 +6.2	19.1	30.4
May 31	02 09.45	+10 06.1	3.780	3.022	+1.47 +5.6	19.1	36.2
June 10	02 24.03	+10 59.5	3.698	3.022	+1.44 +5.0	19.0	42.1
June 20	02 38.30	+11 46.3	3.606	3.023	+1.41 +4.3	19.0	48.1
June 30	02 52.15	+12 25.7	3.506	3.025	+1.36 +3.5	18.9	54.2
July 10	03 05.46	+12 57.3	3.398	3.028	+1.30 +2.7	18.9	60.4
July 20	03 18.09	+13 20.7	3.284	3.032	+1.22 +1.9	18.8	66.9
July 30	03 29.89	+13 35.5	3.164	3.037	+1.13 +1.0	18.7	73.6
Aug. 9	03 40.68	+13 41.4	3.040	3.042	+1.02 +0.1	18.7	80.5
Aug. 19	03 50.26	+13 38.3	2.914	3.049	+0.88 -0.8	18.6	87.8
Aug. 29	03 58.39	+13 26.1	2.789	3.056	+0.73 -1.7	18.5	95.5
Sept. 8	04 04.85	+13 05.2	2.666	3.064	+0.55 -2.6	18.5	103.6
Sept. 18	04 09.43	+12 35.9	2.548	3.073	+0.34 -3.4	18.4	112.2
Sept. 28	04 11.91	+11 58.9	2.440	3.082	+0.13 -4.1	18.3	121.4
Oct. 8	04 12.19	+11 15.6	2.344	3.093	-0.09 -4.6	18.3	131.0
Oct. 18	04 10.28	+10 27.7	2.265	3.104	-0.31 -4.9	18.2	141.0
Oct. 28	04 06.35	+09 38.0	2.207	3.115	-0.49 -5.0	18.2	151.3
Nov. 7	04 00.82	+08 49.7	2.174	3.128	-0.62 -4.6	18.2	161.0
Nov. 17	03 54.29	+08 06.3	2.168	3.141	-0.68 -3.9	18.2	167.6
Nov. 27	03 47.52	+07 31.7	2.191	3.155	-0.66 -2.9	18.3	165.2
Dec. 7	03 41.30	+07 08.4	2.242	3.169	-0.57 -1.6	18.4	156.5
Dec. 17	03 36.27	+06 58.0	2.319	3.184	-0.42 -0.3	18.5	146.3
Dec. 27	03 32.95	+07 00.9	2.419	3.200	-0.23 +1.0	18.6	135.9
Jan. 6	03 31.59	+07 15.8	2.539	3.216	-0.02 +2.1	18.8	125.9
Jan. 16	03 32.27	+07 41.2	2.674	3.233	+0.18 +3.0	18.9	116.3
Jan. 26	03 34.94	+08 14.9	2.821	3.250	+0.37 +3.7	19.1	107.2
Feb. 5	03 39.45	+08 54.8	2.974	3.268	+0.55 +4.2	19.3	98.4
Feb. 15	03 45.63	+09 38.7	3.132	3.286	+0.70 +4.5	19.4	90.1
Feb. 25	03 53.27	+10 24.8	3.291	3.305	+0.84 +4.7	19.6	82.2
Mar. 7	04 02.17	+11 11.3	3.447	3.324	+0.95 +4.6	19.7	74.6
Mar. 17	04 12.17	+11 57.0	3.600	3.344	+1.05 +4.5	19.9	67.3
Mar. 27	04 23.10	+12 40.5	3.746	3.364	+1.14 +4.2	20.0	60.2

## Comet 84P/Giclas

Epoch = 2020 July 10.0 TT  
 T = 2020 June 3.81352 TT  
 Peri. = 281.56274 e = 0.5154920  
 Node = 108.17455 2000.0 a = 3.5476077 AU  
 Incl. = 7.55231 n = 0.14750295  
 q = 1.7188443 AU P = 6.68 years

$$m_1 = 12.4 + 5 \log(\Delta) + 12.5 \log(r(t-100))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	20 45.90	-21 01.5	3.028	2.204	+2.11	+6.9	20.3	27.6
Jan. 12	21 07.30	-19 46.7	3.027	2.154	+2.17	+8.1	20.2	22.7
Jan. 22	21 29.26	-18 19.9	3.018	2.104	+2.22	+9.3	20.1	18.0
Feb. 1	21 51.69	-16 41.2	3.001	2.056	+2.27	+10.5	19.9	13.6
Feb. 11	22 14.53	-14 51.3	2.977	2.010	+2.30	+11.6	19.8	9.5
Feb. 21	22 37.73	-12 50.9	2.947	1.966	+2.34	+12.6	19.7	6.1
Mar. 2	23 01.28	-10 40.9	2.912	1.925	+2.37	+13.5	19.5	4.1
Mar. 12	23 25.16	-08 22.8	2.874	1.886	+2.41	+14.2	19.4	5.1
Mar. 22	23 49.37	-05 58.0	2.833	1.851	+2.44	+14.8	19.2	7.7
Apr. 1	00 13.93	-03 28.3	2.792	1.819	+2.48	+15.1	19.0	10.7
Apr. 11	00 38.84	+00 56.0	2.750	1.791	+2.51	+15.3	18.9	13.6
Apr. 21	01 04.14	+01 36.7	2.709	1.767	+2.55	+15.2	18.7	16.4
May 1	01 29.83	+04 07.5	2.669	1.748	+2.59	+14.9	18.6	19.1
May 11	01 55.89	+06 33.5	2.630	1.733	+2.63	+14.3	18.4	21.8
May 21	02 22.31	+08 52.4	2.594	1.724	+2.66	+13.4	18.3	24.4
May 31	02 49.04	+11 01.6	2.560	1.719	+2.69	+12.3	18.1	27.0
June 10	03 15.99	+12 58.8	2.528	1.720	+2.70	+11.0	18.0	29.6
June 20	03 43.06	+14 42.1	2.497	1.726	+2.71	+9.5	17.8	32.3
June 30	04 10.09	+16 10.1	2.467	1.736	+2.69	+7.9	17.7	35.1
July 10	04 36.92	+17 21.8	2.437	1.752	+2.67	+6.3	17.6	38.0
July 20	05 03.36	+18 16.9	2.407	1.772	+2.62	+4.6	17.5	41.1
July 30	05 29.21	+18 55.9	2.375	1.797	+2.54	+3.0	17.4	44.5
Aug. 9	05 54.25	+19 19.7	2.340	1.826	+2.45	+1.6	17.3	48.1
Aug. 19	06 18.30	+19 29.7	2.303	1.859	+2.34	+0.3	17.2	52.0
Aug. 29	06 41.15	+19 28.0	2.261	1.895	+2.21	-0.7	17.1	56.2
Sept. 8	07 02.64	+19 16.7	2.215	1.934	+2.07	-1.5	17.1	60.8
Sept. 18	07 22.60	+18 58.6	2.163	1.976	+1.90	-2.1	17.0	65.8
Sept. 28	07 40.84	+18 36.4	2.107	2.021	+1.72	-2.3	17.0	71.2
Oct. 8	07 57.20	+18 13.0	2.045	2.067	+1.53	-2.3	16.9	77.2
Oct. 18	08 11.48	+17 51.7	1.979	2.115	+1.30	-1.9	16.9	83.7
Oct. 28	08 23.44	+17 35.5	1.910	2.165	+1.06	-1.2	16.9	90.8
Nov. 7	08 32.86	+17 27.5	1.840	2.216	+0.79	-0.2	16.9	98.6
Nov. 17	08 39.45	+17 30.8	1.771	2.269	+0.49	+1.0	16.9	107.1
Nov. 27	08 42.96	+17 47.5	1.707	2.322	+0.17	+2.5	16.9	116.5
Dec. 7	08 43.22	+18 19.1	1.651	2.375	-0.16	+4.0	17.0	126.7
Dec. 17	08 40.20	+19 04.9	1.609	2.429	-0.48	+5.3	17.0	137.8
Dec. 27	08 34.17	+20 02.3	1.586	2.484	-0.75	+6.2	17.1	149.5
Jan. 6	08 25.78	+21 05.9	1.586	2.539	-0.93	+6.5	17.2	161.8
Jan. 16	08 16.04	+22 09.4	1.613	2.594	-1.00	+6.1	17.4	174.1
Jan. 26	08 06.23	+23 06.6	1.670	2.649	-0.94	+5.2	17.6	172.3
Feb. 5	07 57.55	+23 53.0	1.755	2.704	-0.77	+4.0	17.8	160.4
Feb. 15	07 50.93	+24 27.1	1.866	2.758	-0.52	+2.7	18.1	148.7
Feb. 25	07 46.91	+24 49.0	2.001	2.813	-0.25	+1.6	18.4	137.7
Mar. 7	07 45.61	+25 00.2	2.154	2.867	+0.02	+0.6	18.6	127.4
Mar. 17	07 46.90	+25 02.2	2.322	2.921	+0.26	-0.3	18.9	117.7
Mar. 27	07 50.53	+24 56.3	2.501	2.974	+0.48	-1.0	19.2	108.6

Comet C/2019 K7 (Smith)

Epoch = 2020 July 10.0 TT  
 T = 2020 June 16.92188 TT  
 Peri. = 27.29552  
 Node = 307.92618 2000.0  
 Incl. = 103.53649  
 q = 4.4749905 AU  
 e = 1.0010372

$$m1 = 6.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	20 16.96	-16 51.4	5.572	4.675	+0.46	+8.1	16.4	22.0
Jan. 12	20 21.73	-15 29.7	5.602	4.652	+0.49	+8.3	16.4	13.6
Jan. 22	20 26.66	-14 06.0	5.607	4.631	+0.50	+8.5	16.4	6.6
Feb. 1	20 31.62	-12 39.8	5.586	4.611	+0.49	+8.8	16.4	7.4
Feb. 11	20 36.45	-11 10.6	5.540	4.592	+0.47	+9.1	16.3	14.7
Feb. 21	20 41.03	-09 38.1	5.469	4.575	+0.44	+9.5	16.3	23.0
Mar. 2	20 45.20	-08 01.8	5.375	4.559	+0.39	+9.8	16.2	31.4
Mar. 12	20 48.82	-06 21.4	5.259	4.544	+0.33	+10.3	16.2	40.0
Mar. 22	20 51.74	-04 36.6	5.125	4.530	+0.25	+10.7	16.1	48.7
Apr. 1	20 53.80	-02 47.1	4.976	4.519	+0.15	+11.2	16.0	57.5
Apr. 11	20 54.82	+00 52.7	4.815	4.508	+0.04	+11.7	16.0	66.4
Apr. 21	20 54.61	+01 06.6	4.646	4.499	-0.10	+12.2	15.9	75.4
May 1	20 52.99	+03 10.5	4.475	4.491	-0.25	+12.6	15.8	84.5
May 11	20 49.74	+05 18.3	4.305	4.485	-0.42	+13.0	15.7	93.7
May 21	20 44.71	+07 28.8	4.144	4.480	-0.61	+13.1	15.6	102.9
May 31	20 37.74	+09 39.8	3.996	4.477	-0.81	+13.0	15.5	112.1
June 10	20 28.78	+11 48.2	3.869	4.475	-1.00	+12.6	15.4	120.9
June 20	20 17.89	+13 50.0	3.766	4.475	-1.19	+11.6	15.4	128.9
June 30	20 05.32	+15 40.6	3.694	4.476	-1.33	+10.3	15.3	135.5
July 10	19 51.51	+17 15.4	3.656	4.479	-1.43	+8.5	15.3	139.6
July 20	19 37.07	+18 30.8	3.652	4.483	-1.45	+6.4	15.3	140.5
July 30	19 22.73	+19 24.8	3.684	4.489	-1.40	+4.2	15.4	137.8
Aug. 9	19 09.19	+19 58.0	3.748	4.496	-1.29	+2.3	15.4	132.5
Aug. 19	18 57.05	+20 12.8	3.841	4.504	-1.12	+0.6	15.5	125.4
Aug. 29	18 46.74	+20 13.1	3.958	4.514	-0.92	-0.6	15.5	117.5
Sept. 8	18 38.47	+20 03.3	4.092	4.526	-0.71	-1.4	15.6	109.3
Sept. 18	18 32.27	+19 47.8	4.238	4.538	-0.51	-1.7	15.7	101.0
Sept. 28	18 28.09	+19 30.5	4.390	4.553	-0.31	-1.7	15.8	92.9
Oct. 8	18 25.74	+19 14.5	4.544	4.568	-0.14	-1.4	15.9	85.1
Oct. 18	18 25.05	+19 02.5	4.693	4.585	+0.01	-0.9	16.0	77.7
Oct. 28	18 25.80	+18 56.4	4.835	4.603	+0.15	-0.2	16.1	70.7
Nov. 7	18 27.76	+18 57.9	4.966	4.623	+0.26	+0.6	16.1	64.3
Nov. 17	18 30.75	+19 08.0	5.084	4.644	+0.35	+1.5	16.2	58.5
Nov. 27	18 34.56	+19 28.0	5.185	4.666	+0.42	+2.6	16.3	53.5
Dec. 7	18 39.00	+19 58.6	5.268	4.690	+0.47	+3.7	16.3	49.6
Dec. 17	18 43.92	+20 40.3	5.333	4.714	+0.51	+4.8	16.4	46.8
Dec. 27	18 49.14	+21 33.8	5.380	4.740	+0.53	+6.0	16.4	45.3
Jan. 6	18 54.51	+22 39.4	5.407	4.767	+0.54	+7.2	16.4	45.3
Jan. 16	18 59.86	+23 57.6	5.417	4.795	+0.53	+8.5	16.5	46.6
Jan. 26	19 05.02	+25 28.5	5.410	4.825	+0.50	+9.8	16.5	49.2
Feb. 5	19 09.85	+27 12.0	5.389	4.855	+0.46	+11.0	16.5	52.7
Feb. 15	19 14.16	+29 08.1	5.355	4.886	+0.40	+12.3	16.5	56.9
Feb. 25	19 17.75	+31 16.3	5.311	4.919	+0.31	+13.5	16.5	61.7
Mar. 7	19 20.44	+33 35.7	5.260	4.952	+0.21	+14.5	16.6	66.7
Mar. 17	19 21.98	+36 05.2	5.206	4.987	+0.08	+15.4	16.6	71.8
Mar. 27	19 22.11	+38 42.9	5.153	5.022	-0.07	+16.1	16.6	76.9

## Comet A/2019 U6

Epoch = 2020 July 10.0 TT  
 T = 2020 June 18.82334 TT  
 Peri. = 329.66129  
 Node = 235.70591 2000.0  
 Incl. = 61.00148  
 q = 0.9142510 AU  
 e = 0.9978903

$$m1 = 13.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	04 38.38	-26 18.2	2.085	2.733	-1.46	-7.4	19.0	121.7
Jan. 12	04 24.45	-27 15.7	2.061	2.613	-1.30	-3.8	18.7	113.4
Jan. 22	04 12.56	-27 39.5	2.050	2.491	-1.04	-0.7	18.5	104.8
Feb. 1	04 03.50	-27 35.4	2.047	2.368	-0.73	+1.6	18.3	96.3
Feb. 11	03 57.71	-27 11.1	2.044	2.244	-0.39	+3.3	18.1	88.3
Feb. 21	03 55.29	-26 33.8	2.035	2.118	-0.06	+4.2	17.8	81.0
Mar. 2	03 56.22	-25 49.6	2.016	1.992	+0.27	+4.6	17.5	74.3
Mar. 12	04 00.40	-25 03.7	1.984	1.865	+0.59	+4.5	17.2	68.5
Mar. 22	04 07.74	-24 19.6	1.934	1.738	+0.91	+4.2	16.8	63.6
Apr. 1	04 18.29	-23 40.1	1.865	1.612	+1.24	+3.6	16.4	59.7
Apr. 11	04 32.20	-23 06.7	1.777	1.487	+1.59	+3.0	16.0	56.8
Apr. 21	04 49.88	-22 39.3	1.669	1.365	+2.00	+2.5	15.5	54.8
May 1	05 12.05	-22 15.7	1.542	1.249	+2.50	+2.3	14.9	53.9
May 11	05 39.84	-21 49.6	1.399	1.141	+3.15	+3.2	14.3	53.7
May 21	06 15.01	-21 05.9	1.245	1.048	+4.01	+6.3	13.7	54.1
May 31	06 59.87	-19 35.6	1.092	0.974	+5.11	+13.3	13.1	55.0
June 10	07 56.50	-16 29.6	0.954	0.928	+6.34	+26.1	12.6	56.1
June 20	09 04.52	-10 55.2	0.858	0.914	+7.26	+42.2	12.3	57.7
June 30	10 18.13	-03 02.5	0.827	0.936	+7.30	+51.0	12.3	60.0
July 10	11 27.94	+05 14.2	0.871	0.989	+6.48	+45.7	12.7	62.7
July 20	12 27.76	+11 56.1	0.974	1.068	+5.37	+33.1	13.2	64.9
July 30	13 16.91	+16 32.4	1.115	1.165	+4.40	+21.5	13.9	66.2
Aug. 9	13 57.48	+19 27.5	1.274	1.275	+3.68	+13.2	14.6	66.6
Aug. 19	14 31.90	+21 12.6	1.441	1.393	+3.18	+7.7	15.2	66.6
Aug. 29	15 02.10	+22 12.2	1.612	1.516	+2.84	+4.2	15.8	66.1
Sept. 8	15 29.38	+22 43.3	1.781	1.641	+2.60	+2.0	16.4	65.4
Sept. 18	15 54.62	+22 57.0	1.950	1.768	+2.44	+0.7	16.9	64.5
Sept. 28	16 18.43	+23 01.3	2.117	1.895	+2.32	+0.2	17.4	63.5
Oct. 8	16 41.14	+23 01.9	2.281	2.021	+2.22	0.0	17.8	62.3
Oct. 18	17 03.02	+23 02.7	2.444	2.147	+2.15	+0.2	18.3	61.1
Oct. 28	17 24.21	+23 06.9	2.605	2.273	+2.08	+0.7	18.6	59.8
Nov. 7	17 44.78	+23 16.7	2.763	2.396	+2.03	+1.3	19.0	58.4
Nov. 17	18 04.80	+23 33.6	2.919	2.519	+1.97	+2.1	19.3	56.9
Nov. 27	18 24.27	+23 58.8	3.073	2.641	+1.92	+3.0	19.7	55.4
Dec. 7	18 43.18	+24 33.0	3.223	2.761	+1.86	+3.9	20.0	54.0
Dec. 17	19 01.52	+25 16.3	3.370	2.880	+1.80	+4.9	20.2	52.6
Dec. 27	19 19.26	+26 09.1	3.512	2.997	+1.74	+5.8	20.5	51.3
Jan. 6	19 36.36	+27 11.0	3.650	3.113	+1.67	+6.7	20.7	50.2
Jan. 16	19 52.81	+28 21.7	3.782	3.228	+1.61	+7.5	21.0	49.3
Jan. 26	20 08.54	+29 40.7	3.907	3.342	+1.53	+8.3	21.2	48.8
Feb. 5	20 23.54	+31 07.3	4.025	3.455	+1.46	+9.1	21.4	48.7
Feb. 15	20 37.75	+32 41.0	4.136	3.566	+1.38	+9.7	21.6	49.0
Feb. 25	20 51.13	+34 20.9	4.238	3.676	+1.29	+10.3	21.8	49.7
Mar. 7	21 03.62	+36 06.1	4.332	3.785	+1.20	+10.8	22.0	50.9
Mar. 17	21 15.16	+37 55.9	4.416	3.893	+1.10	+11.2	.	52.6
Mar. 27	21 25.67	+39 49.4	4.492	4.000	+0.99	+11.5	.	54.8

## Comet P/2012 SB6 (Lemmon)

Epoch = 2020 July 10.0 TT  
 T = 2020 June 19.41825 TT  
 Peri. = 14.39410 e = 0.4048234  
 Node = 8.20960 2000.0 a = 3.8254614 AU  
 Incl. = 10.92853 n = 0.13172807  
 q = 2.2768251 AU P = 7.48 years

$$m_1 = 11.6 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot. /PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	21 24.62	-20 46.9	3.294	2.571	-0.73 -5.1	20.3	26.3/66	36.6
Jan. 12	21 41.87	-18 56.8	3.335	2.541	-0.72 -5.5	20.3	27.2/65	30.8
Jan. 22	21 59.39	-17 00.3	3.366	2.512	-0.72 -5.8	20.2	28.0/65	25.3
Feb. 1	22 17.13	-14 57.6	3.388	2.484	-0.72 -6.2	20.2	28.7/64	19.8
Feb. 11	22 35.01	-12 49.3	3.399	2.457	-0.72 -6.5	20.1	29.4/64	14.6
Feb. 21	22 53.00	-10 35.9	3.401	2.432	-0.72 -6.8	20.0	29.9/63	9.5
Mar. 2	23 11.08	-08 18.3	3.394	2.408	-0.73 -7.1	20.0	30.3/63	4.8
Mar. 12	23 29.21	-05 57.2	3.378	2.386	-0.73 -7.3	19.9	30.6/62	2.6
Mar. 22	23 47.42	-03 33.5	3.354	2.366	-0.74 -7.5	19.8	30.9/62	6.2
Apr. 1	00 05.68	-01 08.0	3.322	2.348	-0.75 -7.7	19.8	31.1/62	10.7
Apr. 11	00 24.00	+01 18.2	3.283	2.331	-0.77 -7.8	19.7	31.2/62	15.3
Apr. 21	00 42.40	+03 44.3	3.237	2.317	-0.78 -7.9	19.6	31.2/62	19.9
May 1	01 00.88	+06 09.3	3.184	2.305	-0.80 -8.0	19.6	31.1/62	24.4
May 11	01 19.43	+08 32.1	3.126	2.295	-0.83 -8.0	19.5	31.0/63	28.9
May 21	01 38.06	+10 52.0	3.062	2.287	-0.85 -7.9	19.4	30.7/63	33.5
May 31	01 56.74	+13 08.0	2.993	2.281	-0.88 -7.8	19.4	30.4/64	38.0
June 10	02 15.44	+15 19.3	2.919	2.278	-0.91 -7.6	19.3	29.9/65	42.6
June 20	02 34.13	+17 25.2	2.841	2.277	-0.95 -7.4	19.2	29.4/65	47.2
June 30	02 52.73	+19 25.2	2.759	2.278	-0.99 -7.1	19.2	28.6/66	52.0
July 10	03 11.15	+21 18.6	2.673	2.282	-1.03 -6.8	19.1	27.8/67	56.8
July 20	03 29.27	+23 05.5	2.584	2.288	-1.07 -6.4	19.1	26.8/67	61.9
July 30	03 46.93	+24 45.8	2.492	2.296	-1.12 -6.0	19.0	25.5/68	67.1
Aug. 9	04 03.94	+26 19.6	2.397	2.306	-1.18 -5.6	18.9	24.0/68	72.6
Aug. 19	04 20.07	+27 47.7	2.300	2.319	-1.23 -5.1	18.9	22.3/67	78.3
Aug. 29	04 35.03	+29 10.8	2.203	2.333	-1.30 -4.6	18.8	20.2/66	84.5
Sept. 8	04 48.49	+30 29.8	2.105	2.350	-1.37 -4.0	18.8	17.9/64	91.0
Sept. 18	05 00.09	+31 46.0	2.009	2.368	-1.45 -3.5	18.7	15.2/60	98.0
Sept. 28	05 09.38	+33 00.2	1.916	2.389	-1.54 -3.0	18.7	12.3/53	105.6
Oct. 8	05 15.94	+34 12.8	1.829	2.411	-1.65 -2.6	18.6	9.4/40	113.7
Oct. 18	05 19.35	+35 23.3	1.751	2.434	-1.76 -2.4	18.6	7.1/15	122.4
Oct. 28	05 19.27	+36 29.7	1.684	2.460	-1.89 -2.3	18.6	6.7/339	131.7
Nov. 7	05 15.67	+37 28.3	1.634	2.487	-2.00 -2.5	18.6	8.4/309	141.4
Nov. 17	05 08.85	+38 14.0	1.603	2.515	-2.10 -2.9	18.6	10.4/291	151.1
Nov. 27	04 59.69	+38 41.9	1.596	2.544	-2.15 -3.6	18.7	11.8/278	159.6
Dec. 7	04 49.52	+38 49.0	1.614	2.575	-2.14 -4.4	18.8	11.9/268	163.7
Dec. 17	04 39.85	+38 36.1	1.659	2.607	-2.08 -5.0	18.9	10.6/258	160.2
Dec. 27	04 32.07	+38 07.8	1.730	2.639	-1.97 -5.4	19.1	8.2/245	152.0
Jan. 6	04 27.07	+37 30.4	1.825	2.673	-1.84 -5.5	19.3	5.6/225	142.5
Jan. 16	04 25.22	+36 50.2	1.941	2.708	-1.70 -5.3	19.5	4.0/181	132.9
Jan. 26	04 26.54	+36 11.7	2.073	2.743	-1.56 -4.9	19.8	5.1/135	123.5
Feb. 5	04 30.75	+35 37.6	2.219	2.778	-1.44 -4.4	20.0	7.6/114	114.6
Feb. 15	04 37.47	+35 08.5	2.376	2.815	-1.32 -3.8	20.2	10.1/105	106.1
Feb. 25	04 46.34	+34 44.2	2.539	2.852	-1.23 -3.2	20.4	12.4/100	98.1
Mar. 7	04 56.97	+34 23.7	2.706	2.889	-1.14 -2.6	20.7	14.3/98	90.4
Mar. 17	05 09.04	+34 05.5	2.875	2.927	-1.06 -2.0	20.9	15.9/96	83.1
Mar. 27	05 22.27	+33 48.4	3.043	2.965	-1.00 -1.5	21.1	17.2/96	76.0

## Comet 2P/Encke

Epoch = 2020 July 10.0 TT  
 T = 2020 June 25.84555 TT  
 Peri. = 186.56272 e = 0.8480023  
 Node = 334.55168 2000.0 a = 2.2153052 AU  
 Incl. = 11.76461 n = 0.29891913  
 q = 0.3367213 AU P = 3.30 years

H = 14.4 , G = 0.15 (r > 2.0 AU)  
 m1 = 13.1 + 5 log(Delta) + 12.5 log(r) (r < 2.0 AU)

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	Mag.	Elong.
2020/21	h m	° '			m		°
Jan. 2	23 01.96	+00 12.3	2.788	2.553	+0.72 +3.6	19.7	66.1
Jan. 12	23 09.83	+00 53.9	2.843	2.468	+0.87 +4.8	19.6	58.0
Jan. 22	23 19.17	+01 46.9	2.882	2.379	+1.01 +5.9	19.5	50.4
Feb. 1	23 29.86	+02 50.8	2.902	2.286	+1.14 +7.0	19.4	43.2
Feb. 11	23 41.81	+04 04.8	2.904	2.189	+1.26 +7.9	19.3	36.4
Feb. 21	23 55.00	+05 28.6	2.885	2.087	+1.39 +8.9	19.1	30.0
Mar. 2	00 09.44	+07 01.9	2.845	1.981	+1.52 +9.8	19.1	24.0
Mar. 12	00 25.21	+08 44.3	2.786	1.870	+1.66 +10.7	18.7	18.5
Mar. 22	00 42.50	+10 35.9	2.706	1.753	+1.82 +11.7	18.3	13.5
Apr. 1	01 01.56	+12 36.6	2.607	1.629	+2.02 +12.6	17.8	9.4
Apr. 11	01 22.79	+14 46.2	2.491	1.499	+2.26 +13.4	17.3	6.5
Apr. 21	01 46.81	+17 04.2	2.358	1.361	+2.59 +14.2	16.6	5.7
May 1	02 14.49	+19 29.1	2.211	1.215	+3.02 +14.8	15.9	6.3
May 11	02 47.15	+21 57.0	2.053	1.058	+3.61 +14.7	15.0	7.2
May 21	03 26.75	+24 18.8	1.887	0.891	+4.44 +13.2	13.9	7.1
May 31	04 16.02	+26 13.5	1.715	0.713	+5.59 +8.5	12.4	5.7
June 10	05 18.38	+26 55.1	1.537	0.529	+7.07 -2.9	10.6	4.1
June 20	06 35.58	+24 51.7	1.336	0.372	+8.31 -26.2	8.4	9.4
June 30	07 56.46	+18 33.1	1.079	0.355	+7.44 -49.3	7.6	19.2
July 10	09 07.02	+09 21.7	0.836	0.499	+6.97 -62.4	8.9	29.2
July 20	10 21.21	-02 07.8	0.678	0.682	+8.14 -76.0	10.2	41.8
July 30	11 48.70	-14 52.4	0.622	0.862	+9.32 -71.6	11.3	57.7
Aug. 9	13 21.55	-24 50.2	0.668	1.031	+8.88 -43.1	12.4	72.3
Aug. 19	14 42.88	-29 54.2	0.790	1.189	+7.11 -17.2	13.5	81.5
Aug. 29	15 45.66	-31 37.2	0.959	1.337	+5.34 -3.9	14.6	85.5
Sept. 8	16 32.99	-31 47.0	1.154	1.476	+4.08 +1.7	15.5	85.9
Sept. 18	17 09.89	-31 18.9	1.364	1.608	+3.27 +3.9	16.4	84.0
Sept. 28	17 40.09	-30 35.7	1.584	1.732	+2.75 +4.8	17.1	80.7
Oct. 8	18 05.90	-29 46.1	1.808	1.850	+2.40 +5.2	17.7	76.5
Oct. 18	18 28.78	-28 53.5	2.034	1.962	+2.16 +5.4	18.3	71.6
Oct. 28	18 49.61	-27 58.9	2.258	2.070	+1.99 +5.6	18.9	66.3
Nov. 7	19 08.94	-27 02.6	2.477	2.172	+1.87 +5.7	19.2	60.7
Nov. 17	19 27.13	-26 04.6	2.690	2.269	+1.77 +5.9	19.4	54.8
Nov. 27	19 44.42	-25 04.8	2.894	2.363	+1.68 +6.1	19.5	48.7
Dec. 7	20 00.93	-24 03.2	3.087	2.453	+1.61 +6.3	19.7	42.5
Dec. 17	20 16.78	-22 59.8	3.267	2.539	+1.55 +6.4	19.8	36.1
Dec. 27	20 32.03	-21 54.9	3.431	2.621	+1.49 +6.6	19.8	29.6
Jan. 6	20 46.70	-20 48.7	3.578	2.701	+1.44 +6.7	19.9	23.0
Jan. 16	21 00.82	-19 41.4	3.706	2.777	+1.38 +6.8	19.9	16.4
Jan. 26	21 14.39	-18 33.5	3.815	2.850	+1.33 +6.8	19.9	9.7
Feb. 5	21 27.41	-17 25.4	3.904	2.920	+1.27 +6.8	19.9	3.5
Feb. 15	21 39.87	-16 17.6	3.971	2.988	+1.21 +6.7	20.0	4.9
Feb. 25	21 51.73	-15 10.6	4.016	3.053	+1.15 +6.6	20.2	11.6
Mar. 7	22 02.97	-14 05.1	4.039	3.115	+1.09 +6.5	20.4	18.6
Mar. 17	22 13.56	-13 01.6	4.042	3.175	+1.02 +6.2	20.5	25.8
Mar. 27	22 23.43	-12 00.9	4.023	3.233	+0.95 +5.9	20.6	33.0

Comet 249P/LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2020 June 29.49733 TT  
 Peri. = 65.60545 e = 0.8201549  
 Node = 239.17646 2000.0 a = 2.7621108 AU  
 Incl. = 8.39688 n = 0.21470513  
 q = 0.4967521 AU P = 4.59 years

H = 16.2 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		V	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	12 03.87	-10 27.9	2.291	2.580	+0.60	-7.6	21.1	95.6
Jan. 12	12 09.22	-11 42.5	2.060	2.488	+0.44	-7.2	20.8	103.9
Jan. 22	12 12.77	-12 52.2	1.835	2.392	+0.24	-6.6	20.5	112.6
Feb. 1	12 13.96	-13 54.6	1.617	2.294	-0.04	-5.7	20.1	121.8
Feb. 11	12 12.09	-14 45.9	1.410	2.192	-0.39	-4.3	19.6	131.5
Feb. 21	12 06.32	-15 20.1	1.218	2.087	-0.83	-2.2	19.1	141.8
Mar. 2	11 55.65	-15 28.3	1.045	1.978	-1.37	+1.1	18.6	152.4
Mar. 12	11 39.28	-14 58.1	0.895	1.864	-1.97	+5.7	17.9	161.5
Mar. 22	11 16.88	-13 34.7	0.771	1.747	-2.55	+11.8	17.5	162.3
Apr. 1	10 49.39	-11 06.1	0.675	1.624	-2.95	+18.5	17.3	151.3
Apr. 11	10 19.21	-07 34.2	0.607	1.497	-3.05	+24.1	17.2	135.6
Apr. 21	09 49.32	-03 16.6	0.561	1.364	-2.87	+27.3	17.2	118.4
May 1	09 21.89	+01 22.0	0.529	1.226	-2.59	+28.3	17.2	101.3
May 11	08 56.68	+06 08.9	0.502	1.083	-2.50	+29.3	17.3	84.4
May 21	08 30.31	+11 14.1	0.473	0.936	-2.94	+32.5	17.4	67.2
May 31	07 55.35	+17 05.2	0.443	0.789	-4.42	+38.4	17.9	47.9
June 10	07 00.10	+23 39.7	0.430	0.649	-6.90	+37.3	20.2	24.4
June 20	05 47.26	+28 17.6	0.481	0.539	-6.73	+13.0	.	5.2
June 30	04 59.48	+28 50.8	0.630	0.497	-2.11	-4.0	19.2	22.5
July 10	04 55.77	+28 01.6	0.831	0.547	+1.22	-4.9	17.8	32.5
July 20	05 13.75	+27 14.8	1.019	0.662	+2.22	-4.5	17.8	38.0
July 30	05 36.62	+26 28.5	1.171	0.803	+2.28	-4.8	18.2	42.4
Aug. 9	05 58.53	+25 38.8	1.288	0.951	+2.06	-5.2	18.5	47.0
Aug. 19	06 17.88	+24 45.7	1.374	1.098	+1.77	-5.4	18.9	52.2
Aug. 29	06 34.22	+23 51.0	1.432	1.240	+1.46	-5.5	19.1	58.0
Sept. 8	06 47.42	+22 56.3	1.466	1.378	+1.15	-5.4	19.3	64.6
Sept. 18	06 57.40	+22 03.2	1.480	1.510	+0.81	-5.2	19.5	72.0
Sept. 28	07 03.92	+21 13.1	1.476	1.637	+0.45	-4.8	19.6	80.2
Oct. 8	07 06.77	+20 27.3	1.460	1.759	+0.07	-4.3	19.7	89.3
Oct. 18	07 05.61	+19 46.7	1.436	1.876	-0.35	-3.8	19.7	99.3
Oct. 28	07 00.14	+19 11.6	1.410	1.989	-0.79	-3.2	19.7	110.5
Nov. 7	06 50.31	+18 41.6	1.389	2.098	-1.22	-2.7	19.6	122.7
Nov. 17	06 36.42	+18 15.7	1.382	2.203	-1.58	-2.4	19.6	135.9
Nov. 27	06 19.40	+17 52.4	1.397	2.304	-1.82	-2.2	19.5	149.8
Dec. 7	06 00.86	+17 30.7	1.440	2.402	-1.87	-2.1	19.4	163.8
Dec. 17	05 42.65	+17 11.1	1.516	2.497	-1.73	-1.8	19.4	173.8
Dec. 27	05 26.52	+16 55.0	1.626	2.589	-1.45	-1.3	19.8	165.2
Jan. 6	05 13.60	+16 44.5	1.766	2.677	-1.09	-0.7	20.2	152.6
Jan. 16	05 04.33	+16 40.4	1.933	2.764	-0.72	0.0	20.6	140.4
Jan. 26	04 58.66	+16 42.8	2.122	2.847	-0.38	+0.6	21.0	129.0
Feb. 5	04 56.24	+16 50.9	2.328	2.928	-0.08	+1.1	21.3	118.4
Feb. 15	04 56.59	+17 03.2	2.544	3.007	+0.17	+1.4	21.6	108.5
Feb. 25	04 59.28	+17 18.4	2.768	3.083	+0.38	+1.6	21.8	99.1
Mar. 7	05 03.85	+17 35.0	2.994	3.157	+0.55	+1.7	22.0	90.2
Mar. 17	05 09.96	+17 51.8	3.218	3.230	+0.68	+1.6	22.2	81.8
Mar. 27	05 17.31	+18 07.7	3.439	3.300	+0.79	+1.5	22.4	73.6

## Comet 377P/Scotti

Epoch = 2020 July 10.0 TT  
 T = 2020 July 11.28555 TT  
 Peri. = 354.96871 e = 0.2527386  
 Node = 226.05929 2000.0 a = 6.7134774 AU  
 Incl. = 9.02208 n = 0.05666081  
 q = 5.0167225 AU P = 17.39 years

$$m_1 = 9.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	13 58.31	-15 43.2	5.360	5.070	+0.63	-3.1	19.7	67.8
Jan. 12	14 04.18	-16 11.9	5.204	5.065	+0.54	-2.6	19.6	76.5
Jan. 22	14 09.14	-16 35.3	5.043	5.060	+0.44	-2.0	19.6	85.4
Feb. 1	14 13.04	-16 52.8	4.880	5.055	+0.33	-1.4	19.5	94.6
Feb. 11	14 15.78	-17 03.9	4.720	5.050	+0.21	-0.7	19.4	104.0
Feb. 21	14 17.28	-17 08.1	4.566	5.046	+0.08	0.0	19.3	113.7
Mar. 2	14 17.49	-17 05.0	4.424	5.042	-0.05	+0.7	19.3	123.7
Mar. 12	14 16.42	-16 54.6	4.297	5.038	-0.17	+1.4	19.2	134.0
Mar. 22	14 14.16	-16 36.9	4.190	5.035	-0.28	+2.2	19.1	144.6
Apr. 1	14 10.90	-16 12.5	4.107	5.032	-0.37	+2.8	19.1	155.3
Apr. 11	14 06.89	-15 42.5	4.051	5.029	-0.43	+3.2	19.1	166.1
Apr. 21	14 02.47	-15 08.5	4.023	5.027	-0.45	+3.5	19.0	176.3
May 1	13 57.99	-14 32.5	4.026	5.024	-0.44	+3.6	19.0	171.4
May 11	13 53.83	-13 56.9	4.058	5.022	-0.39	+3.5	19.1	160.8
May 21	13 50.29	-13 23.7	4.117	5.021	-0.31	+3.1	19.1	150.2
May 31	13 47.66	-12 55.0	4.202	5.019	-0.21	+2.6	19.1	139.8
June 10	13 46.10	-12 32.3	4.307	5.018	-0.09	+1.9	19.2	129.8
June 20	13 45.71	-12 16.4	4.431	5.017	+0.03	+1.2	19.2	120.1
June 30	13 46.53	-12 07.7	4.567	5.017	+0.15	+0.5	19.3	110.7
July 10	13 48.53	-12 06.3	4.713	5.017	+0.26	-0.2	19.4	101.6
July 20	13 51.66	-12 11.7	4.864	5.017	+0.37	-0.9	19.4	92.8
July 30	13 55.85	-12 23.5	5.016	5.017	+0.47	-1.5	19.5	84.3
Aug. 9	14 01.01	-12 40.9	5.166	5.018	+0.56	-2.0	19.6	76.0
Aug. 19	14 07.04	-13 03.0	5.312	5.019	+0.65	-2.4	19.6	67.9
Aug. 29	14 13.85	-13 29.0	5.449	5.020	+0.72	-2.8	19.7	59.9
Sept. 8	14 21.36	-13 58.2	5.577	5.022	+0.79	-3.1	19.7	52.1
Sept. 18	14 29.47	-14 29.6	5.692	5.024	+0.84	-3.2	19.8	44.4
Sept. 28	14 38.11	-15 02.6	5.792	5.026	+0.89	-3.3	19.8	36.8
Oct. 8	14 47.20	-15 36.2	5.877	5.028	+0.93	-3.4	19.9	29.2
Oct. 18	14 56.66	-16 10.0	5.944	5.031	+0.96	-3.3	19.9	21.7
Oct. 28	15 06.41	-16 43.1	5.992	5.034	+0.99	-3.2	19.9	14.1
Nov. 7	15 16.37	-17 14.9	6.021	5.038	+1.00	-3.1	19.9	6.6
Nov. 17	15 26.46	-17 45.0	6.030	5.041	+1.01	-2.9	19.9	1.5
Nov. 27	15 36.59	-18 12.7	6.018	5.045	+1.01	-2.6	19.9	8.8
Dec. 7	15 46.67	-18 37.8	5.986	5.049	+1.00	-2.3	19.9	16.5
Dec. 17	15 56.61	-18 59.7	5.935	5.054	+0.98	-2.0	19.9	24.3
Dec. 27	16 06.29	-19 18.3	5.864	5.059	+0.95	-1.7	19.9	32.1
Jan. 6	16 15.62	-19 33.3	5.776	5.064	+0.91	-1.3	19.9	40.1
Jan. 16	16 24.47	-19 44.6	5.671	5.069	+0.85	-0.9	19.8	48.2
Jan. 26	16 32.72	-19 52.1	5.552	5.075	+0.79	-0.5	19.8	56.5
Feb. 5	16 40.24	-19 56.0	5.421	5.080	+0.71	-0.2	19.7	64.8
Feb. 15	16 46.92	-19 56.2	5.280	5.087	+0.62	+0.2	19.7	73.4
Feb. 25	16 52.60	-19 52.9	5.133	5.093	+0.51	+0.5	19.6	82.2
Mar. 7	16 57.19	-19 46.4	4.983	5.100	+0.39	+0.8	19.6	91.1
Mar. 17	17 00.56	-19 36.8	4.834	5.107	+0.27	+1.1	19.5	100.3
Mar. 27	17 02.63	-19 24.5	4.690	5.114	+0.13	+1.4	19.4	109.8

## Comet C/2019 V1 (Borisov)

Epoch = 2020 July 10.0 TT  
 T = 2020 July 16.57253 TT  
 Peri. = 51.20176  
 Node = 83.20550 2000.0  
 Incl. = 61.86265  
 q = 3.0971186 AU  
 e = 0.9986833

$$m1 = 11.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	05 17.50	+30 24.0	2.696	3.630	-1.19	+11.4	19.3	158.8
Jan. 12	05 06.05	+32 13.9	2.721	3.582	-1.07	+10.5	19.2	146.3
Jan. 22	04 56.11	+33 54.0	2.777	3.535	-0.88	+9.5	19.2	134.3
Feb. 1	04 48.39	+35 24.8	2.857	3.491	-0.63	+8.6	19.2	122.8
Feb. 11	04 43.28	+36 48.3	2.954	3.448	-0.36	+8.0	19.2	112.0
Feb. 21	04 40.95	+38 06.7	3.062	3.407	-0.08	+7.6	19.3	101.9
Mar. 2	04 41.39	+39 22.0	3.176	3.368	+0.19	+7.4	19.3	92.5
Mar. 12	04 44.47	+40 35.8	3.291	3.332	+0.45	+7.3	19.3	83.7
Mar. 22	04 50.03	+41 49.1	3.401	3.298	+0.69	+7.3	19.3	75.6
Apr. 1	04 57.91	+43 02.3	3.505	3.266	+0.91	+7.3	19.4	68.0
Apr. 11	05 07.94	+44 15.5	3.600	3.237	+1.12	+7.3	19.4	61.1
Apr. 21	05 19.99	+45 28.4	3.684	3.210	+1.31	+7.3	19.4	54.7
May 1	05 33.98	+46 40.4	3.756	3.186	+1.50	+7.1	19.4	48.9
May 11	05 49.81	+47 50.9	3.814	3.164	+1.68	+6.9	19.4	43.9
May 21	06 07.46	+48 58.9	3.860	3.146	+1.86	+6.6	19.4	39.5
May 31	06 26.88	+50 03.4	3.893	3.130	+2.04	+6.2	19.4	36.0
June 10	06 48.03	+51 03.3	3.914	3.118	+2.21	+5.7	19.4	33.5
June 20	07 10.87	+51 57.1	3.923	3.108	+2.38	+5.0	19.4	32.0
June 30	07 35.34	+52 43.8	3.921	3.101	+2.53	+4.2	19.4	31.6
July 10	08 01.33	+53 21.8	3.910	3.098	+2.68	+3.3	19.4	32.2
July 20	08 28.69	+53 50.0	3.891	3.097	+2.81	+2.2	19.4	33.7
July 30	08 57.23	+54 07.2	3.866	3.100	+2.91	+1.1	19.3	35.8
Aug. 9	09 26.67	+54 12.7	3.835	3.106	+2.98	-0.1	19.3	38.4
Aug. 19	09 56.73	+54 06.1	3.802	3.114	+3.03	-1.3	19.3	41.3
Aug. 29	10 27.08	+53 47.5	3.766	3.126	+3.04	-2.5	19.3	44.4
Sept. 8	10 57.37	+53 17.7	3.730	3.141	+3.01	-3.6	19.3	47.6
Sept. 18	11 27.30	+52 37.8	3.695	3.158	+2.96	-4.5	19.3	50.8
Sept. 28	11 56.59	+51 49.8	3.662	3.179	+2.88	-5.2	19.3	54.0
Oct. 8	12 25.01	+50 55.9	3.632	3.202	+2.79	-5.6	19.4	57.2
Oct. 18	12 52.38	+49 58.7	3.605	3.228	+2.67	-5.8	19.4	60.2
Oct. 28	13 18.57	+49 01.1	3.582	3.256	+2.55	-5.7	19.4	63.1
Nov. 7	13 43.46	+48 05.9	3.563	3.287	+2.42	-5.3	19.4	66.0
Nov. 17	14 07.00	+47 15.6	3.548	3.321	+2.28	-4.6	19.5	68.8
Nov. 27	14 29.09	+46 32.9	3.536	3.357	+2.13	-3.8	19.5	71.5
Dec. 7	14 49.68	+45 59.7	3.527	3.395	+1.97	-2.7	19.5	74.3
Dec. 17	15 08.69	+45 37.7	3.520	3.435	+1.81	-1.5	19.6	77.0
Dec. 27	15 26.03	+45 28.0	3.514	3.477	+1.64	-0.3	19.6	79.7
Jan. 6	15 41.59	+45 31.1	3.510	3.521	+1.45	+1.0	19.7	82.6
Jan. 16	15 55.25	+45 47.1	3.507	3.567	+1.26	+2.3	19.7	85.5
Jan. 26	16 06.85	+46 15.4	3.504	3.614	+1.04	+3.4	19.8	88.4
Feb. 5	16 16.23	+46 54.4	3.503	3.663	+0.81	+4.4	19.9	91.5
Feb. 15	16 23.18	+47 42.3	3.502	3.714	+0.55	+5.2	19.9	94.6
Feb. 25	16 27.52	+48 36.0	3.504	3.766	+0.28	+5.6	20.0	97.7
Mar. 7	16 29.07	+49 31.9	3.509	3.820	0.00	+5.5	20.0	100.7
Mar. 17	16 27.73	+50 25.5	3.518	3.874	-0.30	+5.0	20.1	103.6
Mar. 27	16 23.49	+51 11.3	3.534	3.930	-0.58	+3.9	20.2	106.1

## Comet 178P/Hug-Bell

Epoch = 2020 July 10.0 TT  
 T = 2020 July 16.60745 TT  
 Peri. = 297.78436 e = 0.4817980  
 Node = 102.87420 2000.0 a = 3.6303779 AU  
 Incl. = 11.08964 n = 0.14248735  
 q = 1.8812691 AU P = 6.92 years

$$m_1 = 13.2 + 5 \log(\Delta) + 12.5 \log(r(t-60))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	21 08.36	-22 25.7	3.249	2.478	+1.84	+7.0	21.3	32.6
Jan. 12	21 27.06	-21 11.9	3.264	2.430	+1.90	+7.9	21.2	27.1
Jan. 22	21 46.28	-19 49.0	3.269	2.383	+1.95	+8.8	21.1	21.8
Feb. 1	22 05.95	-18 17.3	3.262	2.337	+1.99	+9.6	21.0	16.9
Feb. 11	22 25.99	-16 37.4	3.246	2.292	+2.02	+10.4	20.9	12.4
Feb. 21	22 46.37	-14 49.8	3.221	2.249	+2.06	+11.2	20.8	8.8
Mar. 2	23 07.06	-12 55.2	3.187	2.206	+2.08	+11.8	20.6	6.8
Mar. 12	23 28.04	-10 54.7	3.147	2.166	+2.11	+12.3	20.5	7.6
Mar. 22	23 49.31	-08 49.1	3.100	2.127	+2.14	+12.8	20.4	10.3
Apr. 1	00 10.88	-06 39.8	3.048	2.090	+2.17	+13.1	20.2	13.6
Apr. 11	00 32.75	-04 28.0	2.991	2.055	+2.21	+13.3	20.1	17.2
Apr. 21	00 54.96	-02 15.2	2.932	2.023	+2.24	+13.3	19.9	20.7
May 1	01 17.50	+00 03.0	2.870	1.994	+2.27	+13.1	19.8	24.1
May 11	01 40.39	+02 07.1	2.807	1.967	+2.31	+12.8	19.6	27.5
May 21	02 03.64	+04 13.3	2.743	1.944	+2.34	+12.3	19.5	30.8
May 31	02 27.21	+06 13.9	2.679	1.924	+2.37	+11.7	19.3	34.0
June 10	02 51.08	+08 07.1	2.615	1.908	+2.40	+10.9	19.2	37.2
June 20	03 15.19	+09 51.5	2.550	1.895	+2.42	+9.9	19.1	40.4
June 30	03 39.45	+11 25.5	2.486	1.887	+2.43	+8.8	18.9	43.7
July 10	04 03.76	+12 48.0	2.423	1.882	+2.43	+7.6	18.8	47.0
July 20	04 27.97	+13 58.4	2.359	1.881	+2.41	+6.3	18.7	50.4
July 30	04 51.91	+14 56.1	2.294	1.885	+2.37	+5.1	18.6	54.0
Aug. 9	05 15.41	+15 41.4	2.229	1.892	+2.32	+3.9	18.4	57.7
Aug. 19	05 38.27	+16 14.8	2.162	1.903	+2.24	+2.7	18.3	61.7
Aug. 29	06 00.24	+16 37.5	2.094	1.919	+2.14	+1.7	18.3	66.0
Sept. 8	06 21.13	+16 51.2	2.023	1.937	+2.02	+1.0	18.2	70.6
Sept. 18	06 40.68	+16 58.1	1.951	1.959	+1.87	+0.4	18.1	75.6
Sept. 28	06 58.64	+17 00.7	1.877	1.985	+1.70	+0.1	18.0	81.0
Oct. 8	07 14.75	+17 02.1	1.801	2.013	+1.50	+0.2	17.9	87.0
Oct. 18	07 28.71	+17 05.6	1.725	2.045	+1.26	+0.6	17.9	93.6
Oct. 28	07 40.19	+17 14.8	1.649	2.078	+1.00	+1.4	17.8	100.8
Nov. 7	07 48.87	+17 33.2	1.576	2.115	+0.70	+2.5	17.8	108.8
Nov. 17	07 54.41	+18 04.0	1.507	2.153	+0.37	+3.9	17.7	117.7
Nov. 27	07 56.53	+18 49.6	1.448	2.193	+0.02	+5.4	17.7	127.4
Dec. 7	07 55.15	+19 50.2	1.402	2.235	-0.33	+6.8	17.7	138.1
Dec. 17	07 50.41	+21 03.5	1.374	2.278	-0.64	+7.9	17.8	149.6
Dec. 27	07 42.95	+22 24.3	1.368	2.323	-0.86	+8.2	17.9	161.7
Jan. 6	07 33.84	+23 45.3	1.388	2.368	-0.95	+7.8	18.0	173.9
Jan. 16	07 24.44	+24 59.1	1.436	2.415	-0.90	+6.8	18.1	172.7
Jan. 26	07 16.18	+26 00.8	1.511	2.462	-0.72	+5.4	18.4	160.8
Feb. 5	07 10.14	+26 48.2	1.612	2.510	-0.46	+4.0	18.6	149.3
Feb. 15	07 06.89	+27 21.9	1.735	2.559	-0.16	+2.7	18.9	138.4
Feb. 25	07 06.65	+27 43.4	1.876	2.608	+0.14	+1.6	19.1	128.3
Mar. 7	07 09.24	+27 54.8	2.032	2.657	+0.40	+0.6	19.4	118.8
Mar. 17	07 14.34	+27 57.4	2.200	2.707	+0.63	-0.2	19.7	110.0
Mar. 27	07 21.59	+27 52.4	2.375	2.756	+0.83	-0.9	20.0	101.7

## Comet A/2019 Q1

Epoch = 2020 July 10.0 TT  
 T = 2020 July 19.78664 TT  
 Peri. = 55.93138  
 Node = 42.33623 2000.0  
 Incl. = 155.72016  
 q = 4.9968004 AU  
 e = 1.0004740

H = 12.0 G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		V	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	23 47.17	+12 05.7	5.282	5.226	-0.29	-2.1	19.9	81.4
Jan. 12	23 44.90	+11 48.7	5.444	5.205	-0.16	-1.2	19.9	70.8
Jan. 22	23 43.81	+11 40.8	5.595	5.184	-0.05	-0.3	19.9	60.6
Feb. 1	23 43.70	+11 41.5	5.730	5.164	+0.04	+0.5	19.9	50.8
Feb. 11	23 44.36	+11 50.0	5.845	5.145	+0.10	+1.2	19.9	41.3
Feb. 21	23 45.62	+12 05.2	5.936	5.128	+0.15	+1.9	19.9	32.3
Mar. 2	23 47.30	+12 26.5	6.001	5.111	+0.18	+2.4	19.8	24.0
Mar. 12	23 49.23	+12 53.0	6.038	5.095	+0.20	+2.9	19.8	17.0
Mar. 22	23 51.25	+13 23.9	6.046	5.081	+0.20	+3.3	19.7	13.3
Apr. 1	23 53.22	+13 58.6	6.025	5.068	+0.19	+3.6	19.7	15.3
Apr. 11	23 54.97	+14 36.3	5.975	5.055	+0.16	+3.9	19.8	21.4
Apr. 21	23 56.36	+15 16.4	5.898	5.044	+0.11	+4.1	19.8	29.2
May 1	23 57.22	+15 58.1	5.795	5.034	+0.05	+4.2	19.8	37.6
May 11	23 57.37	+16 40.7	5.669	5.026	-0.03	+4.3	19.9	46.4
May 21	23 56.65	+17 23.4	5.522	5.018	-0.13	+4.2	19.8	55.4
May 31	23 54.84	+18 05.2	5.359	5.011	-0.25	+4.1	19.8	64.8
June 10	23 51.74	+18 44.8	5.184	5.006	-0.39	+3.8	19.8	74.3
June 20	23 47.15	+19 20.6	5.002	5.002	-0.55	+3.3	19.7	84.1
June 30	23 40.86	+19 50.7	4.819	4.999	-0.73	+2.6	19.6	94.3
July 10	23 32.72	+20 12.7	4.642	4.997	-0.92	+1.6	19.5	104.7
July 20	23 22.64	+20 23.7	4.477	4.997	-1.11	+0.4	19.4	115.3
July 30	23 10.66	+20 20.8	4.333	4.997	-1.30	-1.2	19.3	126.0
Aug. 9	22 57.01	+20 01.1	4.216	4.999	-1.44	-3.0	19.2	136.4
Aug. 19	22 42.09	+19 23.0	4.133	5.002	-1.54	-4.9	19.1	145.7
Aug. 29	22 26.52	+18 26.2	4.091	5.006	-1.57	-6.6	19.0	152.2
Sept. 8	22 11.02	+17 12.9	4.091	5.012	-1.52	-8.1	19.0	153.3
Sept. 18	21 56.29	+15 47.0	4.135	5.018	-1.40	-9.1	19.1	148.3
Sept. 28	21 42.96	+14 13.9	4.220	5.026	-1.24	-9.5	19.2	139.7
Oct. 8	21 31.42	+12 39.2	4.341	5.035	-1.05	-9.4	19.3	129.4
Oct. 18	21 21.89	+11 07.9	4.491	5.045	-0.84	-8.8	19.4	118.6
Oct. 28	21 14.40	+09 43.7	4.664	5.056	-0.64	-7.9	19.5	107.8
Nov. 7	21 08.84	+08 29.0	4.850	5.068	-0.46	-6.9	19.6	97.1
Nov. 17	21 05.04	+07 25.1	5.043	5.081	-0.29	-5.8	19.7	86.6
Nov. 27	21 02.78	+06 32.5	5.236	5.096	-0.15	-4.6	19.8	76.5
Dec. 7	21 01.82	+05 50.9	5.422	5.112	-0.03	-3.6	19.9	66.6
Dec. 17	21 01.93	+05 19.9	5.595	5.128	+0.06	-2.5	19.9	57.2
Dec. 27	21 02.90	+04 58.9	5.751	5.146	+0.14	-1.6	19.9	48.1
Jan. 6	21 04.52	+04 46.9	5.885	5.165	+0.19	-0.7	19.9	39.5
Jan. 16	21 06.59	+04 43.1	5.996	5.185	+0.23	+0.1	19.9	31.7
Jan. 26	21 08.94	+04 46.9	6.080	5.205	+0.24	+0.8	19.9	25.1
Feb. 5	21 11.41	+04 57.2	6.136	5.227	+0.25	+1.4	19.9	21.0
Feb. 15	21 13.83	+05 13.4	6.163	5.250	+0.23	+1.9	19.9	20.6
Feb. 25	21 16.05	+05 34.7	6.162	5.274	+0.21	+2.4	19.9	24.1
Mar. 7	21 17.92	+06 00.2	6.133	5.299	+0.16	+2.8	20.0	30.1
Mar. 17	21 19.30	+06 29.2	6.078	5.324	+0.10	+3.1	20.0	37.6
Mar. 27	21 20.03	+07 00.9	5.999	5.351	+0.03	+3.3	20.1	45.8

## Comet 115P/Maury

Epoch = 2020 July 10.0 TT  
 T = 2020 July 29.75480 TT  
 Peri. = 121.01522  
 Node = 176.01932 2000.0  
 Incl. = 11.67418  
 q = 2.0569128 AU

e = 0.5190554  
 a = 4.2768186 AU  
 n = 0.11143531  
 P = 8.84 years

$$m_1 = 11.0 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	15 54.45	-13 01.5	3.330	2.681	+1.78	-2.9	20.0	42.0
Jan. 12	16 12.32	-13 26.6	3.192	2.634	+1.79	-2.0	19.8	47.8
Jan. 22	16 30.31	-13 41.8	3.048	2.587	+1.80	-0.9	19.6	53.5
Feb. 1	16 48.32	-13 46.3	2.899	2.541	+1.80	+0.2	19.4	59.3
Feb. 11	17 06.23	-13 39.7	2.748	2.497	+1.78	+1.3	19.2	65.0
Feb. 21	17 23.90	-13 21.6	2.595	2.453	+1.75	+2.5	18.9	70.7
Mar. 2	17 41.17	-12 51.7	2.441	2.411	+1.70	+3.6	18.7	76.5
Mar. 12	17 57.87	-12 10.3	2.289	2.370	+1.63	+4.8	18.4	82.3
Mar. 22	18 13.83	-11 17.9	2.140	2.331	+1.55	+5.8	18.2	88.1
Apr. 1	18 28.80	-10 15.3	1.995	2.294	+1.43	+6.8	17.9	94.1
Apr. 11	18 42.58	-09 04.0	1.855	2.259	+1.30	+7.5	17.7	100.1
Apr. 21	18 54.91	-07 45.7	1.723	2.226	+1.14	+8.1	17.4	106.4
May 1	19 05.50	-06 23.2	1.598	2.195	+0.95	+8.4	17.1	112.9
May 11	19 14.09	-05 00.0	1.483	2.167	+0.74	+8.2	16.9	119.6
May 21	19 20.43	-03 40.2	1.378	2.142	+0.50	+7.6	16.7	126.6
May 31	19 24.29	-02 29.4	1.287	2.120	+0.25	+6.4	16.4	134.0
June 10	19 25.63	-01 33.7	1.210	2.101	0.00	+4.5	16.2	141.4
June 20	19 24.57	+00 59.2	1.149	2.085	-0.22	+2.0	16.1	148.8
June 30	19 21.58	+00 51.8	1.106	2.073	-0.38	-0.9	16.0	155.2
July 10	19 17.46	-01 14.2	1.082	2.064	-0.44	-3.9	15.9	159.0
July 20	19 13.23	-02 05.8	1.079	2.059	-0.39	-6.6	15.9	158.4
July 30	19 10.01	-03 21.9	1.097	2.057	-0.23	-8.7	15.9	153.7
Aug. 9	19 08.76	-04 54.6	1.134	2.059	+0.01	-9.8	16.0	146.9
Aug. 19	19 10.07	-06 34.8	1.189	2.064	+0.29	-10.1	16.1	139.2
Aug. 29	19 14.25	-08 14.3	1.261	2.073	+0.58	-9.6	16.3	131.5
Sept. 8	19 21.27	-09 46.2	1.347	2.086	+0.85	-8.6	16.4	124.1
Sept. 18	19 30.88	-11 05.9	1.446	2.102	+1.09	-7.2	16.6	116.9
Sept. 28	19 42.78	-12 10.4	1.557	2.121	+1.30	-5.5	16.9	110.1
Oct. 8	19 56.55	-12 57.9	1.676	2.143	+1.47	-3.8	17.1	103.6
Oct. 18	20 11.84	-13 28.1	1.803	2.169	+1.60	-2.1	17.3	97.3
Oct. 28	20 28.29	-13 41.1	1.937	2.197	+1.70	-0.4	17.6	91.3
Nov. 7	20 45.57	-13 37.6	2.076	2.227	+1.76	+1.2	17.8	85.4
Nov. 17	21 03.43	-13 18.8	2.219	2.260	+1.81	+2.7	18.0	79.6
Nov. 27	21 21.66	-12 46.1	2.364	2.296	+1.83	+4.0	18.3	73.9
Dec. 7	21 40.05	-12 01.0	2.511	2.333	+1.84	+5.1	18.5	68.3
Dec. 17	21 58.47	-11 05.2	2.657	2.372	+1.84	+6.1	18.7	62.6
Dec. 27	22 16.83	-10 00.4	2.802	2.413	+1.83	+6.9	19.0	57.1
Jan. 6	22 35.04	-08 48.1	2.944	2.455	+1.81	+7.6	19.2	51.5
Jan. 16	22 53.04	-07 30.0	3.081	2.499	+1.79	+8.1	19.4	45.9
Jan. 26	23 10.81	-06 07.6	3.213	2.543	+1.76	+8.4	19.6	40.4
Feb. 5	23 28.31	-04 42.3	3.337	2.589	+1.73	+8.6	19.8	34.8
Feb. 15	23 45.53	-03 15.4	3.454	2.636	+1.71	+8.7	20.0	29.2
Feb. 25	00 02.47	-01 48.2	3.561	2.684	+1.68	+8.7	20.2	23.6
Mar. 7	00 19.12	+00 21.8	3.658	2.732	+1.65	+8.6	20.4	18.0
Mar. 17	00 35.47	+01 02.9	3.744	2.781	+1.62	+8.3	20.5	12.5
Mar. 27	00 51.51	+02 24.8	3.817	2.830	+1.59	+8.0	20.7	7.1

Comet 304P/Ory

Epoch = 2020 July 10.0 TT  
 T = 2020 Aug. 12.47571 TT  
 Peri. = 335.22512  
 Node = 58.93689 2000.0  
 Incl. = 2.60666  
 q = 1.2586887 AU  
 e = 0.6003910  
 a = 3.1498007 AU  
 n = 0.17631102  
 P = 5.59 years

$$m_1 = 13.2 + 5 \log(\Delta) + 25.0 \log(r(t-25))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	18 54.43	-24 10.0	3.552	2.570	+1.90	+2.2	.	2.1
Jan. 12	19 13.69	-23 43.4	3.481	2.502	+1.96	+3.2	.	4.3
Jan. 22	19 33.54	-23 07.0	3.396	2.432	+2.02	+4.2	.	9.8
Feb. 1	19 53.93	-22 20.3	3.299	2.362	+2.07	+5.3	.	15.2
Feb. 11	20 14.81	-21 22.7	3.191	2.291	+2.11	+6.4	.	20.4
Feb. 21	20 36.18	-20 13.7	3.073	2.220	+2.16	+7.5	.	25.3
Mar. 2	20 58.02	-18 52.9	2.947	2.148	+2.21	+8.7	.	30.1
Mar. 12	21 20.35	-17 20.0	2.816	2.075	+2.26	+10.0	.	34.5
Mar. 22	21 43.23	-15 34.5	2.680	2.002	+2.32	+11.3	.	38.7
Apr. 1	22 06.70	-13 36.1	2.542	1.930	+2.38	+12.5	.	42.6
Apr. 11	22 30.84	-11 24.7	2.405	1.857	+2.46	+13.9	.	46.2
Apr. 21	22 55.80	-09 00.2	2.269	1.786	+2.54	+15.2	.	49.3
May 1	23 21.69	-06 22.7	2.138	1.715	+2.65	+16.4	21.8	52.1
May 11	23 48.68	-03 32.9	2.013	1.647	+2.77	+17.6	21.2	54.5
May 21	00 16.97	+00 31.8	1.895	1.580	+2.91	+18.6	20.7	56.5
May 31	00 46.72	+02 38.2	1.788	1.517	+3.06	+19.4	20.1	58.0
June 10	01 18.09	+05 53.8	1.692	1.459	+3.23	+19.7	19.5	59.1
June 20	01 51.24	+09 10.1	1.609	1.405	+3.41	+19.4	19.0	59.8
June 30	02 26.16	+12 20.6	1.539	1.358	+3.59	+18.4	18.4	60.2
July 10	03 02.76	+15 17.7	1.483	1.319	+3.74	+16.7	17.9	60.3
July 20	03 40.76	+17 53.6	1.440	1.289	+3.86	+14.1	17.5	60.4
July 30	04 19.64	+20 01.0	1.410	1.269	+3.91	+11.0	17.1	60.5
Aug. 9	04 58.74	+21 34.9	1.390	1.259	+3.89	+7.5	16.8	60.8
Aug. 19	05 37.28	+22 33.5	1.378	1.261	+3.79	+3.9	16.6	61.4
Aug. 29	06 14.48	+22 57.8	1.372	1.274	+3.62	+0.7	16.4	62.5
Sept. 8	06 49.66	+22 52.1	1.368	1.297	+3.39	-2.0	16.4	64.1
Sept. 18	07 22.34	+22 22.3	1.365	1.330	+3.11	-4.1	16.4	66.3
Sept. 28	07 52.16	+21 35.2	1.360	1.372	+2.82	-5.4	16.6	69.1
Oct. 8	08 18.92	+20 37.6	1.351	1.421	+2.51	-6.1	16.8	72.7
Oct. 18	08 42.53	+19 36.2	1.337	1.476	+2.18	-6.1	17.1	76.9
Oct. 28	09 02.85	+18 36.9	1.318	1.536	+1.85	-5.6	17.4	82.0
Nov. 7	09 19.80	+17 45.1	1.293	1.600	+1.50	-4.6	17.8	87.9
Nov. 17	09 33.18	+17 05.5	1.263	1.667	+1.13	-3.1	18.1	94.7
Nov. 27	09 42.76	+16 42.4	1.231	1.736	+0.74	-1.3	18.5	102.5
Dec. 7	09 48.28	+16 38.9	1.198	1.807	+0.32	+0.8	18.9	111.4
Dec. 17	09 49.49	+16 56.8	1.169	1.879	-0.12	+3.0	19.3	121.3
Dec. 27	09 46.29	+17 35.4	1.148	1.952	-0.55	+4.9	19.7	132.4
Jan. 6	09 39.01	+18 30.3	1.142	2.024	-0.93	+6.1	20.1	144.4
Jan. 16	09 28.45	+19 33.9	1.155	2.097	-1.19	+6.5	20.6	157.1
Jan. 26	09 16.06	+20 36.3	1.194	2.169	-1.27	+5.8	21.0	169.8
Feb. 5	09 03.61	+21 28.3	1.259	2.241	-1.18	+4.4	21.5	174.0
Feb. 15	08 52.70	+22 04.8	1.351	2.313	-0.95	+2.7	.	162.7
Feb. 25	08 44.52	+22 24.3	1.469	2.384	-0.64	+1.1	.	151.0
Mar. 7	08 39.56	+22 28.6	1.609	2.453	-0.32	-0.3	.	139.9
Mar. 17	08 37.82	+22 20.2	1.768	2.522	-0.01	-1.4	.	129.7
Mar. 27	08 39.00	+22 01.6	1.942	2.591	+0.26	-2.3	.	120.1

## Comet P/2013 W1 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 10.37309 TT  
 Peri. = 1.29847 e = 0.5928432  
 Node = 117.84855 2000.0 a = 3.4909737 AU  
 Incl. = 4.69543 n = 0.15110687  
 q = 1.4213737 AU P = 6.52 years

$$m_1 = 15.6 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	23 34.35	-07 22.5	2.955	2.786	-0.49 -2.6	.	14.7/63	70.5
Jan. 12	23 43.80	-06 11.8	3.023	2.721	-0.49 -2.8	.	17.0/64	62.9
Jan. 22	23 54.61	-04 52.7	3.081	2.656	-0.50 -2.9	.	19.1/64	55.8
Feb. 1	00 06.67	-03 26.1	3.127	2.590	-0.52 -3.1	.	21.1/65	49.0
Feb. 11	00 19.87	-01 53.1	3.161	2.523	-0.55 -3.3	.	22.8/65	42.5
Feb. 21	00 34.12	+00 14.3	3.181	2.456	-0.57 -3.6	.	24.4/65	36.4
Mar. 2	00 49.40	+01 29.4	3.189	2.389	-0.61 -3.8	.	26.0/66	30.5
Mar. 12	01 05.67	+03 17.0	3.183	2.321	-0.65 -4.0	.	27.5/66	25.0
Mar. 22	01 22.94	+05 07.7	3.166	2.253	-0.69 -4.3	.	28.9/67	19.8
Apr. 1	01 41.24	+07 00.4	3.136	2.186	-0.75 -4.5	.	30.3/68	14.9
Apr. 11	02 00.60	+08 53.9	3.096	2.118	-0.81 -4.7	.	31.7/69	10.4
Apr. 21	02 21.11	+10 47.0	3.047	2.051	-0.88 -4.9	.	33.1/70	6.3
May 1	02 42.84	+12 38.0	2.990	1.985	-0.96 -5.0	.	34.6/72	3.3
May 11	03 05.87	+14 25.2	2.926	1.920	-1.04 -5.0	.	36.1/73	3.8
May 21	03 30.30	+16 06.5	2.858	1.856	-1.14 -4.9	21.9	37.6/75	6.5
May 31	03 56.20	+17 39.5	2.786	1.794	-1.24 -4.7	21.6	39.2/77	9.5
June 10	04 23.61	+19 01.3	2.713	1.734	-1.35 -4.3	21.4	40.8/79	12.3
June 20	04 52.57	+20 08.9	2.640	1.678	-1.46 -3.7	21.1	42.4/82	14.9
June 30	05 23.03	+20 59.1	2.568	1.625	-1.57 -2.9	20.8	43.9/85	17.2
July 10	05 54.84	+21 28.7	2.501	1.577	-1.67 -1.9	20.6	45.4/88	19.2
July 20	06 27.82	+21 34.8	2.438	1.533	-1.75 -0.7	20.3	46.8/91	21.1
July 30	07 01.66	+21 15.3	2.380	1.496	-1.82 +0.6	20.1	47.9/94	22.7
Aug. 9	07 36.00	+20 29.2	2.330	1.466	-1.85 +2.0	19.9	48.8/97	24.2
Aug. 19	08 10.46	+19 16.7	2.287	1.443	-1.86 +3.4	19.8	49.4/100	25.6
Aug. 29	08 44.63	+17 39.7	2.252	1.428	-1.84 +4.7	19.7	49.7/103	27.0
Sept. 8	09 18.20	+15 41.1	2.224	1.422	-1.80 +5.8	19.6	49.6/105	28.4
Sept. 18	09 50.89	+13 25.3	2.203	1.424	-1.74 +6.6	19.6	49.1/107	29.9
Sept. 28	10 22.52	+10 56.9	2.188	1.435	-1.67 +7.2	19.7	48.2/108	31.6
Oct. 8	10 52.97	+08 21.2	2.178	1.454	-1.59 +7.5	19.7	47.0/110	33.5
Oct. 18	11 22.20	+05 42.9	2.170	1.481	-1.50 +7.6	19.8	45.4/110	35.7
Oct. 28	11 50.16	+03 06.4	2.164	1.515	-1.42 +7.5	20.0	43.6/111	38.3
Nov. 7	12 16.87	+00 35.7	2.158	1.555	-1.33 +7.2	20.1	41.7/111	41.2
Nov. 17	12 42.33	-01 46.3	2.150	1.601	-1.26 +6.8	20.3	39.5/110	44.4
Nov. 27	13 06.50	-03 57.1	2.138	1.652	-1.19 +6.4	20.5	37.2/109	48.1
Dec. 7	13 29.35	-05 55.0	2.122	1.707	-1.12 +6.0	20.7	34.8/109	52.3
Dec. 17	13 50.83	-07 38.7	2.100	1.765	-1.06 +5.5	20.9	32.2/107	56.8
Dec. 27	14 10.81	-09 07.6	2.071	1.826	-1.01 +5.2	21.1	29.4/106	61.8
Jan. 6	14 29.16	-10 21.3	2.035	1.889	-0.97 +4.9	21.3	26.5/104	67.3
Jan. 16	14 45.69	-11 19.8	1.993	1.953	-0.94 +4.6	21.5	23.3/103	73.4
Jan. 26	15 00.18	-12 03.5	1.944	2.019	-0.93 +4.5	21.6	19.8/100	79.9
Feb. 5	15 12.39	-12 32.8	1.891	2.086	-0.92 +4.5	21.8	16.0/98	87.0
Feb. 15	15 22.03	-12 48.4	1.833	2.153	-0.93 +4.5	21.9	11.9/94	94.7
Feb. 25	15 28.79	-12 50.9	1.776	2.221	-0.95 +4.7	22.0	7.5/87	103.2
Mar. 7	15 32.46	-12 41.4	1.720	2.289	-1.00 +5.0	.	3.2/60	112.3
Mar. 17	15 32.83	-12 20.8	1.671	2.357	-1.05 +5.3	.	3.4/321	122.2
Mar. 27	15 29.91	-11 50.8	1.633	2.424	-1.11 +5.7	.	7.6/297	132.8

Comet 257P/Catalina

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 10.74914 TT  
 Peri. = 117.64478 e = 0.4308630  
 Node = 207.74574 2000.0 a = 3.7643509 AU  
 Incl. = 20.22086 n = 0.13494877  
 q = 2.1424314 AU P = 7.30 years

$$m1 = 12.6 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	16 58.02	-12 49.3	3.646	2.814	+1.73	+0.8	19.9	27.7
Jan. 12	17 15.40	-12 36.2	3.539	2.772	+1.74	+1.9	19.8	33.5
Jan. 22	17 32.84	-12 12.1	3.422	2.732	+1.74	+3.0	19.6	39.2
Feb. 1	17 50.25	-11 36.6	3.296	2.691	+1.73	+4.2	19.5	45.0
Feb. 11	18 07.51	-10 49.1	3.164	2.651	+1.71	+5.4	19.3	50.7
Feb. 21	18 24.52	-09 49.4	3.026	2.612	+1.68	+6.7	19.2	56.4
Mar. 2	18 41.15	-08 37.3	2.884	2.574	+1.64	+7.9	19.0	62.1
Mar. 12	18 57.28	-07 13.0	2.740	2.536	+1.58	+9.1	18.8	67.7
Mar. 22	19 12.78	-05 36.8	2.595	2.500	+1.51	+10.3	18.7	73.4
Apr. 1	19 27.51	-03 49.1	2.451	2.464	+1.42	+11.4	18.5	79.0
Apr. 11	19 41.32	-01 51.0	2.309	2.430	+1.32	+12.4	18.3	84.7
Apr. 21	19 54.04	+00 16.5	2.170	2.397	+1.20	+13.2	18.1	90.4
May 1	20 05.48	+02 31.7	2.036	2.366	+1.07	+13.9	17.9	96.1
May 11	20 15.43	+04 52.3	1.908	2.336	+0.91	+14.2	17.7	101.9
May 21	20 23.69	+07 15.3	1.787	2.307	+0.72	+14.3	17.5	107.8
May 31	20 29.99	+09 36.8	1.675	2.281	+0.51	+13.9	17.3	113.8
June 10	20 34.14	+11 51.5	1.573	2.256	+0.29	+12.9	17.1	119.8
June 20	20 35.97	+13 53.4	1.482	2.234	+0.05	+11.2	16.9	125.8
June 30	20 35.44	+15 34.5	1.405	2.214	-0.18	+8.7	16.8	131.6
July 10	20 32.76	+16 47.0	1.341	2.196	-0.37	+5.4	16.7	136.9
July 20	20 28.40	+17 23.5	1.293	2.180	-0.50	+1.4	16.5	141.2
July 30	20 23.14	+17 18.7	1.263	2.168	-0.53	-2.8	16.5	144.0
Aug. 9	20 18.04	+16 32.0	1.250	2.157	-0.46	-6.9	16.4	144.6
Aug. 19	20 14.12	+15 07.5	1.255	2.150	-0.29	-10.2	16.4	142.8
Aug. 29	20 12.30	+13 13.7	1.278	2.145	-0.04	-12.5	16.4	138.9
Sept. 8	20 13.18	+11 02.3	1.319	2.143	+0.25	-13.7	16.5	133.7
Sept. 18	20 16.97	+08 44.8	1.376	2.143	+0.54	-13.7	16.6	127.7
Sept. 28	20 23.66	+06 31.2	1.448	2.147	+0.82	-12.8	16.7	121.3
Oct. 8	20 33.00	+04 29.5	1.533	2.153	+1.07	-11.3	16.9	114.8
Oct. 18	20 44.63	+02 44.7	1.629	2.162	+1.28	-9.4	17.0	108.4
Oct. 28	20 58.21	+01 19.8	1.736	2.173	+1.45	-7.3	17.2	102.1
Nov. 7	21 13.33	+00 15.9	1.851	2.187	+1.58	-5.2	17.3	95.9
Nov. 17	21 29.66	+00 27.2	1.973	2.204	+1.69	-3.2	17.5	89.8
Nov. 27	21 46.91	+00 50.4	2.100	2.223	+1.76	-1.3	17.7	83.9
Dec. 7	22 04.80	+00 55.3	2.230	2.244	+1.82	+0.4	17.9	78.0
Dec. 17	22 23.12	+00 44.0	2.363	2.267	+1.85	+2.0	18.0	72.3
Dec. 27	22 41.72	+00 18.4	2.498	2.293	+1.87	+3.3	18.2	66.6
Jan. 6	23 00.46	+00 19.1	2.631	2.320	+1.88	+4.3	18.4	61.0
Jan. 16	23 19.23	+01 06.4	2.763	2.349	+1.88	+5.2	18.5	55.4
Jan. 26	23 37.99	+02 01.5	2.891	2.380	+1.87	+5.9	18.7	49.9
Feb. 5	23 56.66	+03 02.2	3.015	2.412	+1.86	+6.3	18.8	44.4
Feb. 15	00 15.23	+04 06.9	3.133	2.445	+1.85	+6.6	19.0	38.9
Feb. 25	00 33.66	+05 13.8	3.245	2.480	+1.83	+6.7	19.1	33.5
Mar. 7	00 51.94	+06 21.3	3.348	2.516	+1.82	+6.7	19.2	28.1
Mar. 17	01 10.06	+07 28.1	3.442	2.553	+1.80	+6.6	19.4	22.7
Mar. 27	01 28.00	+08 32.8	3.527	2.591	+1.78	+6.3	19.5	17.3

Comet 278P/McNaught

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 12.06463 TT  
 Peri. = 238.08588 e = 0.4348948  
 Node = 15.44963 2000.0 a = 3.6931263 AU  
 Incl. = 6.68515 n = 0.13887140  
 q = 2.0870049 AU P = 7.10 years

$$m1 = 12.8 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	m1	Elong.
2020/21	h m	° ' "			m		°
Jan. 2	12 55.00	-03 00.0	2.667	2.793	+0.95 -6.7	21.6	86.9
Jan. 12	13 04.05	-04 04.3	2.491	2.751	+0.84 -6.1	21.4	94.6
Jan. 22	13 11.84	-05 01.8	2.317	2.709	+0.70 -5.3	21.1	102.6
Feb. 1	13 18.06	-05 51.2	2.149	2.667	+0.52 -4.5	20.9	111.1
Feb. 11	13 22.41	-06 31.8	1.990	2.626	+0.32 -3.5	20.6	119.9
Feb. 21	13 24.59	-07 02.6	1.843	2.585	+0.09 -2.5	20.3	129.3
Mar. 2	13 24.32	-07 23.0	1.710	2.545	-0.17 -1.4	20.1	139.3
Mar. 12	13 21.52	-07 32.8	1.596	2.506	-0.42 -0.4	19.8	149.9
Mar. 22	13 16.31	-07 32.7	1.504	2.468	-0.64 +0.5	19.6	161.1
Apr. 1	13 09.15	-07 24.6	1.436	2.431	-0.79 +1.1	19.4	172.7
Apr. 11	13 00.91	-07 12.0	1.395	2.395	-0.84 +1.3	19.2	175.5
Apr. 21	12 52.68	-06 59.7	1.379	2.360	-0.78 +1.0	19.1	163.7
May 1	12 45.60	-06 52.7	1.387	2.327	-0.60 +0.2	19.0	152.3
May 11	12 40.63	-06 55.7	1.417	2.295	-0.36 -1.0	19.0	141.5
May 21	12 38.34	-07 11.7	1.465	2.265	-0.07 -2.4	19.0	131.4
May 31	12 39.01	-07 42.2	1.526	2.237	+0.23 -3.9	19.0	122.2
June 10	12 42.62	-08 27.1	1.597	2.211	+0.51 -5.3	19.0	113.7
June 20	12 48.96	-09 25.5	1.676	2.187	+0.78 -6.5	19.0	106.0
June 30	12 57.80	-10 35.9	1.760	2.165	+1.01 -7.6	19.1	99.0
July 10	13 08.86	-11 56.4	1.847	2.146	+1.22 -8.5	19.1	92.5
July 20	13 21.90	-13 24.8	1.935	2.129	+1.41 -9.2	19.2	86.5
July 30	13 36.73	-14 59.1	2.024	2.115	+1.57 -9.7	19.2	80.9
Aug. 9	13 53.15	-16 36.9	2.113	2.104	+1.72 -9.9	19.3	75.6
Aug. 19	14 11.02	-18 16.1	2.201	2.096	+1.86 -9.9	19.3	70.6
Aug. 29	14 30.23	-19 54.4	2.289	2.090	+1.99 -9.7	19.4	65.8
Sept. 8	14 50.67	-21 29.4	2.376	2.087	+2.11 -9.2	19.5	61.2
Sept. 18	15 12.24	-22 58.9	2.462	2.088	+2.22 -8.6	19.6	56.7
Sept. 28	15 34.84	-24 20.8	2.546	2.091	+2.31 -7.7	19.6	52.3
Oct. 8	15 58.34	-25 32.9	2.629	2.097	+2.39 -6.6	19.7	48.0
Oct. 18	16 22.62	-26 33.5	2.710	2.106	+2.47 -5.4	19.8	43.7
Oct. 28	16 47.52	-27 21.0	2.789	2.118	+2.52 -4.0	19.9	39.4
Nov. 7	17 12.85	-27 54.1	2.865	2.132	+2.55 -2.5	20.0	35.1
Nov. 17	17 38.44	-28 12.1	2.939	2.150	+2.57 -1.0	20.1	30.8
Nov. 27	18 04.08	-28 14.7	3.008	2.169	+2.56 +0.6	20.2	26.4
Dec. 7	18 29.57	-28 01.9	3.074	2.191	+2.53 +2.1	20.3	22.0
Dec. 17	18 54.74	-27 34.3	3.134	2.216	+2.49 +3.5	20.5	17.6
Dec. 27	19 19.41	-26 52.9	3.189	2.242	+2.43 +4.9	20.6	13.1
Jan. 6	19 43.44	-25 58.9	3.237	2.271	+2.36 +6.0	20.7	8.9
Jan. 16	20 06.75	-24 53.7	3.279	2.301	+2.29 +7.1	20.8	5.3
Jan. 26	20 29.22	-23 39.1	3.312	2.333	+2.20 +7.9	20.9	5.0
Feb. 5	20 50.83	-22 16.6	3.338	2.366	+2.11 +8.6	21.0	8.4
Feb. 15	21 11.54	-20 48.1	3.354	2.401	+2.02 +9.1	21.1	12.9
Feb. 25	21 31.32	-19 15.1	3.361	2.438	+1.93 +9.5	21.2	17.9
Mar. 7	21 50.18	-17 39.4	3.358	2.475	+1.84 +9.7	21.3	23.0
Mar. 17	22 08.13	-16 02.4	3.345	2.513	+1.74 +9.7	21.4	28.3
Mar. 27	22 25.14	-14 25.5	3.321	2.552	+1.65 +9.6	21.5	33.7

## Comet P/2007 R2 (Gibbs)

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 15.60464 TT  
 Peri. = 352.34246 e = 0.5419053  
 Node = 11.48512 2000.0 a = 3.5739132 AU  
 Incl. = 1.21286 n = 0.14587742  
 q = 1.6371907 AU P = 6.76 years

$$m_1 = 17.2 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	17 52.49	-24 17.4	3.736	2.784	-0.69 +0.1	.	25.2/ 91	12.5
Jan. 12	18 11.08	-24 17.4	3.641	2.726	-0.73 -0.2	.	25.7/ 89	18.4
Jan. 22	18 30.07	-24 09.0	3.534	2.668	-0.78 -0.6	.	26.3/ 87	24.3
Feb. 1	18 49.37	-23 52.0	3.415	2.609	-0.83 -1.0	.	26.8/ 85	30.0
Feb. 11	19 08.92	-23 25.8	3.287	2.551	-0.89 -1.5	.	27.2/ 84	35.7
Feb. 21	19 28.66	-22 50.4	3.149	2.492	-0.94 -2.0	.	27.7/ 82	41.2
Mar. 2	19 48.52	-22 05.7	3.005	2.433	-1.01 -2.6	.	28.1/ 80	46.6
Mar. 12	20 08.45	-21 11.8	2.856	2.375	-1.07 -3.3	.	28.5/ 78	51.9
Mar. 22	20 28.40	-20 08.7	2.703	2.317	-1.14 -4.1	.	28.9/ 77	57.1
Apr. 1	20 48.34	-18 56.9	2.547	2.259	-1.22 -5.0	.	29.3/ 75	62.1
Apr. 11	21 08.23	-17 36.7	2.391	2.202	-1.31 -5.9	.	29.6/ 73	67.0
Apr. 21	21 28.05	-16 08.7	2.235	2.146	-1.40 -6.9	.	30.0/ 72	71.9
May 1	21 47.77	-14 33.4	2.081	2.092	-1.50 -8.1	.	30.2/ 71	76.6
May 11	22 07.38	-12 51.6	1.931	2.038	-1.62 -9.3	.	30.5/ 70	81.2
May 21	22 26.85	-11 04.1	1.786	1.986	-1.75 -10.6	.	30.6/ 69	85.8
May 31	22 46.14	-09 12.1	1.645	1.937	-1.89 -12.1	21.9	30.6/ 68	90.3
June 10	23 05.20	-07 16.7	1.512	1.889	-2.05 -13.6	21.6	30.5/ 68	94.7
June 20	23 23.95	-05 19.4	1.385	1.845	-2.24 -15.2	21.2	30.1/ 67	99.2
June 30	23 42.24	-03 22.1	1.266	1.803	-2.45 -17.0	20.9	29.3/ 67	103.8
July 10	23 59.91	-01 26.6	1.156	1.766	-2.69 -18.8	20.6	28.3/ 66	108.5
July 20	00 16.71	+00 24.6	1.055	1.732	-2.96 -20.7	20.3	26.5/ 66	113.5
July 30	00 32.26	+02 08.9	0.963	1.703	-3.27 -22.8	20.0	24.2/ 66	118.8
Aug. 9	00 46.16	+03 43.7	0.882	1.679	-3.62 -24.9	19.7	21.1/ 65	124.5
Aug. 19	00 57.88	+05 06.1	0.810	1.660	-4.00 -27.0	19.5	17.1/ 64	130.9
Aug. 29	01 06.87	+06 13.3	0.751	1.646	-4.39 -29.2	19.3	12.4/ 62	138.0
Sept. 8	01 12.74	+07 03.9	0.704	1.639	-4.78 -31.3	19.1	7.3/ 56	146.1
Sept. 18	01 15.32	+07 37.0	0.671	1.637	-5.11 -33.1	19.0	2.7/ 27	155.0
Sept. 28	01 14.96	+07 54.3	0.654	1.642	-5.32 -34.3	19.0	2.6/ 293	164.8
Oct. 8	01 12.66	+08 00.4	0.654	1.652	-5.35 -34.5	19.0	4.3/ 273	175.1
Oct. 18	01 09.80	+08 01.8	0.674	1.668	-5.19 -33.6	19.1	3.8/ 273	174.3
Oct. 28	01 07.90	+08 06.3	0.712	1.690	-4.87 -31.7	19.3	1.6/ 305	164.0
Nov. 7	01 08.12	+08 20.1	0.769	1.716	-4.44 -29.0	19.6	3.2/ 50	154.1
Nov. 17	01 11.01	+08 46.5	0.844	1.747	-3.99 -25.9	19.9	7.4/ 63	144.9
Nov. 27	01 16.73	+09 26.6	0.934	1.783	-3.55 -22.9	20.2	11.7/ 66	136.3
Dec. 7	01 25.05	+10 19.1	1.039	1.823	-3.16 -20.0	20.5	15.3/ 68	128.4
Dec. 17	01 35.58	+11 21.6	1.157	1.866	-2.81 -17.3	20.9	18.4/ 69	121.1
Dec. 27	01 47.99	+12 31.5	1.286	1.911	-2.51 -15.0	21.3	20.8/ 69	114.1
Jan. 6	02 01.89	+13 46.0	1.425	1.960	-2.25 -12.9	21.6	22.6/ 70	107.5
Jan. 16	02 16.99	+15 02.7	1.573	2.011	-2.04 -11.0	22.0	24.0/ 71	101.2
Jan. 26	02 33.06	+16 19.5	1.727	2.063	-1.85 -9.4	.	25.0/ 72	95.1
Feb. 5	02 49.89	+17 34.2	1.888	2.118	-1.69 -7.9	.	25.6/ 73	89.2
Feb. 15	03 07.33	+18 45.4	2.053	2.173	-1.55 -6.7	.	26.1/ 75	83.4
Feb. 25	03 25.24	+19 51.8	2.220	2.229	-1.43 -5.5	.	26.3/ 76	77.7
Mar. 7	03 43.50	+20 52.3	2.389	2.287	-1.32 -4.6	.	26.4/ 77	72.0
Mar. 17	04 02.02	+21 45.9	2.557	2.345	-1.23 -3.7	.	26.4/ 79	66.5
Mar. 27	04 20.71	+22 32.2	2.724	2.403	-1.14 -2.9	.	26.3/ 81	60.9

## Comet 296P/Garradd

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 17.92542 TT  
 Peri. = 350.12596 e = 0.4785246  
 Node = 263.64055 2000.0 a = 3.4966756 AU  
 Incl. = 25.23502 n = 0.15073741  
 q = 1.8234303 AU P = 6.54 years

$$m_1 = 11.2 + 5 \log(\Delta) + 17.5 \log(r(t-30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	11 21.96	-26 25.2	2.457	2.757	+0.48	-14.7	21.3	97.1
Jan. 12	11 25.88	-28 51.5	2.296	2.707	+0.28	-14.4	21.0	104.0
Jan. 22	11 27.71	-31 13.2	2.143	2.657	+0.05	-13.7	20.7	110.8
Feb. 1	11 27.09	-33 25.1	2.000	2.607	-0.21	-12.4	20.4	117.6
Feb. 11	11 23.83	-35 20.9	1.871	2.557	-0.48	-10.4	20.1	124.0
Feb. 21	11 17.89	-36 53.1	1.756	2.507	-0.73	-7.6	19.8	129.9
Mar. 2	11 09.61	-37 53.0	1.658	2.458	-0.93	-3.9	19.6	134.7
Mar. 12	10 59.85	-38 13.7	1.578	2.409	-1.01	+0.2	19.3	137.9
Mar. 22	10 49.86	-37 51.8	1.518	2.361	-0.96	+4.5	19.1	138.9
Apr. 1	10 41.11	-36 48.6	1.477	2.314	-0.75	+8.3	18.9	137.5
Apr. 11	10 34.93	-35 11.9	1.454	2.267	-0.44	+11.1	18.7	133.9
Apr. 21	10 32.17	-33 12.5	1.448	2.222	-0.07	+12.7	18.5	129.0
May 1	10 33.26	-31 02.6	1.456	2.177	+0.32	+13.1	18.4	123.1
May 11	10 38.16	-28 53.6	1.478	2.135	+0.69	+12.5	18.3	117.0
May 21	10 46.60	-26 53.6	1.509	2.094	+1.02	+11.3	18.2	110.7
May 31	10 58.21	-25 08.1	1.549	2.055	+1.32	+9.6	18.1	104.7
June 10	11 12.55	-23 40.2	1.595	2.018	+1.57	+7.8	18.0	98.8
June 20	11 29.25	-22 30.4	1.646	1.983	+1.79	+6.0	17.9	93.3
June 30	11 47.95	-21 38.4	1.702	1.952	+1.97	+4.3	17.8	88.0
July 10	12 08.33	-21 02.4	1.761	1.923	+2.12	+2.8	17.8	83.0
July 20	12 30.14	-20 39.9	1.822	1.897	+2.25	+1.6	17.7	78.3
July 30	12 53.15	-20 28.6	1.887	1.875	+2.36	+0.6	17.7	73.7
Aug. 9	13 17.15	-20 25.3	1.953	1.857	+2.45	0.0	17.6	69.4
Aug. 19	13 41.99	-20 27.2	2.022	1.842	+2.52	-0.4	17.6	65.2
Aug. 29	14 07.50	-20 31.4	2.092	1.832	+2.58	-0.4	17.6	61.1
Sept. 8	14 33.54	-20 35.0	2.164	1.826	+2.63	-0.2	17.6	57.2
Sept. 18	14 59.98	-20 35.6	2.237	1.823	+2.66	+0.2	17.6	53.3
Sept. 28	15 26.70	-20 30.8	2.311	1.826	+2.68	+0.9	17.6	49.4
Oct. 8	15 53.54	-20 18.7	2.385	1.832	+2.69	+1.7	17.7	45.7
Oct. 18	16 20.39	-19 57.6	2.460	1.843	+2.68	+2.7	17.7	41.9
Oct. 28	16 47.12	-19 26.3	2.534	1.857	+2.66	+3.7	17.8	38.2
Nov. 7	17 13.60	-18 43.8	2.607	1.876	+2.63	+4.9	17.9	34.5
Nov. 17	17 39.72	-17 49.7	2.678	1.898	+2.59	+6.1	18.0	30.8
Nov. 27	18 05.37	-16 43.9	2.748	1.923	+2.54	+7.2	18.1	27.2
Dec. 7	18 30.46	-15 26.4	2.814	1.952	+2.47	+8.4	18.2	23.6
Dec. 17	18 54.91	-13 57.8	2.878	1.984	+2.41	+9.5	18.4	20.2
Dec. 27	19 18.66	-12 18.7	2.937	2.018	+2.33	+10.5	18.5	17.1
Jan. 6	19 41.65	-10 29.9	2.992	2.055	+2.26	+11.4	18.7	14.5
Jan. 16	20 03.88	-08 32.6	3.042	2.094	+2.18	+12.2	18.8	12.8
Jan. 26	20 25.31	-06 27.7	3.086	2.135	+2.10	+12.9	19.0	12.5
Feb. 5	20 45.93	-04 16.5	3.124	2.178	+2.02	+13.4	19.1	13.6
Feb. 15	21 05.76	-02 00.0	3.154	2.222	+1.94	+13.9	19.3	16.1
Feb. 25	21 24.78	+00 20.6	3.178	2.268	+1.86	+14.2	19.5	19.3
Mar. 7	21 43.01	+02 44.3	3.194	2.314	+1.78	+14.5	19.6	23.1
Mar. 17	22 00.45	+05 10.0	3.201	2.362	+1.70	+14.7	19.8	27.3
Mar. 27	22 17.09	+07 36.9	3.200	2.410	+1.62	+14.7	19.9	31.8

## Comet P/2007 VQ11 (Catalina)

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 18.09612 TT  
 Peri. = 277.68015 e = 0.5032059  
 Node = 163.81748 2000.0 a = 5.4254555 AU  
 Incl. = 12.32008 n = 0.07799195  
 q = 2.6953343 AU P = 12.64 years

$$m_1 = 12.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	00 17.14	-05 55.7	3.285	3.276	-0.62 -1.5	20.2	12.2/67	80.9
Jan. 12	00 25.26	-05 03.7	3.387	3.238	-0.61 -1.6	20.3	14.4/67	73.0
Jan. 22	00 34.64	-04 04.1	3.483	3.201	-0.61 -1.7	20.3	16.3/67	65.4
Feb. 1	00 45.13	-02 58.2	3.572	3.165	-0.61 -1.7	20.3	17.9/67	58.2
Feb. 11	00 56.62	-01 47.4	3.651	3.130	-0.61 -1.8	20.3	19.4/68	51.3
Feb. 21	01 08.98	+00 33.0	3.720	3.096	-0.61 -1.9	20.3	20.7/68	44.6
Mar. 2	01 22.13	+00 44.0	3.778	3.062	-0.62 -2.0	20.2	21.8/69	38.2
Mar. 12	01 35.98	+02 02.2	3.824	3.030	-0.63 -2.0	20.2	22.7/70	32.1
Mar. 22	01 50.46	+03 20.5	3.859	2.998	-0.64 -2.1	20.2	23.5/71	26.3
Apr. 1	02 05.52	+04 38.0	3.881	2.968	-0.65 -2.1	20.2	24.2/72	20.8
Apr. 11	02 21.10	+05 53.5	3.892	2.939	-0.66 -2.1	20.1	24.8/73	15.7
Apr. 21	02 37.17	+07 06.0	3.890	2.911	-0.68 -2.1	20.1	25.3/74	11.3
May 1	02 53.67	+08 14.5	3.878	2.885	-0.70 -2.1	20.0	25.7/75	8.4
May 11	03 10.55	+09 18.1	3.855	2.860	-0.72 -2.0	20.0	26.0/76	8.6
May 21	03 27.77	+10 15.9	3.822	2.837	-0.74 -2.0	19.9	26.2/78	11.5
May 31	03 45.28	+11 07.0	3.778	2.815	-0.76 -1.9	19.9	26.4/80	15.6
June 10	04 03.01	+11 50.7	3.726	2.795	-0.78 -1.8	19.8	26.5/81	20.1
June 20	04 20.88	+12 26.4	3.665	2.777	-0.80 -1.6	19.8	26.4/83	24.9
June 30	04 38.83	+12 53.4	3.596	2.760	-0.82 -1.5	19.7	26.3/85	29.7
July 10	04 56.75	+13 11.5	3.519	2.745	-0.84 -1.3	19.6	26.1/87	34.7
July 20	05 14.55	+13 20.4	3.436	2.732	-0.86 -1.2	19.5	25.8/89	39.7
July 30	05 32.12	+13 20.0	3.346	2.721	-0.88 -1.0	19.5	25.4/91	44.8
Aug. 9	05 49.32	+13 10.4	3.250	2.712	-0.90 -0.8	19.4	24.8/93	50.0
Aug. 19	06 06.04	+12 52.1	3.148	2.705	-0.92 -0.7	19.3	24.1/95	55.4
Aug. 29	06 22.11	+12 25.6	3.042	2.699	-0.95 -0.5	19.2	23.2/98	60.9
Sept. 8	06 37.40	+11 51.6	2.932	2.696	-0.97 -0.4	19.1	22.0/100	66.7
Sept. 18	06 51.73	+11 11.4	2.818	2.695	-1.00 -0.3	19.1	20.7/102	72.7
Sept. 28	07 04.90	+10 26.1	2.702	2.696	-1.03 -0.2	19.0	19.0/104	79.0
Oct. 8	07 16.74	+09 37.6	2.585	2.699	-1.06 -0.1	18.9	17.0/107	85.6
Oct. 18	07 27.02	+08 47.5	2.469	2.704	-1.10 -0.1	18.8	14.7/110	92.6
Oct. 28	07 35.52	+07 58.3	2.355	2.712	-1.15 -0.1	18.7	12.0/113	100.1
Nov. 7	07 42.01	+07 12.6	2.245	2.721	-1.20 -0.1	18.6	9.0/118	108.1
Nov. 17	07 46.30	+06 33.1	2.142	2.732	-1.26 -0.1	18.5	5.7/128	116.6
Nov. 27	07 48.22	+06 03.2	2.050	2.745	-1.32 -0.1	18.4	2.5/159	125.6
Dec. 7	07 47.76	+05 45.9	1.972	2.759	-1.39 0.0	18.4	2.7/250	135.1
Dec. 17	07 45.06	+05 43.6	1.912	2.776	-1.45 0.0	18.3	5.7/277	145.0
Dec. 27	07 40.50	+05 58.1	1.874	2.795	-1.49 +0.1	18.3	8.3/287	154.6
Jan. 6	07 34.72	+06 29.1	1.861	2.815	-1.52 +0.1	18.3	10.0/293	162.7
Jan. 16	07 28.52	+07 14.7	1.874	2.836	-1.51 +0.2	18.4	10.5/300	165.2
Jan. 26	07 22.80	+08 11.2	1.915	2.860	-1.49 +0.2	18.5	9.7/309	159.9
Feb. 5	07 18.35	+09 14.0	1.983	2.885	-1.44 +0.2	18.6	8.3/321	151.0
Feb. 15	07 15.74	+10 18.5	2.074	2.911	-1.37 +0.2	18.7	6.7/341	141.2
Feb. 25	07 15.29	+11 20.8	2.187	2.938	-1.30 +0.2	18.9	6.1/11	131.5
Mar. 7	07 17.07	+12 17.7	2.317	2.967	-1.22 +0.2	19.0	6.9/39	122.2
Mar. 17	07 21.00	+13 07.4	2.461	2.998	-1.14 +0.2	19.2	8.6/58	113.3
Mar. 27	07 26.88	+13 48.6	2.615	3.029	-1.07 +0.3	19.4	10.6/70	104.9

## Comet 88P/Howell

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 26.61334 TT  
 Peri. = 235.91515 e = 0.5643283  
 Node = 56.68540 2000.0 a = 3.1057174 AU  
 Incl. = 4.38382 n = 0.18007821  
 q = 1.3530732 AU P = 5.47 years

$$m_1 = 10.5 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	13 09.35	-03 09.6	2.743	2.809	+0.97	-5.2	18.3	83.6
Jan. 12	13 18.67	-03 57.9	2.544	2.748	+0.88	-4.4	18.0	91.3
Jan. 22	13 26.95	-04 38.0	2.346	2.687	+0.76	-3.5	17.7	99.3
Feb. 1	13 33.90	-05 08.7	2.152	2.624	+0.61	-2.5	17.4	107.6
Feb. 11	13 39.18	-05 28.5	1.966	2.561	+0.42	-1.3	17.1	116.4
Feb. 21	13 42.43	-05 36.3	1.789	2.497	+0.20	-0.1	16.7	125.6
Mar. 2	13 43.24	-05 30.8	1.625	2.433	-0.07	+1.3	16.4	135.5
Mar. 12	13 41.29	-05 11.4	1.478	2.368	-0.36	+2.7	16.0	145.9
Mar. 22	13 36.39	-04 38.6	1.351	2.302	-0.65	+4.0	15.7	157.0
Apr. 1	13 28.63	-03 54.7	1.248	2.236	-0.91	+4.8	15.3	168.4
Apr. 11	13 18.64	-03 04.5	1.169	2.169	-1.09	+5.1	15.0	174.8
Apr. 21	13 07.47	-02 15.4	1.116	2.102	-1.13	+4.5	14.8	164.7
May 1	12 56.60	-01 36.0	1.088	2.036	-1.01	+3.1	14.5	152.5
May 11	12 47.54	-01 14.4	1.080	1.969	-0.76	+1.0	14.3	140.8
May 21	12 41.43	-01 15.4	1.089	1.903	-0.42	-1.5	14.2	129.8
May 31	12 38.99	-01 41.6	1.110	1.839	-0.03	-4.0	14.0	119.9
June 10	12 40.47	-02 32.5	1.137	1.775	+0.36	-6.4	13.9	111.0
June 20	12 45.77	-03 46.5	1.168	1.713	+0.73	-8.6	13.8	103.1
June 30	12 54.72	-05 21.4	1.198	1.654	+1.09	-10.6	13.6	96.3
July 10	13 07.07	-07 14.7	1.227	1.598	+1.41	-12.2	13.5	90.3
July 20	13 22.60	-09 23.4	1.254	1.545	+1.72	-13.6	13.4	85.1
July 30	13 41.22	-11 44.7	1.277	1.497	+2.03	-14.7	13.2	80.7
Aug. 9	14 02.83	-14 14.6	1.297	1.455	+2.33	-15.3	13.1	76.9
Aug. 19	14 27.44	-16 48.6	1.316	1.419	+2.63	-15.4	13.0	73.8
Aug. 29	14 55.08	-19 21.1	1.335	1.390	+2.93	-14.9	12.9	71.2
Sept. 8	15 25.70	-21 45.0	1.354	1.369	+3.22	-13.6	12.9	69.1
Sept. 18	15 59.22	-23 52.6	1.377	1.356	+3.50	-11.5	12.8	67.3
Sept. 28	16 35.35	-25 35.5	1.405	1.353	+3.74	-8.6	12.9	66.0
Oct. 8	17 13.55	-26 45.8	1.440	1.359	+3.91	-5.0	13.0	64.8
Oct. 18	17 53.05	-27 17.8	1.484	1.374	+3.99	-1.0	13.1	63.7
Oct. 28	18 32.93	-27 08.8	1.539	1.397	+3.97	+3.2	13.3	62.7
Nov. 7	19 12.21	-26 19.6	1.605	1.428	+3.86	+7.0	13.5	61.5
Nov. 17	19 50.11	-24 54.3	1.682	1.466	+3.69	+10.3	13.7	60.1
Nov. 27	20 26.09	-22 59.4	1.770	1.510	+3.48	+12.8	14.0	58.5
Dec. 7	20 59.85	-20 42.2	1.869	1.559	+3.25	+14.7	14.3	56.5
Dec. 17	21 31.38	-18 09.6	1.977	1.613	+3.03	+15.9	14.6	54.2
Dec. 27	22 00.78	-15 27.6	2.093	1.670	+2.83	+16.5	14.9	51.5
Jan. 6	22 28.24	-12 41.3	2.216	1.730	+2.65	+16.7	15.2	48.6
Jan. 16	22 54.01	-09 54.3	2.343	1.792	+2.49	+16.6	15.5	45.3
Jan. 26	23 18.32	-07 09.6	2.472	1.856	+2.36	+16.3	15.8	41.7
Feb. 5	23 41.36	-04 29.1	2.602	1.922	+2.24	+15.8	16.1	37.9
Feb. 15	00 03.35	-01 54.2	2.730	1.987	+2.15	+15.1	16.4	33.8
Feb. 25	00 24.43	+00 34.1	2.856	2.054	+2.06	+14.4	16.7	29.6
Mar. 7	00 44.73	+02 55.0	2.977	2.121	+1.99	+13.7	16.9	25.1
Mar. 17	01 04.37	+05 08.1	3.091	2.187	+1.93	+12.9	17.2	20.5
Mar. 27	01 23.42	+07 13.1	3.198	2.254	+1.88	+12.0	17.4	15.8

Comet 254P/McNaught

Epoch = 2020 July 10.0 TT  
 T = 2020 Sept. 29.57914 TT  
 Peri. = 219.46604 e = 0.3203621  
 Node = 129.17321 2000.0 a = 4.6156920 AU  
 Incl. = 32.57112 n = 0.09939141  
 q = 3.1369992 AU P = 9.92 years

$$m_1 = 7.8 + 5 \log(\Delta) + 15.0 \log(r(t-160))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	19 42.97	-16 04.5	4.398	3.457	+1.41	-0.9	19.8	14.9
Jan. 12	19 57.23	-16 11.1	4.405	3.436	+1.44	-0.3	19.7	8.4
Jan. 22	20 11.67	-16 11.7	4.397	3.415	+1.45	+0.2	19.7	3.7
Feb. 1	20 26.21	-16 07.0	4.371	3.395	+1.46	+0.7	19.6	7.0
Feb. 11	20 40.76	-15 58.1	4.329	3.376	+1.45	+1.1	19.6	13.2
Feb. 21	20 55.25	-15 45.7	4.271	3.357	+1.44	+1.4	19.5	19.8
Mar. 2	21 09.61	-15 30.9	4.197	3.339	+1.43	+1.6	19.4	26.4
Mar. 12	21 23.77	-15 15.0	4.109	3.321	+1.40	+1.6	19.3	33.1
Mar. 22	21 37.67	-14 59.2	4.008	3.304	+1.37	+1.5	19.2	39.8
Apr. 1	21 51.24	-14 44.9	3.895	3.288	+1.34	+1.3	19.1	46.5
Apr. 11	22 04.41	-14 33.5	3.771	3.273	+1.29	+0.9	19.0	53.3
Apr. 21	22 17.12	-14 26.9	3.638	3.258	+1.24	+0.3	18.9	60.2
May 1	22 29.27	-14 26.6	3.498	3.244	+1.18	-0.4	18.8	67.2
May 11	22 40.77	-14 34.7	3.353	3.231	+1.11	-1.3	18.6	74.3
May 21	22 51.53	-14 53.0	3.205	3.218	+1.03	-2.5	18.5	81.7
May 31	23 01.40	-15 23.8	3.056	3.207	+0.93	-3.8	18.3	89.2
June 10	23 10.25	-16 09.0	2.910	3.196	+0.82	-5.4	18.2	97.0
June 20	23 17.89	-17 10.4	2.768	3.186	+0.69	-7.1	18.1	105.0
June 30	23 24.14	-18 29.4	2.634	3.177	+0.54	-8.9	17.9	113.3
July 10	23 28.81	-20 06.5	2.512	3.169	+0.37	-10.7	17.8	121.9
July 20	23 31.69	-22 00.8	2.405	3.161	+0.18	-12.3	17.6	130.5
July 30	23 32.66	-24 09.4	2.318	3.155	-0.01	-13.5	17.5	139.0
Aug. 9	23 31.67	-26 27.2	2.252	3.150	-0.20	-14.0	17.4	146.8
Aug. 19	23 28.83	-28 46.7	2.211	3.145	-0.38	-13.7	17.3	152.7
Aug. 29	23 24.45	-30 58.9	2.197	3.142	-0.50	-12.5	17.3	155.0
Sept. 8	23 19.10	-32 55.1	2.210	3.139	-0.56	-10.4	17.3	152.6
Sept. 18	23 13.45	-34 28.2	2.249	3.138	-0.55	-7.8	17.3	146.7
Sept. 28	23 08.33	-35 33.8	2.311	3.137	-0.45	-5.0	17.3	139.0
Oct. 8	23 04.43	-36 11.0	2.394	3.137	-0.30	-2.2	17.4	130.6
Oct. 18	23 02.28	-36 21.5	2.493	3.139	-0.10	+0.3	17.4	122.1
Oct. 28	23 02.19	-36 08.2	2.606	3.141	+0.11	+2.5	17.5	113.8
Nov. 7	23 04.24	-35 35.1	2.727	3.144	+0.32	+4.3	17.6	105.7
Nov. 17	23 08.34	-34 45.7	2.855	3.148	+0.52	+5.7	17.6	98.0
Nov. 27	23 14.33	-33 43.2	2.986	3.153	+0.69	+6.9	17.7	90.5
Dec. 7	23 21.97	-32 30.4	3.118	3.159	+0.85	+7.8	17.8	83.4
Dec. 17	23 31.03	-31 09.4	3.247	3.166	+0.98	+8.5	17.9	76.5
Dec. 27	23 41.28	-29 42.3	3.373	3.174	+1.08	+9.0	17.9	70.0
Jan. 6	23 52.52	-28 10.6	3.494	3.183	+1.17	+9.4	18.0	63.7
Jan. 16	00 04.57	-26 35.6	3.608	3.193	+1.24	+9.6	18.1	57.7
Jan. 26	00 17.28	-24 58.8	3.714	3.203	+1.30	+9.7	18.1	52.0
Feb. 5	00 30.51	-23 21.2	3.812	3.214	+1.35	+9.8	18.2	46.6
Feb. 15	00 44.17	-21 43.9	3.899	3.227	+1.39	+9.7	18.2	41.5
Feb. 25	00 58.17	-20 08.0	3.977	3.240	+1.41	+9.5	18.2	36.8
Mar. 7	01 12.42	-18 34.4	4.044	3.253	+1.44	+9.2	18.3	32.7
Mar. 17	01 26.86	-17 04.2	4.100	3.268	+1.45	+8.8	18.3	29.2
Mar. 27	01 41.43	-15 38.1	4.145	3.283	+1.46	+8.3	18.3	26.5

## Comet 218P/LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2020 Oct. 3.76622 TT  
 Peri. = 59.78260 e = 0.6218727  
 Node = 175.97597 2000.0 a = 3.0939472 AU  
 Incl. = 2.72545 n = 0.18110679  
 q = 1.1699059 AU P = 5.44 years

$$m_1 = 14.4 + 5 \log(\Delta) + 17.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	07 49.23	+17 20.5	1.983	2.942	-1.00	+2.3	.	164.3
Jan. 12	07 38.47	+17 45.6	1.896	2.877	-1.15	+2.7	.	175.6
Jan. 22	07 26.69	+18 14.1	1.840	2.812	-1.19	+2.9	.	168.8
Feb. 1	07 15.05	+18 43.1	1.815	2.745	-1.11	+2.8	.	156.2
Feb. 11	07 04.77	+19 10.4	1.817	2.677	-0.91	+2.6	.	143.7
Feb. 21	06 56.83	+19 34.6	1.843	2.608	-0.64	+2.2	.	131.8
Mar. 2	06 51.90	+19 55.1	1.886	2.537	-0.31	+1.8	.	120.6
Mar. 12	06 50.26	+20 11.9	1.940	2.466	+0.02	+1.5	.	110.2
Mar. 22	06 51.90	+20 24.5	2.000	2.393	+0.34	+1.0	.	100.6
Apr. 1	06 56.65	+20 32.4	2.062	2.319	+0.64	+0.5	.	91.8
Apr. 11	07 04.27	+20 34.7	2.121	2.245	+0.91	-0.1	.	83.7
Apr. 21	07 14.46	+20 30.5	2.174	2.169	+1.15	-0.8	22.0	76.3
May 1	07 26.98	+20 18.3	2.220	2.093	+1.37	-1.7	21.7	69.5
May 11	07 41.58	+19 56.9	2.256	2.016	+1.57	-2.7	21.5	63.3
May 21	07 58.07	+19 24.8	2.282	1.938	+1.75	-3.8	21.2	57.6
May 31	08 16.29	+18 40.7	2.298	1.860	+1.91	-5.1	20.9	52.3
June 10	08 36.10	+17 43.0	2.303	1.783	+2.06	-6.6	20.6	47.6
June 20	08 57.41	+16 30.5	2.298	1.706	+2.21	-8.1	20.3	43.2
June 30	09 20.15	+15 02.0	2.284	1.630	+2.35	-9.8	19.9	39.4
July 10	09 44.28	+13 16.3	2.261	1.556	+2.49	-11.5	19.5	35.9
July 20	10 09.78	+11 12.8	2.231	1.485	+2.63	-13.4	19.1	32.9
July 30	10 36.69	+08 51.1	2.197	1.418	+2.77	-15.2	18.8	30.4
Aug. 9	11 05.04	+06 11.7	2.159	1.355	+2.92	-16.9	18.4	28.4
Aug. 19	11 34.90	+03 15.5	2.121	1.299	+3.07	-18.4	18.0	26.8
Aug. 29	12 06.38	+00 05.2	2.084	1.252	+3.24	-19.7	17.7	25.6
Sept. 8	12 39.53	-03 15.3	2.051	1.213	+3.41	-20.4	17.4	24.9
Sept. 18	13 14.43	-06 40.4	2.026	1.186	+3.59	-20.5	17.2	24.5
Sept. 28	13 51.09	-10 02.8	2.010	1.172	+3.76	-19.8	17.1	24.4
Oct. 8	14 29.38	-13 13.7	2.006	1.171	+3.91	-18.1	17.1	24.4
Oct. 18	15 09.08	-16 04.1	2.015	1.183	+4.03	-15.6	17.2	24.5
Oct. 28	15 49.73	-18 25.7	2.039	1.208	+4.10	-12.3	17.4	24.6
Nov. 7	16 30.74	-20 12.2	2.078	1.245	+4.09	-8.6	17.7	24.4
Nov. 17	17 11.42	-21 20.5	2.131	1.291	+4.02	-4.7	18.0	23.9
Nov. 27	17 51.08	-21 50.4	2.197	1.346	+3.88	-1.0	18.4	23.1
Dec. 7	18 29.10	-21 44.9	2.275	1.408	+3.70	+2.3	18.8	21.8
Dec. 17	19 05.09	-21 08.9	2.360	1.474	+3.48	+5.1	19.2	20.0
Dec. 27	19 38.82	-20 07.8	2.452	1.545	+3.24	+7.3	19.7	17.8
Jan. 6	20 10.23	-18 47.5	2.548	1.619	+3.02	+8.9	20.1	15.1
Jan. 16	20 39.40	-17 13.0	2.644	1.694	+2.80	+10.0	20.5	12.0
Jan. 26	21 06.46	-15 28.8	2.738	1.771	+2.60	+10.8	20.9	8.6
Feb. 5	21 31.60	-13 38.5	2.829	1.848	+2.42	+11.2	21.3	4.8
Feb. 15	21 55.01	-11 45.0	2.913	1.926	+2.25	+11.4	21.7	1.1
Feb. 25	22 16.86	-09 50.6	2.990	2.003	+2.11	+11.4	.	3.9
Mar. 7	22 37.31	-07 57.1	3.057	2.081	+1.97	+11.2	.	8.4
Mar. 17	22 56.49	-06 05.8	3.113	2.157	+1.85	+10.9	.	13.3
Mar. 27	23 14.51	-04 18.1	3.157	2.233	+1.74	+10.5	.	18.4

## Comet P/2015 X6 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2020 Oct. 17.21985 TT  
 Peri. = 329.88392 e = 0.1724298  
 Node = 106.94647 2000.0 a = 2.7528231 AU  
 Incl. = 4.56483 n = 0.21579263  
 q = 2.2781544 AU P = 4.57 years

$$m_1 = 16.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	22 40.21	-12 21.6	3.019	2.605	-0.71 -3.6	.	22.2/67	56.3
Jan. 12	22 54.43	-10 51.3	3.109	2.587	-0.70 -3.7	.	23.4/67	49.9
Jan. 22	23 09.27	-09 15.4	3.189	2.569	-0.69 -3.8	.	24.5/66	43.7
Feb. 1	23 24.63	-07 34.6	3.258	2.551	-0.68 -3.9	.	25.4/66	37.7
Feb. 11	23 40.43	-05 50.0	3.317	2.534	-0.68 -4.0	.	26.2/66	31.9
Feb. 21	23 56.62	-04 02.2	3.365	2.517	-0.68 -4.1	.	26.8/66	26.3
Mar. 2	00 13.15	-02 12.3	3.402	2.500	-0.68 -4.2	.	27.4/66	20.8
Mar. 12	00 29.99	+00 21.1	3.427	2.484	-0.68 -4.3	.	27.8/66	15.5
Mar. 22	00 47.12	+01 30.4	3.441	2.467	-0.69 -4.4	.	28.2/67	10.4
Apr. 1	01 04.53	+03 21.3	3.444	2.452	-0.70 -4.4	.	28.5/67	5.7
Apr. 11	01 22.20	+05 10.5	3.436	2.436	-0.71 -4.4	.	28.7/68	3.2
Apr. 21	01 40.14	+06 57.2	3.418	2.422	-0.73 -4.4	.	28.9/69	6.2
May 1	01 58.34	+08 40.4	3.390	2.407	-0.75 -4.3	.	29.0/70	10.7
May 11	02 16.78	+10 19.2	3.352	2.394	-0.77 -4.3	.	29.0/71	15.4
May 21	02 35.47	+11 52.8	3.305	2.380	-0.79 -4.2	.	29.0/72	20.1
May 31	02 54.36	+13 20.2	3.250	2.368	-0.82 -4.1	.	29.0/73	24.8
June 10	03 13.43	+14 40.7	3.186	2.356	-0.84 -3.9	.	28.8/75	29.5
June 20	03 32.64	+15 53.5	3.114	2.345	-0.87 -3.7	.	28.6/76	34.3
June 30	03 51.92	+16 58.2	3.035	2.335	-0.90 -3.5	.	28.3/78	39.0
July 10	04 11.20	+17 54.1	2.949	2.325	-0.94 -3.3	22.0	27.9/79	43.8
July 20	04 30.39	+18 41.1	2.857	2.316	-0.97 -3.0	21.9	27.5/81	48.7
July 30	04 49.37	+19 18.9	2.759	2.308	-1.01 -2.8	21.8	26.8/83	53.7
Aug. 9	05 08.01	+19 47.7	2.655	2.301	-1.05 -2.5	21.7	26.1/85	58.9
Aug. 19	05 26.17	+20 07.9	2.547	2.295	-1.09 -2.2	21.6	25.1/86	64.2
Aug. 29	05 43.66	+20 20.0	2.435	2.290	-1.14 -1.8	21.5	24.0/88	69.7
Sept. 8	06 00.28	+20 24.9	2.320	2.286	-1.19 -1.5	21.4	22.6/90	75.5
Sept. 18	06 15.81	+20 24.1	2.202	2.282	-1.24 -1.2	21.3	20.9/91	81.6
Sept. 28	06 29.98	+20 18.9	2.083	2.280	-1.31 -0.8	21.2	18.7/92	88.0
Oct. 8	06 42.51	+20 11.5	1.964	2.279	-1.39 -0.5	21.0	16.2/93	94.9
Oct. 18	06 53.07	+20 03.9	1.847	2.278	-1.48 -0.2	20.9	13.1/93	102.3
Oct. 28	07 01.27	+19 58.7	1.734	2.279	-1.58 +0.1	20.8	9.5/92	110.3
Nov. 7	07 06.76	+19 58.3	1.628	2.280	-1.70 +0.4	20.6	5.4/87	119.0
Nov. 17	07 09.17	+20 05.0	1.532	2.283	-1.83 +0.6	20.5	1.4/37	128.5
Nov. 27	07 08.26	+20 20.2	1.449	2.286	-1.97 +0.7	20.4	4.4/297	138.9
Dec. 7	07 04.06	+20 44.0	1.384	2.291	-2.11 +0.6	20.3	8.7/289	150.0
Dec. 17	06 56.95	+21 15.0	1.340	2.296	-2.22 +0.4	20.2	12.2/286	161.9
Dec. 27	06 47.85	+21 50.1	1.322	2.302	-2.28 0.0	20.2	14.0/285	174.2
Jan. 6	06 38.11	+22 25.4	1.330	2.310	-2.27 -0.5	20.3	13.6/285	173.2
Jan. 16	06 29.19	+22 57.9	1.366	2.318	-2.21 -0.9	20.3	11.3/286	160.9
Jan. 26	06 22.43	+23 26.1	1.426	2.327	-2.10 -1.3	20.4	7.6/290	149.2
Feb. 5	06 18.66	+23 49.5	1.507	2.336	-1.96 -1.4	20.6	3.4/308	138.2
Feb. 15	06 18.21	+24 08.5	1.607	2.347	-1.82 -1.4	20.7	2.5/49	127.9
Feb. 25	06 21.06	+24 23.3	1.720	2.358	-1.68 -1.2	20.9	6.3/79	118.5
Mar. 7	06 26.89	+24 33.5	1.843	2.370	-1.55 -0.9	21.1	10.0/86	109.8
Mar. 17	06 35.32	+24 38.7	1.973	2.382	-1.44 -0.6	21.2	13.2/89	101.7
Mar. 27	06 45.94	+24 38.1	2.107	2.396	-1.34 -0.2	21.4	15.9/91	94.2

## Comet 378P/McNaught

Epoch = 2020 July 10.0 TT  
 T = 2020 Oct. 21.33048 TT  
 Peri. = 194.12769 e = 0.4692798  
 Node = 94.51733 2000.0 a = 6.3699938 AU  
 Incl. = 19.10667 n = 0.06130495  
 q = 3.3806844 AU P = 16.08 years

$$m1 = 8.5 + 5 \log(\Delta) + 10.0 \log(r(t-1050))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	16 27.06	-12 02.6	4.610	3.846	+1.21	-3.9	20.4	35.0
Jan. 12	16 39.07	-12 38.9	4.494	3.818	+1.19	-3.4	20.4	41.8
Jan. 22	16 50.79	-13 10.2	4.364	3.790	+1.15	-2.9	20.3	48.9
Feb. 1	17 02.10	-13 36.8	4.224	3.763	+1.10	-2.4	20.2	56.0
Feb. 11	17 12.85	-13 59.0	4.074	3.737	+1.04	-2.0	20.1	63.4
Feb. 21	17 22.89	-14 17.5	3.916	3.712	+0.96	-1.7	20.0	70.9
Mar. 2	17 32.07	-14 33.0	3.753	3.687	+0.86	-1.4	19.9	78.6
Mar. 12	17 40.20	-14 46.4	3.587	3.663	+0.75	-1.3	19.8	86.5
Mar. 22	17 47.12	-14 58.9	3.421	3.640	+0.62	-1.2	19.7	94.7
Apr. 1	17 52.63	-15 11.7	3.257	3.617	+0.47	-1.3	19.5	103.1
Apr. 11	17 56.56	-15 26.0	3.100	3.596	+0.30	-1.6	19.4	111.9
Apr. 21	17 58.77	-15 43.2	2.951	3.575	+0.12	-1.9	19.3	121.1
May 1	17 59.14	-16 04.4	2.816	3.555	-0.07	-2.4	19.2	130.6
May 11	17 57.64	-16 30.7	2.698	3.537	-0.25	-2.9	19.1	140.5
May 21	17 54.37	-17 02.4	2.600	3.519	-0.42	-3.5	19.0	150.8
May 31	17 49.57	-17 39.5	2.526	3.502	-0.55	-4.0	18.9	161.4
June 10	17 43.67	-18 21.3	2.478	3.486	-0.63	-4.4	18.8	171.5
June 20	17 37.22	-19 06.8	2.459	3.471	-0.65	-4.7	18.8	174.0
June 30	17 30.87	-19 54.7	2.467	3.457	-0.60	-4.9	18.8	164.4
July 10	17 25.28	-20 43.6	2.503	3.445	-0.49	-4.9	18.8	153.8
July 20	17 21.01	-21 32.6	2.563	3.433	-0.34	-4.9	18.8	143.4
July 30	17 18.46	-22 21.0	2.645	3.422	-0.15	-4.8	18.9	133.4
Aug. 9	17 17.90	-23 08.2	2.744	3.413	+0.06	-4.6	18.9	123.7
Aug. 19	17 19.40	-23 53.8	2.858	3.405	+0.26	-4.5	19.0	114.5
Aug. 29	17 22.96	-24 37.6	2.982	3.398	+0.47	-4.3	19.1	105.7
Sept. 8	17 28.46	-25 18.9	3.113	3.392	+0.65	-4.0	19.1	97.3
Sept. 18	17 35.77	-25 57.4	3.247	3.387	+0.82	-3.7	19.2	89.3
Sept. 28	17 44.74	-26 32.3	3.383	3.384	+0.98	-3.3	19.3	81.5
Oct. 8	17 55.16	-27 03.1	3.517	3.382	+1.12	-2.8	19.3	74.1
Oct. 18	18 06.87	-27 29.2	3.647	3.381	+1.24	-2.3	19.4	66.8
Oct. 28	18 19.70	-27 50.1	3.771	3.381	+1.34	-1.8	19.5	59.7
Nov. 7	18 33.49	-28 05.3	3.888	3.382	+1.42	-1.2	19.5	52.8
Nov. 17	18 48.07	-28 14.5	3.996	3.385	+1.50	-0.6	19.5	46.0
Nov. 27	19 03.30	-28 17.3	4.093	3.389	+1.55	+0.1	19.6	39.4
Dec. 7	19 19.02	-28 13.8	4.179	3.394	+1.59	+0.7	19.6	32.9
Dec. 17	19 35.11	-28 04.1	4.253	3.400	+1.62	+1.3	19.6	26.5
Dec. 27	19 51.44	-27 48.2	4.313	3.407	+1.64	+1.9	19.6	20.3
Jan. 6	20 07.87	-27 26.7	4.359	3.416	+1.65	+2.4	19.6	14.5
Jan. 16	20 24.32	-27 00.1	4.391	3.426	+1.64	+2.9	19.6	9.7
Jan. 26	20 40.68	-26 29.0	4.409	3.437	+1.63	+3.3	19.6	7.9
Feb. 5	20 56.85	-25 54.2	4.413	3.449	+1.60	+3.6	19.6	10.7
Feb. 15	21 12.77	-25 16.7	4.401	3.462	+1.57	+3.9	19.5	15.8
Feb. 25	21 28.35	-24 37.5	4.376	3.476	+1.54	+4.0	19.5	21.7
Mar. 7	21 43.54	-23 57.7	4.338	3.491	+1.49	+4.0	19.5	27.8
Mar. 17	21 58.26	-23 18.3	4.286	3.507	+1.44	+3.9	19.4	34.1
Mar. 27	22 12.46	-22 40.6	4.222	3.524	+1.39	+3.6	19.4	40.6

Comet 184P/Lovas

Epoch = 2020 July 10.0 TT  
 T = 2020 Oct. 26.16211 TT  
 Peri. = 186.42756 e = 0.5511192  
 Node = 173.25711 2000.0 a = 3.7945544 AU  
 Incl. = 4.57328 n = 0.13334075  
 q = 1.7033026 AU P = 7.39 years

$$m1 = 13.4 + 5 \log(\Delta) + 15.0 \log(r(t-30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	17 24.15	-19 41.1	3.964	3.055	+1.61	-1.1	.	19.5
Jan. 12	17 40.36	-19 49.3	3.853	2.999	+1.63	-0.4	.	25.8
Jan. 22	17 56.78	-19 50.4	3.729	2.941	+1.65	+0.3	.	32.1
Feb. 1	18 13.35	-19 44.1	3.592	2.884	+1.66	+1.0	.	38.3
Feb. 11	18 29.96	-19 30.2	3.444	2.826	+1.66	+1.8	.	44.5
Feb. 21	18 46.55	-19 08.9	3.288	2.768	+1.65	+2.5	.	50.6
Mar. 2	19 03.01	-18 40.1	3.123	2.710	+1.64	+3.3	.	56.7
Mar. 12	19 19.28	-18 04.2	2.954	2.652	+1.61	+4.0	.	62.8
Mar. 22	19 35.25	-17 21.6	2.780	2.593	+1.58	+4.6	.	68.9
Apr. 1	19 50.84	-16 32.9	2.604	2.535	+1.53	+5.2	22.0	74.9
Apr. 11	20 05.94	-15 38.9	2.427	2.477	+1.48	+5.7	21.7	81.0
Apr. 21	20 20.46	-14 40.5	2.251	2.419	+1.41	+6.0	21.4	87.1
May 1	20 34.25	-13 38.9	2.078	2.362	+1.33	+6.3	21.0	93.4
May 11	20 47.18	-12 35.7	1.909	2.305	+1.24	+6.4	20.7	99.7
May 21	20 59.09	-11 32.4	1.747	2.250	+1.13	+6.2	20.4	106.2
May 31	21 09.75	-10 31.4	1.591	2.195	+0.99	+5.9	20.0	112.9
June 10	21 18.94	-09 35.3	1.445	2.141	+0.83	+5.2	19.6	120.0
June 20	21 26.40	-08 47.1	1.309	2.089	+0.64	+4.2	19.3	127.5
June 30	21 31.82	-08 10.6	1.186	2.039	+0.42	+2.9	18.9	135.4
July 10	21 34.99	-07 49.6	1.077	1.991	+0.19	+1.1	18.5	144.0
July 20	21 35.77	-07 47.6	0.984	1.945	-0.05	-1.0	18.2	153.1
July 30	21 34.25	-08 07.1	0.909	1.902	-0.26	-3.1	17.8	162.8
Aug. 9	21 31.00	-08 47.4	0.853	1.863	-0.39	-5.1	17.5	172.1
Aug. 19	21 26.92	-09 44.6	0.818	1.827	-0.40	-6.4	17.3	172.8
Aug. 29	21 23.36	-10 50.7	0.803	1.794	-0.27	-6.7	17.1	163.4
Sept. 8	21 21.70	-11 55.8	0.807	1.767	-0.02	-6.1	17.0	153.3
Sept. 18	21 23.02	-12 50.3	0.829	1.743	+0.32	-4.6	16.9	143.8
Sept. 28	21 27.95	-13 26.9	0.865	1.725	+0.70	-2.5	16.9	135.0
Oct. 8	21 36.58	-13 41.1	0.913	1.713	+1.05	-0.1	16.9	127.1
Oct. 18	21 48.58	-13 31.2	0.973	1.705	+1.37	+2.3	17.0	120.0
Oct. 28	22 03.48	-12 56.8	1.042	1.703	+1.63	+4.7	17.0	113.6
Nov. 7	22 20.66	-11 59.6	1.119	1.707	+1.82	+6.9	17.1	107.9
Nov. 17	22 39.53	-10 41.9	1.204	1.717	+1.96	+8.8	17.3	102.6
Nov. 27	22 59.63	-09 06.4	1.297	1.731	+2.06	+10.4	17.4	97.7
Dec. 7	23 20.51	-07 16.7	1.397	1.751	+2.12	+11.6	17.6	93.0
Dec. 17	23 41.88	-05 16.1	1.504	1.776	+2.16	+12.5	17.8	88.5
Dec. 27	00 03.53	-03 08.0	1.618	1.806	+2.17	+13.1	18.0	84.2
Jan. 6	00 25.28	+00 55.9	1.737	1.839	+2.18	+13.3	18.2	79.9
Jan. 16	00 47.04	+01 17.5	1.862	1.877	+2.18	+13.3	18.5	75.6
Jan. 26	01 08.77	+03 29.7	1.992	1.918	+2.17	+13.1	18.7	71.3
Feb. 5	01 30.40	+05 38.2	2.126	1.962	+2.16	+12.6	19.0	66.9
Feb. 15	01 51.94	+07 41.4	2.262	2.008	+2.15	+12.0	19.3	62.6
Feb. 25	02 13.37	+09 37.6	2.400	2.057	+2.14	+11.2	19.5	58.1
Mar. 7	02 34.67	+11 25.6	2.538	2.108	+2.12	+10.3	19.8	53.7
Mar. 17	02 55.84	+13 04.5	2.676	2.161	+2.11	+9.4	20.1	49.1
Mar. 27	03 16.87	+14 33.5	2.812	2.215	+2.09	+8.3	20.3	44.6

## Comet C/2017 Y2 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2020 Nov. 4.51264 TT  
 Peri. = 147.84983  
 Node = 65.98148 2000.0  
 Incl. = 128.42527  
 q = 4.6321634 AU  
 e = 1.0008664

$$m_1 = 5.4 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	19 40.84	+20 52.0	5.870	5.232	+0.37	-4.1	18.2	45.8
Jan. 12	19 44.63	+20 16.5	5.883	5.196	+0.38	-2.9	18.2	42.2
Jan. 22	19 48.47	+19 52.6	5.873	5.162	+0.38	-1.8	18.2	40.2
Feb. 1	19 52.20	+19 39.6	5.842	5.128	+0.36	-0.7	18.1	40.1
Feb. 11	19 55.64	+19 36.7	5.787	5.095	+0.32	+0.2	18.1	41.9
Feb. 21	19 58.65	+19 43.2	5.709	5.063	+0.27	+1.1	18.0	45.3
Mar. 2	20 01.04	+19 58.0	5.610	5.032	+0.20	+1.9	17.9	50.1
Mar. 12	20 02.65	+20 20.1	5.491	5.002	+0.11	+2.6	17.8	55.9
Mar. 22	20 03.28	+20 48.4	5.354	4.973	0.00	+3.1	17.8	62.4
Apr. 1	20 02.73	+21 21.5	5.203	4.945	-0.13	+3.5	17.7	69.6
Apr. 11	20 00.79	+21 57.6	5.042	4.918	-0.28	+3.7	17.6	77.2
Apr. 21	19 57.27	+22 34.6	4.873	4.892	-0.45	+3.7	17.5	85.1
May 1	19 51.96	+23 09.8	4.703	4.867	-0.64	+3.3	17.4	93.3
May 11	19 44.69	+23 39.9	4.537	4.843	-0.84	+2.6	17.2	101.6
May 21	19 35.39	+24 01.0	4.381	4.821	-1.04	+1.4	17.1	109.9
May 31	19 24.08	+24 08.7	4.241	4.799	-1.23	-0.2	17.1	117.9
June 10	19 10.98	+23 58.4	4.124	4.779	-1.40	-2.2	17.0	125.0
June 20	18 56.49	+23 26.3	4.034	4.760	-1.51	-4.5	16.9	130.8
June 30	18 41.18	+22 30.0	3.976	4.743	-1.55	-7.0	16.8	134.3
July 10	18 25.80	+21 09.6	3.955	4.726	-1.51	-9.3	16.8	134.8
July 20	18 11.06	+19 27.4	3.969	4.711	-1.41	-11.3	16.8	132.1
July 30	17 57.59	+17 27.9	4.020	4.697	-1.26	-12.7	16.8	126.7
Aug. 9	17 45.87	+15 17.1	4.102	4.685	-1.07	-13.5	16.8	119.5
Aug. 19	17 36.12	+13 00.6	4.212	4.673	-0.86	-13.8	16.9	111.1
Aug. 29	17 28.43	+10 43.6	4.344	4.664	-0.66	-13.6	16.9	102.2
Sept. 8	17 22.75	+08 30.2	4.490	4.655	-0.46	-13.0	17.0	93.1
Sept. 18	17 18.90	+06 22.8	4.646	4.648	-0.29	-12.3	17.1	83.9
Sept. 28	17 16.72	+04 23.2	4.803	4.642	-0.14	-11.5	17.1	74.8
Oct. 8	17 15.98	+02 32.3	4.958	4.637	0.00	-10.6	17.2	65.7
Oct. 18	17 16.48	+00 50.3	5.103	4.634	+0.11	-9.7	17.3	56.9
Oct. 28	17 18.00	+00 42.9	5.235	4.633	+0.20	-8.8	17.3	48.2
Nov. 7	17 20.36	-02 07.7	5.350	4.632	+0.27	-8.0	17.4	39.8
Nov. 17	17 23.37	-03 24.4	5.444	4.633	+0.33	-7.3	17.4	31.8
Nov. 27	17 26.86	-04 33.7	5.515	4.636	+0.37	-6.5	17.4	24.6
Dec. 7	17 30.65	-05 36.2	5.560	4.639	+0.39	-5.9	17.5	19.0
Dec. 17	17 34.60	-06 32.4	5.578	4.645	+0.40	-5.3	17.5	16.8
Dec. 27	17 38.53	-07 23.0	5.568	4.651	+0.39	-4.8	17.5	19.3
Jan. 6	17 42.28	-08 08.7	5.531	4.659	+0.36	-4.3	17.5	25.1
Jan. 16	17 45.68	-08 50.2	5.467	4.668	+0.31	-4.0	17.5	32.5
Jan. 26	17 48.56	-09 28.3	5.378	4.679	+0.25	-3.7	17.4	40.9
Feb. 5	17 50.73	-10 03.9	5.266	4.691	+0.17	-3.5	17.4	49.8
Feb. 15	17 51.99	-10 37.8	5.134	4.704	+0.07	-3.3	17.4	59.1
Feb. 25	17 52.13	-11 11.0	4.985	4.718	-0.06	-3.3	17.3	68.8
Mar. 7	17 50.94	-11 44.3	4.825	4.734	-0.20	-3.4	17.3	78.8
Mar. 17	17 48.20	-12 18.7	4.658	4.751	-0.37	-3.5	17.2	89.3
Mar. 27	17 43.69	-12 54.9	4.492	4.770	-0.55	-3.7	17.1	100.1

## Comet 91P/Russell

Epoch = 2020 July 10.0 TT  
 T = 2020 Nov. 9.35521 TT  
 Peri. = 354.79319 e = 0.3305642  
 Node = 247.82788 2000.0 a = 3.8901717 AU  
 Incl. = 14.09175 n = 0.12845497  
 q = 2.6042202 AU P = 7.67 years

$$m_1 = 10.0 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	m <sub>1</sub>	Elong.
2020/21	h m	° ' "			m		°
Jan. 2	12 05.74	-16 44.7	2.967	3.167	+0.60 -7.9	19.9	92.6
Jan. 12	12 11.03	-18 00.3	2.803	3.138	+0.44 -7.1	19.7	100.7
Jan. 22	12 14.68	-19 07.3	2.644	3.109	+0.27 -6.1	19.5	109.2
Feb. 1	12 16.46	-20 03.2	2.493	3.081	+0.07 -4.9	19.3	118.0
Feb. 11	12 16.25	-20 44.9	2.354	3.053	-0.13 -3.3	19.1	127.1
Feb. 21	12 13.99	-21 09.2	2.230	3.025	-0.34 -1.3	19.0	136.5
Mar. 2	12 09.82	-21 13.0	2.126	2.998	-0.51 +0.8	18.8	145.8
Mar. 12	12 04.14	-20 54.4	2.044	2.971	-0.63 +3.1	18.6	154.3
Mar. 22	11 57.56	-20 13.5	1.988	2.945	-0.68 +5.2	18.5	160.3
Apr. 1	11 50.88	-19 12.9	1.958	2.919	-0.64 +6.9	18.4	160.7
Apr. 11	11 44.96	-17 58.3	1.954	2.895	-0.52 +8.0	18.4	155.3
Apr. 21	11 40.51	-16 36.8	1.975	2.870	-0.34 +8.2	18.3	146.9
May 1	11 38.07	-15 15.9	2.020	2.847	-0.12 +7.8	18.3	137.7
May 11	11 37.89	-14 02.4	2.083	2.824	+0.11 +6.8	18.4	128.5
May 21	11 40.01	-13 00.6	2.161	2.803	+0.34 +5.4	18.4	119.6
May 31	11 44.36	-12 13.3	2.251	2.782	+0.55 +3.9	18.4	111.1
June 10	11 50.75	-11 41.7	2.350	2.762	+0.74 +2.3	18.5	103.0
June 20	11 58.94	-11 25.3	2.454	2.743	+0.91 +0.8	18.5	95.4
June 30	12 08.73	-11 23.4	2.560	2.725	+1.06 -0.6	18.6	88.2
July 10	12 19.91	-11 34.6	2.667	2.708	+1.19 -1.8	18.6	81.4
July 20	12 32.29	-11 57.1	2.773	2.692	+1.30 -2.8	18.7	74.8
July 30	12 45.75	-12 29.4	2.877	2.678	+1.40 -3.7	18.7	68.5
Aug. 9	13 00.14	-13 09.5	2.976	2.664	+1.49 -4.4	18.8	62.5
Aug. 19	13 15.36	-13 55.8	3.071	2.652	+1.57 -4.9	18.8	56.6
Aug. 29	13 31.34	-14 46.6	3.159	2.641	+1.64 -5.3	18.8	50.9
Sept. 8	13 48.01	-15 40.3	3.242	2.632	+1.70 -5.5	18.9	45.3
Sept. 18	14 05.30	-16 35.1	3.316	2.624	+1.76 -5.5	18.9	39.8
Sept. 28	14 23.18	-17 29.6	3.383	2.617	+1.82 -5.4	18.9	34.3
Oct. 8	14 41.58	-18 22.3	3.442	2.612	+1.87 -5.1	18.9	28.9
Oct. 18	15 00.45	-19 11.7	3.491	2.608	+1.91 -4.7	19.0	23.5
Oct. 28	15 19.75	-19 56.4	3.532	2.605	+1.95 -4.2	19.0	18.1
Nov. 7	15 39.39	-20 35.2	3.562	2.604	+1.98 -3.5	19.0	12.7
Nov. 17	15 59.32	-21 06.9	3.582	2.605	+2.00 -2.7	19.0	7.2
Nov. 27	16 19.43	-21 30.4	3.592	2.606	+2.02 -1.9	19.0	1.8
Dec. 7	16 39.64	-21 45.1	3.592	2.610	+2.02 -0.9	19.0	3.7
Dec. 17	16 59.84	-21 50.1	3.581	2.614	+2.01 0.0	19.0	9.2
Dec. 27	17 19.91	-21 45.2	3.559	2.620	+1.99 +1.1	19.0	14.8
Jan. 6	17 39.72	-21 29.9	3.527	2.628	+1.96 +2.1	19.0	20.4
Jan. 16	17 59.17	-21 04.5	3.485	2.637	+1.92 +3.1	19.0	26.1
Jan. 26	18 18.11	-20 29.0	3.432	2.647	+1.86 +4.1	19.0	31.8
Feb. 5	18 36.42	-19 44.0	3.370	2.658	+1.79 +5.0	19.0	37.7
Feb. 15	18 54.00	-18 50.1	3.298	2.671	+1.71 +5.9	19.0	43.6
Feb. 25	19 10.69	-17 48.0	3.218	2.685	+1.62 +6.6	19.0	49.6
Mar. 7	19 26.41	-16 38.7	3.131	2.700	+1.51 +7.3	18.9	55.8
Mar. 17	19 41.02	-15 23.2	3.037	2.717	+1.40 +7.8	18.9	62.1
Mar. 27	19 54.40	-14 02.8	2.937	2.734	+1.26 +8.3	18.9	68.5

## Comet 156P/Russell-LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2020 Nov. 17.85914 TT  
 Peri. = 0.41321 e = 0.6147688  
 Node = 35.37337 2000.0 a = 3.4604876 AU  
 Incl. = 17.26253 n = 0.15310808  
 q = 1.3330878 AU P = 6.44 years

H = 15.2 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		V	Elong.
2020/21	h m	° ' "			m	'		°
Jan. 2	18 17.23	-34 30.8	4.194	3.244	+1.68	-0.4	21.2	13.2
Jan. 12	18 34.20	-34 33.3	4.106	3.184	+1.72	0.0	21.2	17.8
Jan. 22	18 51.53	-34 31.9	4.002	3.122	+1.75	+0.4	21.2	23.3
Feb. 1	19 09.14	-34 26.6	3.882	3.059	+1.77	+0.7	21.2	29.1
Feb. 11	19 26.95	-34 17.4	3.748	2.996	+1.79	+1.1	21.1	35.1
Feb. 21	19 44.92	-34 04.5	3.602	2.931	+1.80	+1.5	21.1	41.2
Mar. 2	20 02.97	-33 48.4	3.446	2.866	+1.81	+1.8	21.0	47.2
Mar. 12	20 21.04	-33 29.5	3.280	2.799	+1.81	+2.0	20.9	53.2
Mar. 22	20 39.10	-33 08.5	3.106	2.732	+1.80	+2.2	20.8	59.1
Apr. 1	20 57.09	-32 46.2	2.928	2.664	+1.79	+2.3	20.7	65.0
Apr. 11	21 14.97	-32 23.6	2.745	2.595	+1.78	+2.2	20.5	70.8
Apr. 21	21 32.73	-32 01.9	2.561	2.525	+1.77	+2.1	20.3	76.6
May 1	21 50.31	-31 42.2	2.377	2.455	+1.75	+1.8	20.2	82.3
May 11	22 07.66	-31 26.0	2.195	2.384	+1.72	+1.4	19.9	88.0
May 21	22 24.75	-31 14.8	2.016	2.313	+1.69	+0.8	19.7	93.7
May 31	22 41.47	-31 10.4	1.841	2.241	+1.65	0.0	19.5	99.3
June 10	22 57.75	-31 14.4	1.674	2.169	+1.60	-0.9	19.2	104.9
June 20	23 13.42	-31 28.8	1.514	2.097	+1.53	-2.1	18.9	110.4
June 30	23 28.27	-31 55.0	1.362	2.025	+1.43	-3.3	18.6	115.9
July 10	23 42.01	-32 34.0	1.221	1.954	+1.30	-4.6	18.3	121.3
July 20	23 54.24	-33 26.1	1.091	1.883	+1.12	-5.9	17.9	126.6
July 30	00 04.39	-34 29.7	0.973	1.814	+0.88	-6.8	17.6	131.6
Aug. 9	00 11.83	-35 40.2	0.866	1.746	+0.56	-7.1	17.2	136.3
Aug. 19	00 15.74	-36 49.1	0.773	1.680	+0.17	-6.3	16.9	140.2
Aug. 29	00 15.40	-37 41.6	0.692	1.618	-0.28	-3.6	16.5	143.1
Sept. 8	00 10.58	-37 56.4	0.624	1.559	-0.72	+1.5	16.2	144.6
Sept. 18	00 01.78	-37 07.8	0.569	1.505	-1.04	+9.4	16.0	144.5
Sept. 28	23 50.85	-34 49.6	0.527	1.456	-1.10	+19.5	15.8	142.6
Oct. 8	23 40.57	-30 46.7	0.498	1.415	-0.89	+30.1	15.7	139.3
Oct. 18	23 33.53	-25 01.4	0.483	1.381	-0.45	+39.5	15.6	134.9
Oct. 28	23 31.50	-17 54.9	0.482	1.355	+0.10	+45.8	15.7	130.1
Nov. 7	23 34.96	-10 02.2	0.495	1.339	+0.64	+48.3	15.8	125.2
Nov. 17	23 43.60	-02 00.5	0.523	1.333	+1.13	+47.4	16.0	120.6
Nov. 27	23 56.92	+05 40.2	0.564	1.337	+1.56	+44.1	16.2	116.5
Dec. 7	00 14.21	+12 40.1	0.618	1.352	+1.92	+39.3	16.5	112.9
Dec. 17	00 34.91	+18 49.6	0.685	1.375	+2.24	+34.1	16.7	109.7
Dec. 27	00 58.56	+24 06.7	0.763	1.408	+2.51	+28.9	17.0	106.8
Jan. 6	01 24.65	+28 32.8	0.851	1.449	+2.73	+23.9	17.3	104.1
Jan. 16	01 52.76	+32 11.0	0.950	1.496	+2.91	+19.4	17.5	101.3
Jan. 26	02 22.46	+35 05.6	1.059	1.549	+3.04	+15.2	17.8	98.5
Feb. 5	02 53.21	+37 20.1	1.177	1.607	+3.12	+11.4	18.1	95.6
Feb. 15	03 24.56	+38 58.4	1.305	1.669	+3.15	+8.0	18.4	92.4
Feb. 25	03 56.05	+40 04.4	1.440	1.734	+3.14	+5.0	18.6	89.1
Mar. 7	04 27.21	+40 41.9	1.583	1.802	+3.08	+2.3	18.9	85.5
Mar. 17	04 57.72	+40 54.2	1.733	1.871	+3.00	0.0	19.1	81.8
Mar. 27	05 27.30	+40 45.1	1.888	1.941	+2.90	-2.0	19.3	77.9

Comet 11P/Tempel-Swift-LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2020 Nov. 26.25075 TT  
 Peri. = 167.93247 e = 0.5769863  
 Node = 238.91964 2000.0 a = 3.2832121 AU  
 Incl. = 14.42055 n = 0.16567450  
 q = 1.3888437 AU P = 5.95 years

$$m_1 = 16.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	18 50.27	-15 10.9	4.174	3.203	+1.43	+2.8	.	7.9
Jan. 12	19 04.68	-14 39.6	4.113	3.147	+1.45	+3.6	.	9.4
Jan. 22	19 19.32	-14 00.6	4.034	3.089	+1.48	+4.3	.	14.2
Feb. 1	19 34.14	-13 13.6	3.938	3.031	+1.49	+5.1	.	19.9
Feb. 11	19 49.04	-12 18.6	3.828	2.972	+1.49	+6.0	.	25.9
Feb. 21	20 03.98	-11 15.3	3.703	2.912	+1.49	+6.8	.	31.9
Mar. 2	20 18.89	-10 03.8	3.566	2.851	+1.49	+7.6	.	38.0
Mar. 12	20 33.72	-08 44.2	3.418	2.789	+1.48	+8.4	.	43.9
Mar. 22	20 48.42	-07 16.3	3.260	2.726	+1.46	+9.2	.	49.8
Apr. 1	21 02.95	-05 40.4	3.095	2.663	+1.44	+10.0	.	55.7
Apr. 11	21 17.26	-03 56.5	2.924	2.598	+1.42	+10.8	.	61.4
Apr. 21	21 31.32	-02 04.7	2.749	2.533	+1.39	+11.6	.	67.1
May 1	21 45.08	+00 05.0	2.571	2.468	+1.36	+12.4	.	72.8
May 11	21 58.51	+02 02.2	2.393	2.402	+1.32	+13.1	.	78.4
May 21	22 11.54	+04 17.1	2.215	2.335	+1.28	+13.9	21.9	83.9
May 31	22 24.12	+06 39.4	2.040	2.269	+1.23	+14.6	21.6	89.4
June 10	22 36.16	+09 08.7	1.869	2.202	+1.17	+15.3	21.3	94.9
June 20	22 47.57	+11 44.6	1.703	2.135	+1.10	+15.9	20.9	100.4
June 30	22 58.19	+14 26.3	1.545	2.068	+1.01	+16.4	20.6	105.8
July 10	23 07.89	+17 12.4	1.394	2.001	+0.91	+16.8	20.2	111.3
July 20	23 16.43	+20 01.0	1.253	1.935	+0.78	+16.9	19.9	116.7
July 30	23 23.56	+22 48.4	1.122	1.871	+0.63	+16.5	19.5	122.1
Aug. 9	23 29.04	+25 29.9	1.001	1.807	+0.45	+15.6	19.1	127.5
Aug. 19	23 32.58	+27 58.1	0.893	1.746	+0.24	+13.7	18.7	132.7
Aug. 29	23 34.06	+30 02.7	0.797	1.687	+0.04	+10.7	18.3	137.7
Sept. 8	23 33.70	+31 31.2	0.714	1.631	-0.12	+6.3	17.9	142.2
Sept. 18	23 32.10	+32 09.5	0.644	1.580	-0.18	+0.5	17.5	145.9
Sept. 28	23 30.62	+31 44.5	0.587	1.532	-0.07	-6.3	17.2	148.2
Oct. 8	23 31.07	+30 10.3	0.543	1.490	+0.22	-13.2	16.9	148.7
Oct. 18	23 35.20	+27 29.7	0.513	1.455	+0.68	-19.3	16.7	147.2
Oct. 28	23 44.38	+23 57.8	0.497	1.426	+1.22	-23.1	16.5	144.0
Nov. 7	23 58.99	+19 59.7	0.495	1.405	+1.74	-24.2	16.5	139.5
Nov. 17	00 18.50	+16 03.0	0.508	1.393	+2.19	-22.5	16.5	134.4
Nov. 27	00 41.89	+12 33.4	0.535	1.389	+2.50	-18.7	16.6	129.2
Dec. 7	01 07.81	+09 47.2	0.577	1.394	+2.68	-13.9	16.7	124.3
Dec. 17	01 35.03	+07 50.3	0.631	1.408	+2.76	-9.0	17.0	119.6
Dec. 27	02 02.70	+06 40.8	0.699	1.430	+2.76	-4.6	17.3	115.4
Jan. 6	02 30.16	+06 10.7	0.778	1.459	+2.72	-1.2	17.6	111.4
Jan. 16	02 57.09	+06 10.8	0.868	1.496	+2.66	+1.3	17.9	107.6
Jan. 26	03 23.39	+06 31.9	0.969	1.539	+2.59	+2.9	18.3	103.9
Feb. 5	03 49.01	+07 05.4	1.080	1.587	+2.52	+3.8	18.7	100.3
Feb. 15	04 13.98	+07 44.8	1.201	1.640	+2.46	+4.0	19.0	96.6
Feb. 25	04 38.37	+08 24.8	1.329	1.696	+2.41	+3.9	19.4	92.8
Mar. 7	05 02.18	+09 01.1	1.465	1.755	+2.35	+3.3	19.8	89.0
Mar. 17	05 25.45	+09 31.3	1.608	1.817	+2.30	+2.6	20.1	85.0
Mar. 27	05 48.20	+09 53.2	1.757	1.880	+2.25	+1.7	20.5	81.0

## Comet C/2019 N1 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 1.79110 TT  
 Peri. = 193.44687  
 Node = 13.57371 2000.0  
 Incl. = 82.42574  
 q = 1.7045228 AU  
 e = 0.9999250

$$m1 = 6.3 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	17 49.64	+60 20.1	4.236	4.249	+1.13	-0.1	15.7	84.1
Jan. 12	18 00.76	+60 28.6	4.139	4.158	+1.09	+2.0	15.6	84.3
Jan. 22	18 11.42	+60 57.9	4.040	4.066	+1.03	+4.1	15.4	84.5
Feb. 1	18 21.33	+61 48.7	3.939	3.974	+0.94	+6.3	15.3	84.8
Feb. 11	18 30.15	+63 01.1	3.837	3.882	+0.81	+8.4	15.1	85.2
Feb. 21	18 37.41	+64 35.2	3.733	3.789	+0.62	+10.6	14.9	85.7
Mar. 2	18 42.41	+66 30.5	3.629	3.696	+0.34	+12.7	14.8	86.1
Mar. 12	18 44.02	+68 45.8	3.526	3.603	-0.09	+14.5	14.6	86.5
Mar. 22	18 40.39	+71 18.4	3.425	3.510	-0.76	+16.0	14.4	86.6
Apr. 1	18 28.09	+74 02.9	3.327	3.417	-1.91	+16.7	14.2	86.6
Apr. 11	18 00.89	+76 47.6	3.235	3.324	-3.91	+15.7	14.1	86.3
Apr. 21	17 08.44	+79 07.2	3.150	3.231	-7.06	+10.9	13.9	85.5
May 1	15 43.89	+80 12.7	3.074	3.138	-9.66	+0.2	13.7	84.3
May 11	14 10.54	+79 14.0	3.007	3.045	-8.17	-12.9	13.5	82.5
May 21	13 03.93	+76 19.2	2.952	2.953	-4.87	-22.1	13.4	80.2
May 31	12 26.71	+72 12.8	2.907	2.861	-2.54	-27.2	13.2	77.3
June 10	12 07.87	+67 27.6	2.875	2.770	-1.22	-29.9	13.0	73.9
June 20	11 59.45	+62 21.2	2.854	2.680	-0.46	-31.4	12.9	69.9
June 30	11 57.14	+57 03.8	2.843	2.591	0.00	-32.1	12.7	65.4
July 10	11 58.56	+51 42.2	2.841	2.503	+0.29	-32.2	12.6	60.6
July 20	12 02.38	+46 20.8	2.845	2.417	+0.48	-32.0	12.4	55.4
July 30	12 07.82	+41 02.9	2.854	2.333	+0.61	-31.5	12.3	49.9
Aug. 9	12 14.37	+35 50.3	2.864	2.252	+0.70	-30.9	12.1	44.3
Aug. 19	12 21.72	+30 43.9	2.873	2.174	+0.77	-30.3	12.0	38.5
Aug. 29	12 29.65	+25 43.8	2.878	2.099	+0.82	-29.7	11.8	32.6
Sept. 8	12 37.99	+20 49.3	2.876	2.028	+0.85	-29.2	11.7	26.8
Sept. 18	12 46.67	+15 59.2	2.866	1.963	+0.88	-28.8	11.5	21.2
Sept. 28	12 55.61	+11 11.8	2.845	1.903	+0.90	-28.7	11.4	16.1
Oct. 8	13 04.74	+06 24.7	2.812	1.849	+0.92	-28.8	11.2	12.5
Oct. 18	13 14.06	+01 35.3	2.765	1.803	+0.94	-29.2	11.1	12.0
Oct. 28	13 23.53	-03 19.5	2.705	1.765	+0.96	-29.9	10.9	15.1
Nov. 7	13 33.17	-08 23.4	2.632	1.735	+0.97	-31.0	10.8	20.1
Nov. 17	13 42.98	-13 40.6	2.547	1.716	+0.99	-32.6	10.7	26.1
Nov. 27	13 52.98	-19 15.5	2.452	1.706	+1.01	-34.7	10.6	32.6
Dec. 7	14 03.22	-25 13.1	2.352	1.706	+1.04	-37.2	10.5	39.2
Dec. 17	14 13.75	-31 38.0	2.249	1.716	+1.07	-40.2	10.4	45.9
Dec. 27	14 24.65	-38 34.2	2.150	1.736	+1.12	-43.4	10.4	52.5
Jan. 6	14 36.08	-46 03.5	2.061	1.766	+1.18	-46.7	10.3	58.9
Jan. 16	14 48.31	-54 04.4	1.988	1.805	+1.28	-49.6	10.4	64.8
Jan. 26	15 01.91	-62 29.7	1.938	1.851	+1.48	-51.4	10.4	70.1
Feb. 5	15 18.57	-71 06.8	1.914	1.905	+1.99	-51.7	10.5	74.5
Feb. 15	15 45.04	-79 37.4	1.920	1.965	+4.12	-49.8	10.7	77.8
Feb. 25	17 49.17	-87 24.4	1.955	2.031	+55.26	-34.4	10.8	80.0
Mar. 7	02 28.70	-84 18.2	2.016	2.102	+8.11	+41.3	11.0	81.0
Mar. 17	03 14.20	-77 40.5	2.098	2.177	+2.51	+37.3	11.3	81.0
Mar. 27	03 34.56	-71 51.0	2.197	2.255	+1.66	+32.1	11.5	80.4

Comet 162P/Siding Spring

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 7.80695 TT  
 Peri. = 357.11933  
 Node = 30.91730 2000.0  
 Incl. = 27.55412  
 q = 1.2891849 AU  
 e = 0.5829468  
 a = 3.0911761 AU  
 n = 0.18135037  
 P = 5.43 years

H = 13.4 , G = 0.15

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	V	Elong.
2020/21	h m	° ' "			m		°
Jan. 2	17 16.05	-38 42.6	4.116	3.251	+1.70 -4.5	19.6	24.9
Jan. 12	17 33.29	-39 26.7	4.004	3.196	+1.75 -4.3	19.5	30.6
Jan. 22	17 50.95	-40 09.5	3.876	3.141	+1.79 -4.2	19.5	36.5
Feb. 1	18 08.95	-40 51.0	3.736	3.084	+1.82 -4.1	19.5	42.6
Feb. 11	18 27.23	-41 31.7	3.584	3.026	+1.84 -4.0	19.4	48.8
Feb. 21	18 45.74	-42 11.9	3.422	2.967	+1.86 -4.0	19.3	55.0
Mar. 2	19 04.40	-42 52.7	3.253	2.908	+1.87 -4.1	19.2	61.2
Mar. 12	19 23.15	-43 34.8	3.078	2.847	+1.88 -4.3	19.1	67.3
Mar. 22	19 41.94	-44 19.6	2.899	2.785	+1.88 -4.7	18.9	73.5
Apr. 1	20 00.67	-45 08.5	2.719	2.722	+1.87 -5.2	18.8	79.6
Apr. 11	20 19.29	-46 03.3	2.539	2.658	+1.85 -5.9	18.6	85.7
Apr. 21	20 37.71	-47 05.9	2.361	2.593	+1.83 -6.8	18.4	91.7
May 1	20 55.82	-48 18.5	2.189	2.527	+1.79 -7.9	18.2	97.6
May 11	21 13.49	-49 43.1	2.023	2.461	+1.74 -9.2	18.0	103.3
May 21	21 30.53	-51 21.9	1.866	2.393	+1.66 -10.7	17.8	108.9
May 31	21 46.65	-53 16.5	1.718	2.325	+1.55 -12.4	17.5	114.1
June 10	22 01.45	-55 27.5	1.583	2.256	+1.39 -14.0	17.3	118.9
June 20	22 14.33	-57 54.4	1.460	2.186	+1.15 -15.5	17.0	123.0
June 30	22 24.33	-60 34.3	1.352	2.117	+0.80 -16.5	16.8	126.1
July 10	22 30.15	-63 20.8	1.257	2.046	+0.29 -16.7	16.5	128.0
July 20	22 29.96	-66 03.7	1.177	1.976	-0.43 -15.5	16.3	128.5
July 30	22 21.67	-68 26.6	1.110	1.906	-1.33 -12.4	16.2	127.5
Aug. 9	22 04.20	-70 08.4	1.055	1.837	-2.22 -7.0	16.0	125.2
Aug. 19	21 39.43	-70 46.0	1.010	1.769	-2.67 +0.5	15.9	122.0
Aug. 29	21 13.71	-70 02.7	0.974	1.702	-2.31 +9.0	15.8	118.1
Sept. 8	20 54.43	-67 56.8	0.945	1.637	-1.40 +16.8	15.8	113.9
Sept. 18	20 45.17	-64 37.2	0.921	1.575	-0.36 +23.6	15.7	109.6
Sept. 28	20 45.61	-60 14.6	0.902	1.516	+0.49 +29.4	15.6	105.5
Oct. 8	20 53.47	-54 57.7	0.887	1.462	+1.10 +34.5	15.6	101.5
Oct. 18	21 06.43	-48 51.4	0.877	1.413	+1.51 +39.2	15.6	97.7
Oct. 28	21 22.80	-42 01.1	0.874	1.371	+1.77 +43.2	15.5	94.3
Nov. 7	21 41.27	-34 34.3	0.879	1.337	+1.93 +46.3	15.5	91.1
Nov. 17	22 01.08	-26 41.3	0.893	1.311	+2.04 +48.3	15.6	88.2
Nov. 27	22 21.86	-18 35.0	0.918	1.295	+2.12 +48.8	15.6	85.6
Dec. 7	22 43.35	-10 30.1	0.954	1.289	+2.19 +47.9	15.7	83.3
Dec. 17	23 05.59	-02 39.7	1.003	1.294	+2.27 +45.8	15.8	81.2
Dec. 27	23 28.67	+04 46.0	1.062	1.308	+2.36 +42.9	15.9	79.4
Jan. 6	23 52.74	+11 39.5	1.133	1.332	+2.47 +39.4	16.0	77.7
Jan. 16	00 18.02	+17 56.9	1.212	1.365	+2.60 +35.7	16.2	76.1
Jan. 26	00 44.73	+23 36.5	1.301	1.406	+2.75 +31.8	16.4	74.5
Feb. 5	01 12.99	+28 37.3	1.397	1.454	+2.92 +27.9	16.5	72.9
Feb. 15	01 42.95	+32 59.0	1.500	1.507	+3.09 +24.0	16.7	71.2
Feb. 25	02 14.60	+36 41.6	1.610	1.565	+3.25 +20.1	16.9	69.4
Mar. 7	02 47.79	+39 44.9	1.725	1.627	+3.39 +16.2	17.1	67.4
Mar. 17	03 22.26	+42 09.3	1.847	1.691	+3.50 +12.3	17.2	65.2
Mar. 27	03 57.56	+43 55.5	1.973	1.758	+3.55 +8.6	17.4	62.8

Comet 220P/McNaught

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 10.65921 TT  
 Peri. = 180.54688 e = 0.5018800  
 Node = 150.10719 2000.0 a = 3.1161359 AU  
 Incl. = 8.12794 n = 0.17917586  
 q = 1.5522096 AU P = 5.50 years

$$m1 = 14.6 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	14 58.08	-10 28.8	3.570	3.125	+1.24	-3.6	.	55.8
Jan. 12	15 10.30	-11 01.4	3.396	3.076	+1.20	-2.9	.	62.9
Jan. 22	15 22.11	-11 26.7	3.215	3.026	+1.15	-2.1	.	70.1
Feb. 1	15 33.34	-11 43.8	3.029	2.976	+1.08	-1.2	.	77.5
Feb. 11	15 43.79	-11 52.3	2.839	2.924	+1.00	-0.4	.	85.1
Feb. 21	15 53.27	-11 51.8	2.649	2.872	+0.88	+0.6	.	92.8
Mar. 2	16 01.49	-11 41.8	2.460	2.819	+0.74	+1.5	.	100.8
Mar. 12	16 08.19	-11 22.1	2.277	2.766	+0.57	+2.5	21.9	109.1
Mar. 22	16 13.05	-10 52.7	2.101	2.712	+0.37	+3.5	21.6	117.7
Apr. 1	16 15.74	-10 13.9	1.936	2.657	+0.14	+4.4	21.3	126.8
Apr. 11	16 15.98	-09 26.8	1.785	2.602	-0.12	+5.1	21.0	136.2
Apr. 21	16 13.57	-08 33.0	1.651	2.547	-0.39	+5.6	20.8	146.0
May 1	16 08.49	-07 35.6	1.538	2.491	-0.65	+5.8	20.5	155.6
May 11	16 01.06	-06 38.8	1.449	2.435	-0.85	+5.4	20.2	163.6
May 21	15 51.93	-05 48.3	1.384	2.378	-0.97	+4.5	20.0	165.6
May 31	15 42.11	-05 10.2	1.345	2.322	-0.97	+2.9	19.8	159.3
June 10	15 32.83	-04 49.7	1.330	2.265	-0.85	+0.9	19.7	149.7
June 20	15 25.24	-04 50.1	1.336	2.209	-0.63	-1.2	19.5	139.4
June 30	15 20.25	-05 12.1	1.359	2.153	-0.33	-3.4	19.4	129.4
July 10	15 18.39	-05 54.3	1.394	2.097	0.00	-5.2	19.3	120.1
July 20	15 19.87	-06 54.1	1.438	2.043	+0.33	-6.8	19.3	111.5
July 30	15 24.70	-08 08.1	1.487	1.989	+0.66	-8.0	19.2	103.7
Aug. 9	15 32.72	-09 32.7	1.539	1.937	+0.97	-8.9	19.1	96.5
Aug. 19	15 43.74	-11 04.6	1.590	1.886	+1.26	-9.5	19.1	90.0
Aug. 29	15 57.60	-12 40.4	1.641	1.837	+1.53	-9.7	19.0	84.1
Sept. 8	16 14.11	-14 16.7	1.689	1.790	+1.79	-9.5	18.9	78.8
Sept. 18	16 33.13	-15 50.1	1.735	1.747	+2.04	-9.1	18.8	73.9
Sept. 28	16 54.53	-17 17.2	1.779	1.706	+2.26	-8.2	18.8	69.4
Oct. 8	17 18.14	-18 34.2	1.820	1.670	+2.48	-7.0	18.7	65.2
Oct. 18	17 43.80	-19 37.5	1.860	1.637	+2.67	-5.4	18.6	61.5
Oct. 28	18 11.31	-20 23.6	1.898	1.609	+2.84	-3.5	18.6	58.0
Nov. 7	18 40.36	-20 49.2	1.937	1.587	+2.98	-1.3	18.5	54.7
Nov. 17	19 10.65	-20 51.8	1.977	1.569	+3.08	+1.1	18.5	51.7
Nov. 27	19 41.80	-20 29.9	2.019	1.558	+3.15	+3.6	18.5	48.8
Dec. 7	20 13.39	-19 43.0	2.064	1.553	+3.17	+6.0	18.6	46.1
Dec. 17	20 45.06	-18 32.0	2.112	1.553	+3.16	+8.4	18.6	43.5
Dec. 27	21 16.47	-16 58.7	2.164	1.560	+3.11	+10.4	18.7	40.9
Jan. 6	21 47.33	-15 06.3	2.221	1.573	+3.05	+12.2	18.8	38.4
Jan. 16	22 17.48	-12 58.4	2.282	1.592	+2.97	+13.5	18.9	35.8
Jan. 26	22 46.79	-10 38.8	2.347	1.616	+2.88	+14.4	19.1	33.2
Feb. 5	23 15.20	-08 11.8	2.416	1.645	+2.79	+15.0	19.2	30.5
Feb. 15	23 42.74	-05 40.9	2.489	1.679	+2.71	+15.2	19.4	27.8
Feb. 25	00 09.44	-03 09.8	2.563	1.717	+2.62	+15.0	19.6	24.9
Mar. 7	00 35.34	+00 41.5	2.640	1.758	+2.55	+14.6	19.8	21.9
Mar. 17	01 00.52	+01 41.6	2.716	1.802	+2.48	+13.9	20.0	18.8
Mar. 27	01 25.03	+03 57.4	2.791	1.850	+2.42	+13.1	20.2	15.6

## Comet 141P/Machholz

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 15.40499 TT  
 Peri. = 153.53533 e = 0.7356887  
 Node = 241.85784 2000.0 a = 3.0566257 AU  
 Incl. = 13.94724 n = 0.18443388  
 q = 0.8079007 AU P = 5.34 years

$$m_1 = 16.0 + 5 \log(\Delta) + 20.0 \log(r(t-10))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	16 56.51	-21 17.4	4.500	3.638	+1.20	-0.7	.	25.6
Jan. 12	17 08.46	-21 22.2	4.363	3.578	+1.19	-0.2	.	33.0
Jan. 22	17 20.31	-21 22.4	4.209	3.518	+1.17	+0.2	.	40.4
Feb. 1	17 31.93	-21 17.7	4.038	3.455	+1.14	+0.7	.	47.9
Feb. 11	17 43.19	-21 07.9	3.853	3.392	+1.10	+1.3	.	55.4
Feb. 21	17 53.98	-20 53.0	3.657	3.326	+1.05	+1.8	.	63.0
Mar. 2	18 04.11	-20 33.0	3.451	3.259	+0.97	+2.3	.	70.7
Mar. 12	18 13.42	-20 07.9	3.238	3.191	+0.88	+2.8	.	78.5
Mar. 22	18 21.71	-19 37.8	3.020	3.121	+0.76	+3.3	.	86.4
Apr. 1	18 28.74	-19 02.9	2.801	3.049	+0.62	+3.8	.	94.6
Apr. 11	18 34.24	-18 23.3	2.584	2.976	+0.46	+4.2	.	103.1
Apr. 21	18 37.91	-17 39.2	2.372	2.901	+0.25	+4.7	.	111.9
May 1	18 39.38	-16 50.8	2.168	2.824	+0.01	+5.1	.	121.1
May 11	18 38.29	-15 58.2	1.976	2.745	-0.26	+5.5	.	130.8
May 21	18 34.29	-15 01.6	1.800	2.664	-0.57	+5.9	.	141.0
May 31	18 27.12	-14 01.4	1.644	2.581	-0.89	+6.2	.	151.6
June 10	18 16.81	-12 58.6	1.511	2.496	-1.19	+6.4	.	161.9
June 20	18 03.71	-11 54.9	1.405	2.409	-1.43	+6.3	.	168.3
June 30	17 48.76	-10 53.4	1.328	2.320	-1.55	+5.9	.	163.2
July 10	17 33.36	-09 58.1	1.279	2.229	-1.51	+5.0	.	152.2
July 20	17 19.07	-09 13.2	1.255	2.136	-1.31	+3.8	.	140.0
July 30	17 07.35	-08 41.8	1.251	2.040	-0.99	+2.3	.	128.1
Aug. 9	16 59.18	-08 25.1	1.260	1.942	-0.60	+0.9	.	117.0
Aug. 19	16 55.04	-08 22.2	1.276	1.842	-0.18	-0.4	.	106.7
Aug. 29	16 55.08	-08 31.0	1.293	1.740	+0.23	-1.4	21.9	97.4
Sept. 8	16 59.15	-08 48.3	1.307	1.636	+0.62	-2.1	21.4	89.0
Sept. 18	17 07.08	-09 11.0	1.312	1.531	+1.00	-2.5	20.9	81.5
Sept. 28	17 18.74	-09 35.9	1.306	1.424	+1.36	-2.5	20.3	74.9
Oct. 8	17 33.99	-09 59.8	1.285	1.317	+1.72	-2.2	19.6	69.1
Oct. 18	17 52.84	-10 19.6	1.250	1.212	+2.09	-1.6	18.9	64.1
Oct. 28	18 15.43	-10 32.3	1.197	1.109	+2.47	-0.8	18.1	60.0
Nov. 7	18 41.92	-10 35.6	1.128	1.014	+2.88	+0.3	17.2	56.7
Nov. 17	19 12.68	-10 28.1	1.043	0.929	+3.33	+1.4	16.2	54.3
Nov. 27	19 48.22	-10 10.2	0.944	0.862	+3.84	+2.2	15.2	53.0
Dec. 7	20 29.30	-09 45.5	0.836	0.820	+4.46	+2.7	14.3	52.7
Dec. 17	21 17.35	-09 18.4	0.727	0.808	+5.27	+2.7	13.6	53.9
Dec. 27	22 14.54	-08 49.2	0.629	0.830	+6.31	+3.4	13.1	57.0
Jan. 6	23 22.93	-08 06.0	0.556	0.881	+7.46	+6.0	13.1	62.8
Jan. 16	00 41.20	-06 45.8	0.521	0.954	+8.12	+10.7	13.5	71.3
Jan. 26	02 01.40	-04 39.9	0.533	1.043	+7.70	+14.4	14.2	81.0
Feb. 5	03 13.23	-02 12.3	0.590	1.141	+6.48	+14.7	15.2	89.1
Feb. 15	04 12.08	+00 06.5	0.685	1.245	+5.19	+12.7	16.3	94.5
Feb. 25	04 59.13	+02 01.6	0.808	1.351	+4.17	+10.1	17.4	96.9
Mar. 7	05 37.32	+03 31.1	0.951	1.458	+3.44	+7.6	18.5	97.2
Mar. 17	06 09.35	+04 37.5	1.111	1.564	+2.94	+5.5	19.5	95.8
Mar. 27	06 37.12	+05 23.8	1.283	1.669	+2.60	+3.6	20.4	93.3

## Comet 293P/Spacewatch

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 19.33198 TT  
 Peri. = 41.07877 e = 0.4182122  
 Node = 78.41184 2000.0 a = 3.6435266 AU  
 Incl. = 9.05692 n = 0.14171674  
 q = 2.1197593 AU P = 6.95 years

$$m_1 = 4.6 + 5 \log(\Delta) + 40.0 \log(r(t-30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	00 26.15	-05 31.6	3.159	3.194	+0.58	+7.0	.	83.1
Jan. 12	00 32.63	-04 18.0	3.261	3.152	+0.73	+7.7	.	75.0
Jan. 22	00 40.53	-02 57.8	3.358	3.111	+0.86	+8.3	.	67.2
Feb. 1	00 49.68	-01 32.2	3.446	3.070	+0.98	+8.8	.	59.7
Feb. 11	00 59.95	+00 02.3	3.525	3.028	+1.08	+9.2	.	52.6
Feb. 21	01 11.21	+01 30.9	3.592	2.987	+1.18	+9.5	.	45.7
Mar. 2	01 23.37	+03 06.4	3.647	2.945	+1.26	+9.6	.	39.1
Mar. 12	01 36.33	+04 43.4	3.689	2.904	+1.34	+9.7	.	32.8
Mar. 22	01 50.05	+06 21.0	3.718	2.863	+1.41	+9.8	.	26.6
Apr. 1	02 04.47	+07 58.3	3.734	2.822	+1.48	+9.7	.	20.7
Apr. 11	02 19.55	+09 34.5	3.736	2.781	+1.54	+9.5	.	15.1
Apr. 21	02 35.26	+11 08.9	3.726	2.740	+1.61	+9.3	.	9.7
May 1	02 51.58	+12 40.5	3.702	2.700	+1.66	+9.0	.	5.0
May 11	03 08.49	+14 08.5	3.667	2.660	+1.72	+8.6	.	3.8
May 21	03 25.98	+15 32.3	3.621	2.621	+1.78	+8.1	.	7.7
May 31	03 44.03	+16 50.9	3.563	2.583	+1.83	+7.5	.	12.5
June 10	04 02.60	+18 03.6	3.496	2.545	+1.89	+6.9	.	17.3
June 20	04 21.68	+19 09.7	3.420	2.508	+1.93	+6.2	.	22.1
June 30	04 41.22	+20 08.5	3.335	2.472	+1.98	+5.5	.	26.9
July 10	05 01.18	+20 59.5	3.243	2.437	+2.02	+4.6	.	31.7
July 20	05 21.50	+21 42.1	3.144	2.403	+2.05	+3.8	.	36.4
July 30	05 42.10	+22 16.1	3.039	2.371	+2.07	+2.9	.	41.2
Aug. 9	06 02.90	+22 41.3	2.928	2.339	+2.09	+2.0	.	45.9
Aug. 19	06 23.80	+22 57.9	2.814	2.310	+2.09	+1.2	.	50.7
Aug. 29	06 44.68	+23 06.1	2.695	2.282	+2.08	+0.4	21.7	55.6
Sept. 8	07 05.41	+23 06.6	2.574	2.256	+2.06	-0.3	21.4	60.5
Sept. 18	07 25.88	+23 00.4	2.451	2.232	+2.03	-0.9	21.1	65.6
Sept. 28	07 45.90	+22 49.0	2.327	2.210	+1.97	-1.4	20.8	70.8
Oct. 8	08 05.33	+22 33.9	2.202	2.190	+1.90	-1.6	20.4	76.2
Oct. 18	08 23.99	+22 17.3	2.077	2.172	+1.81	-1.6	20.1	81.8
Oct. 28	08 41.65	+22 01.9	1.954	2.157	+1.70	-1.4	19.8	87.7
Nov. 7	08 58.09	+21 50.5	1.834	2.144	+1.57	-0.8	19.5	94.0
Nov. 17	09 13.03	+21 46.3	1.717	2.134	+1.40	+0.1	19.2	100.7
Nov. 27	09 26.13	+21 52.9	1.606	2.127	+1.20	+1.4	19.0	107.8
Dec. 7	09 37.06	+22 13.4	1.502	2.122	+0.96	+2.9	18.7	115.5
Dec. 17	09 45.39	+22 50.4	1.408	2.120	+0.67	+4.7	18.5	123.8
Dec. 27	09 50.75	+23 44.9	1.326	2.121	+0.36	+6.4	18.3	132.8
Jan. 6	09 52.88	+24 55.4	1.259	2.124	+0.03	+7.8	18.2	142.3
Jan. 16	09 51.71	+26 16.9	1.211	2.130	-0.29	+8.4	18.1	151.9
Jan. 26	09 47.62	+27 40.4	1.185	2.139	-0.54	+8.0	18.0	160.8
Feb. 5	09 41.50	+28 54.6	1.182	2.151	-0.68	+6.5	18.0	165.7
Feb. 15	09 34.64	+29 49.5	1.203	2.165	-0.67	+4.1	18.1	162.4
Feb. 25	09 28.54	+30 18.2	1.247	2.181	-0.52	+1.3	18.3	154.2
Mar. 7	09 24.42	+30 19.4	1.313	2.200	-0.27	-1.3	18.5	144.8
Mar. 17	09 23.02	+29 55.6	1.398	2.221	+0.02	-3.6	18.7	135.6
Mar. 27	09 24.60	+29 10.8	1.499	2.244	+0.32	-5.5	19.0	126.9

## Comet P/2013 TL117 (Lemmon)

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 24.30532 TT  
 Peri. = 112.25003 e = 0.6891867  
 Node = 3.31444 2000.0 a = 3.6095663 AU  
 Incl. = 9.36462 n = 0.14372144  
 q = 1.1219012 AU P = 6.86 years

$$m_1 = 17.4 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° ' "			for T=+1 day			°
Jan. 2	22 12.24	-14 20.2	4.212	3.646	-0.24 -2.2	.	13.6/63	49.2
Jan. 12	22 21.00	-13 17.1	4.262	3.584	-0.25 -2.3	.	15.0/64	41.4
Jan. 22	22 30.53	-12 09.2	4.296	3.520	-0.26 -2.4	.	16.2/64	33.8
Feb. 1	22 40.74	-10 56.7	4.310	3.456	-0.27 -2.6	.	17.2/64	26.4
Feb. 11	22 51.51	-09 39.9	4.306	3.390	-0.29 -2.7	.	18.2/64	19.2
Feb. 21	23 02.78	-08 19.1	4.283	3.323	-0.30 -2.9	.	19.0/64	12.2
Mar. 2	23 14.47	-06 54.7	4.241	3.256	-0.32 -3.1	.	19.7/64	5.6
Mar. 12	23 26.54	-05 27.0	4.179	3.186	-0.35 -3.3	.	20.4/64	2.2
Mar. 22	23 38.94	-03 56.1	4.100	3.116	-0.37 -3.6	.	21.0/64	8.1
Apr. 1	23 51.66	-02 22.5	4.003	3.045	-0.40 -3.8	.	21.5/64	14.4
Apr. 11	00 04.66	+00 46.4	3.889	2.972	-0.44 -4.1	.	22.0/64	20.6
Apr. 21	00 17.95	+00 52.0	3.761	2.898	-0.48 -4.5	.	22.5/64	26.6
May 1	00 31.52	+02 32.5	3.620	2.823	-0.52 -4.8	.	22.9/64	32.6
May 11	00 45.38	+04 14.8	3.466	2.747	-0.57 -5.2	.	23.4/64	38.4
May 21	00 59.56	+05 58.8	3.301	2.669	-0.64 -5.6	.	23.9/64	44.1
May 31	01 14.08	+07 44.5	3.128	2.591	-0.71 -6.1	.	24.3/64	49.7
June 10	01 28.97	+09 31.7	2.948	2.511	-0.79 -6.6	.	24.8/64	55.2
June 20	01 44.29	+11 20.6	2.762	2.430	-0.89 -7.1	.	25.4/64	60.6
June 30	02 00.09	+13 11.3	2.572	2.347	-1.02 -7.7	.	26.0/65	65.9
July 10	02 16.46	+15 03.9	2.380	2.264	-1.16 -8.3	.	26.8/65	71.0
July 20	02 33.50	+16 58.9	2.189	2.180	-1.34 -8.9	.	27.6/65	76.1
July 30	02 51.33	+18 56.7	1.999	2.095	-1.55 -9.5	.	28.6/65	81.0
Aug. 9	03 10.14	+20 58.0	1.812	2.010	-1.82 -10.1	21.7	29.9/65	85.8
Aug. 19	03 30.17	+23 03.6	1.630	1.924	-2.15 -10.6	21.3	31.4/66	90.3
Aug. 29	03 51.74	+25 14.5	1.456	1.837	-2.57 -10.9	20.9	33.4/66	94.6
Sept. 8	04 15.33	+27 31.5	1.290	1.752	-3.09 -10.7	20.4	36.0/67	98.6
Sept. 18	04 41.61	+29 54.9	1.134	1.667	-3.76 -9.8	19.9	39.3/68	102.2
Sept. 28	05 11.49	+32 23.6	0.991	1.583	-4.59 -7.5	19.4	43.6/70	105.2
Oct. 8	05 46.27	+34 53.2	0.862	1.502	-5.60 -2.8	18.8	49.0/72	107.4
Oct. 18	06 27.48	+37 12.7	0.749	1.424	-6.74 +5.7	18.3	55.5/76	108.6
Oct. 28	07 16.52	+39 00.1	0.653	1.351	-7.81 +19.6	17.8	62.9/83	108.5
Nov. 7	08 13.60	+39 40.7	0.578	1.285	-8.39 +39.2	17.3	70.2/90	107.0
Nov. 17	09 15.97	+38 35.7	0.522	1.227	-8.01 +61.5	16.9	75.3/100	104.3
Nov. 27	10 17.81	+35 25.7	0.487	1.180	-6.68 +79.9	16.6	76.8/109	100.9
Dec. 7	11 13.35	+30 29.5	0.470	1.146	-5.00 +89.1	16.3	73.8/117	97.6
Dec. 17	11 59.64	+24 34.7	0.466	1.126	-3.60 +89.2	16.3	67.0/123	95.2
Dec. 27	12 36.57	+18 28.4	0.472	1.122	-2.70 +83.6	16.3	58.3/128	94.4
Jan. 6	13 05.31	+12 41.4	0.482	1.135	-2.25 +75.8	16.4	48.9/132	95.4
Jan. 16	13 26.91	+07 29.2	0.494	1.163	-2.15 +67.8	16.5	39.4/137	98.3
Jan. 26	13 41.94	+02 56.3	0.505	1.204	-2.28 +60.6	16.7	30.5/145	103.1
Feb. 5	13 50.60	+00 57.7	0.515	1.257	-2.59 +54.5	17.0	22.7/160	109.8
Feb. 15	13 52.77	-04 14.0	0.524	1.320	-3.01 +49.4	17.2	17.7/187	118.3
Feb. 25	13 48.51	-06 53.0	0.537	1.390	-3.49 +45.3	17.5	17.9/219	128.5
Mar. 7	13 38.56	-08 54.4	0.558	1.466	-3.91 +42.0	17.8	21.1/242	140.3
Mar. 17	13 24.52	-10 17.3	0.591	1.545	-4.16 +39.3	18.1	23.5/255	152.9
Mar. 27	13 08.94	-11 05.1	0.642	1.628	-4.16 +36.6	18.6	22.8/262	165.7

## Comet P/2009 Q4 (Boattini)

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 26.96417 TT  
 Peri. = 320.22867 e = 0.5825346  
 Node = 127.46521 2000.0 a = 3.1278235 AU  
 Incl. = 11.01529 n = 0.17817252  
 q = 1.3057581 AU P = 5.53 years

m1 = 16.4 + 5 log(Delta) + 7.5 log(r) (post-T & r > 1.8 AU)  
 m1 = 12.0 + 5 log(Delta) + 25.0 log(r) (else)

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	20 44.81	-19 28.3	4.197	3.358	-0.38 -0.3	.	18.1/78	27.7
Jan. 12	20 57.52	-18 48.0	4.207	3.305	-0.39 -0.4	.	18.9/77	20.6
Jan. 22	21 10.71	-18 02.5	4.199	3.251	-0.41 -0.6	.	19.7/76	13.7
Feb. 1	21 24.30	-17 12.2	4.172	3.196	-0.43 -0.8	.	20.4/75	7.0
Feb. 11	21 38.19	-16 17.3	4.126	3.140	-0.45 -1.0	.	21.0/74	2.1
Feb. 21	21 52.35	-15 18.3	4.063	3.083	-0.47 -1.2	.	21.6/74	6.9
Mar. 2	22 06.72	-14 15.5	3.982	3.025	-0.50 -1.4	.	22.0/73	13.2
Mar. 12	22 21.26	-13 09.6	3.885	2.966	-0.53 -1.7	.	22.4/73	19.4
Mar. 22	22 35.95	-12 01.0	3.773	2.906	-0.56 -2.0	.	22.8/72	25.6
Apr. 1	22 50.77	-10 50.5	3.647	2.845	-0.60 -2.2	.	23.1/72	31.7
Apr. 11	23 05.70	-09 38.6	3.508	2.783	-0.64 -2.6	.	23.3/72	37.7
Apr. 21	23 20.75	-08 26.0	3.359	2.720	-0.69 -2.9	.	23.6/72	43.5
May 1	23 35.91	-07 13.6	3.200	2.656	-0.74 -3.3	.	23.8/72	49.3
May 11	23 51.20	-06 02.2	3.034	2.591	-0.81 -3.7	21.9	24.0/73	55.0
May 21	00 06.63	-04 52.7	2.862	2.525	-0.88 -4.2	21.7	24.2/74	60.7
May 31	00 22.19	-03 46.2	2.685	2.459	-0.96 -4.7	21.5	24.3/75	66.3
June 10	00 37.91	-02 43.7	2.506	2.391	-1.06 -5.3	21.2	24.4/76	71.8
June 20	00 53.80	-01 46.6	2.325	2.323	-1.17 -5.9	21.0	24.5/77	77.3
June 30	01 09.84	+00 56.4	2.145	2.254	-1.30 -6.6	20.7	24.6/79	82.7
July 10	01 26.05	+00 14.6	1.967	2.185	-1.46 -7.4	20.4	24.7/82	88.2
July 20	01 42.40	+00 16.8	1.793	2.116	-1.64 -8.4	20.1	24.7/84	93.6
July 30	01 58.83	+00 35.7	1.624	2.046	-1.86 -9.5	19.8	24.7/87	99.0
Aug. 9	02 15.31	+00 39.9	1.463	1.976	-2.12 -10.8	19.4	24.7/91	104.4
Aug. 19	02 31.73	+00 26.8	1.309	1.907	-2.43 -12.3	19.1	24.6/96	109.9
Aug. 29	02 47.92	+00 06.1	1.164	1.839	-2.81 -14.1	18.7	24.4/101	115.3
Sept. 8	03 03.73	-01 00.8	1.030	1.771	-3.26 -16.2	18.3	24.2/106	120.7
Sept. 18	03 18.86	-02 18.8	0.908	1.705	-3.81 -18.7	17.6	23.7/113	126.0
Sept. 28	03 32.99	-03 59.6	0.799	1.641	-4.46 -21.4	16.9	23.1/119	131.0
Oct. 8	03 45.78	-05 59.8	0.703	1.580	-5.23 -24.3	16.2	21.9/126	135.7
Oct. 18	03 56.80	-08 12.2	0.620	1.523	-6.13 -27.1	15.5	19.9/132	139.8
Oct. 28	04 05.73	-10 22.7	0.551	1.471	-7.13 -29.1	14.9	16.7/137	142.9
Nov. 7	04 12.48	-12 11.6	0.494	1.423	-8.19 -29.9	14.3	12.0/137	144.9
Nov. 17	04 17.22	-13 14.4	0.449	1.383	-9.18 -28.9	13.8	6.3/115	145.7
Nov. 27	04 20.78	-13 04.5	0.415	1.350	-9.99 -26.6	13.3	7.7/40	145.7
Dec. 7	04 24.46	-11 22.2	0.392	1.326	-10.49 -24.0	13.0	17.0/22	145.2
Dec. 17	04 29.69	-07 59.5	0.379	1.311	-10.62 -22.5	12.8	27.5/21	144.4
Dec. 27	04 37.97	-03 06.2	0.378	1.306	-10.40 -22.8	12.8	36.7/25	143.1
Jan. 6	04 50.15	+02 46.4	0.390	1.311	-9.94 -24.3	12.9	42.8/30	141.3
Jan. 16	05 06.38	+08 55.6	0.417	1.326	-9.30 -25.2	13.2	45.3/37	138.6
Jan. 26	05 26.38	+14 39.2	0.460	1.350	-8.57 -24.4	13.6	44.7/45	135.2
Feb. 5	05 49.33	+19 27.6	0.518	1.383	-7.79 -21.4	14.1	42.4/53	131.2
Feb. 15	06 14.25	+23 08.2	0.590	1.424	-6.99 -17.1	14.7	39.8/63	127.0
Feb. 25	06 40.28	+25 41.5	0.677	1.471	-6.19 -12.5	15.3	37.4/71	122.7
Mar. 7	07 06.54	+27 14.8	0.777	1.524	-5.43 -8.1	16.0	35.4/79	118.3
Mar. 17	07 32.45	+27 58.3	0.889	1.581	-4.73 -4.4	16.7	33.9/86	113.9
Mar. 27	07 57.65	+28 01.9	1.013	1.642	-4.09 -1.5	17.4	32.7/92	109.5

Comet 277P/LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2020 Dec. 30.20616 TT  
 Peri. = 152.31957 e = 0.5055014  
 Node = 276.34408 2000.0 a = 3.8514914 AU  
 Incl. = 16.77908 n = 0.13039492  
 q = 1.9045571 AU P = 7.56 years

$$m_1 = 12.4 + 5 \log(\Delta) + 15.0 \log(r(t-60))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	20 45.95	-08 03.0	4.151	3.360	+1.21	+5.3	.	32.3
Jan. 12	20 58.31	-07 06.8	4.169	3.311	+1.26	+6.0	.	25.8
Jan. 22	21 11.12	-06 03.3	4.171	3.261	+1.30	+6.8	.	19.7
Feb. 1	21 24.30	-04 52.3	4.156	3.211	+1.34	+7.5	.	14.4
Feb. 11	21 37.79	-03 34.3	4.125	3.161	+1.36	+8.2	.	10.8
Feb. 21	21 51.51	-02 09.4	4.078	3.110	+1.38	+8.9	.	10.4
Mar. 2	22 05.42	+00 37.8	4.015	3.060	+1.40	+9.5	.	13.4
Mar. 12	22 19.47	+01 00.0	3.938	3.009	+1.41	+10.1	.	17.9
Mar. 22	22 33.64	+02 43.8	3.848	2.957	+1.42	+10.7	.	23.1
Apr. 1	22 47.89	+04 33.2	3.745	2.906	+1.43	+11.2	.	28.5
Apr. 11	23 02.22	+06 27.8	3.631	2.855	+1.44	+11.7	.	33.9
Apr. 21	23 16.60	+08 27.1	3.508	2.803	+1.44	+12.2	.	39.3
May 1	23 31.03	+10 30.8	3.376	2.752	+1.44	+12.6	.	44.7
May 11	23 45.49	+12 38.4	3.237	2.701	+1.45	+13.0	.	50.0
May 21	23 59.99	+14 49.5	3.093	2.650	+1.45	+13.3	21.9	55.3
May 31	00 14.48	+17 03.5	2.944	2.600	+1.45	+13.5	21.7	60.5
June 10	00 28.96	+19 19.9	2.792	2.550	+1.45	+13.8	21.5	65.8
June 20	00 43.40	+21 38.1	2.639	2.500	+1.44	+13.9	21.2	71.0
June 30	00 57.73	+23 57.5	2.485	2.451	+1.42	+14.0	21.0	76.3
July 10	01 11.88	+26 17.2	2.332	2.403	+1.40	+14.0	20.7	81.6
July 20	01 25.74	+28 36.4	2.181	2.356	+1.36	+13.9	20.4	87.0
July 30	01 39.13	+30 53.9	2.033	2.311	+1.31	+13.6	20.2	92.4
Aug. 9	01 51.86	+33 08.4	1.890	2.266	+1.23	+13.2	19.9	98.1
Aug. 19	02 03.63	+35 18.2	1.752	2.223	+1.11	+12.6	19.6	103.9
Aug. 29	02 14.06	+37 20.9	1.620	2.182	+0.95	+11.8	19.3	109.9
Sept. 8	02 22.72	+39 13.4	1.497	2.143	+0.75	+10.5	19.0	116.3
Sept. 18	02 29.09	+40 51.4	1.383	2.106	+0.49	+8.8	18.7	122.9
Sept. 28	02 32.68	+42 08.9	1.281	2.071	+0.19	+6.4	18.4	129.9
Oct. 8	02 33.22	+42 58.6	1.191	2.039	-0.11	+3.1	18.1	137.0
Oct. 18	02 30.80	+43 12.1	1.117	2.010	-0.38	-1.0	17.8	144.0
Oct. 28	02 26.17	+42 41.6	1.060	1.984	-0.53	-5.6	17.6	150.2
Nov. 7	02 20.73	+41 24.4	1.022	1.962	-0.53	-10.2	17.4	154.1
Nov. 17	02 16.15	+39 24.3	1.004	1.942	-0.34	-14.0	17.3	154.1
Nov. 27	02 14.05	+36 53.7	1.008	1.927	-0.03	-16.1	17.2	150.0
Dec. 7	02 15.37	+34 09.9	1.033	1.916	+0.34	-16.4	17.1	143.3
Dec. 17	02 20.40	+31 29.3	1.077	1.908	+0.70	-15.4	17.1	135.5
Dec. 27	02 28.98	+29 04.4	1.138	1.905	+1.04	-13.3	17.1	127.6
Jan. 6	02 40.63	+27 01.6	1.214	1.906	+1.31	-11.0	17.2	119.9
Jan. 16	02 54.84	+25 22.1	1.302	1.910	+1.54	-8.7	17.3	112.7
Jan. 26	03 11.11	+24 04.1	1.400	1.919	+1.72	-6.7	17.4	105.9
Feb. 5	03 28.97	+23 03.9	1.507	1.932	+1.86	-5.2	17.5	99.5
Feb. 15	03 48.06	+22 17.2	1.621	1.949	+1.97	-4.1	17.7	93.5
Feb. 25	04 08.08	+21 39.7	1.740	1.969	+2.04	-3.4	17.8	87.8
Mar. 7	04 28.75	+21 07.3	1.864	1.993	+2.09	-3.1	18.0	82.5
Mar. 17	04 49.87	+20 36.9	1.991	2.020	+2.13	-3.0	18.1	77.3
Mar. 27	05 11.25	+20 05.7	2.120	2.050	+2.15	-3.3	18.3	72.3

## Comet 98P/Takamizawa

Epoch = 2020 July 10.0 TT  
 T = 2021 Jan. 4.92940 TT  
 Peri. = 157.92114 e = 0.5621955  
 Node = 114.71236 2000.0 a = 3.7986110 AU  
 Incl. = 10.56138 n = 0.13312721  
 q = 1.6630490 AU P = 7.40 years

$$m_1 = 10.0 + 5 \log(\Delta) + 20.0 \log(r(t-30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .			m	'		°
Jan. 2	11 41.51	+10 45.4	3.013	3.462	+0.33	+1.9	.	109.1
Jan. 12	11 44.02	+11 10.5	2.824	3.408	+0.15	+3.3	.	118.7
Jan. 22	11 44.70	+11 49.9	2.648	3.353	-0.04	+4.7	.	128.8
Feb. 1	11 43.36	+12 43.6	2.489	3.298	-0.25	+6.1	.	139.2
Feb. 11	11 39.96	+13 49.7	2.351	3.242	-0.45	+7.2	.	149.8
Feb. 21	11 34.56	+15 04.9	2.238	3.185	-0.64	+7.8	.	160.0
Mar. 2	11 27.50	+16 23.7	2.154	3.129	-0.78	+7.8	22.0	167.4
Mar. 12	11 19.36	+17 39.2	2.099	3.071	-0.84	+7.1	21.8	165.5
Mar. 22	11 10.94	+18 44.5	2.073	3.013	-0.82	+5.7	21.6	156.4
Apr. 1	11 03.12	+19 33.9	2.075	2.955	-0.72	+3.9	21.5	145.7
Apr. 11	10 56.71	+20 04.0	2.099	2.896	-0.54	+1.9	21.4	135.0
Apr. 21	10 52.32	+20 14.1	2.142	2.837	-0.31	-0.1	21.2	124.6
May 1	10 50.31	+20 04.6	2.199	2.777	-0.06	-1.9	21.1	114.9
May 11	10 50.79	+19 37.6	2.264	2.718	+0.18	-3.6	21.0	105.7
May 21	10 53.70	+18 55.0	2.334	2.658	+0.42	-5.0	20.9	97.2
May 31	10 58.88	+17 58.6	2.405	2.598	+0.64	-6.3	20.8	89.2
June 10	11 06.12	+16 50.1	2.474	2.538	+0.83	-7.5	20.7	81.9
June 20	11 15.21	+15 30.8	2.539	2.478	+1.00	-8.5	20.5	75.0
June 30	11 25.93	+14 01.5	2.598	2.418	+1.16	-9.4	20.4	68.5
July 10	11 38.13	+12 23.3	2.649	2.359	+1.29	-10.3	20.2	62.5
July 20	11 51.64	+10 36.7	2.693	2.300	+1.42	-11.1	20.0	56.8
July 30	12 06.38	+08 42.4	2.729	2.242	+1.54	-11.8	19.9	51.5
Aug. 9	12 22.26	+06 41.2	2.757	2.185	+1.65	-12.5	19.7	46.4
Aug. 19	12 39.23	+04 33.8	2.777	2.129	+1.76	-13.1	19.5	41.7
Aug. 29	12 57.28	+02 21.1	2.788	2.075	+1.86	-13.5	19.2	37.1
Sept. 8	13 16.40	+00 04.2	2.793	2.022	+1.97	-13.9	19.0	32.9
Sept. 18	13 36.62	-02 15.7	2.792	1.972	+2.08	-14.1	18.8	28.8
Sept. 28	13 57.98	-04 37.0	2.785	1.923	+2.20	-14.1	18.6	25.0
Oct. 8	14 20.49	-06 57.8	2.773	1.878	+2.32	-14.0	18.3	21.3
Oct. 18	14 44.23	-09 16.2	2.759	1.836	+2.44	-13.6	18.1	17.8
Oct. 28	15 09.21	-11 29.5	2.741	1.797	+2.57	-12.9	17.9	14.6
Nov. 7	15 35.44	-13 35.0	2.723	1.763	+2.69	-12.0	17.6	11.5
Nov. 17	16 02.92	-15 29.8	2.704	1.733	+2.81	-10.8	17.4	8.6
Nov. 27	16 31.56	-17 10.9	2.686	1.708	+2.92	-9.2	17.2	6.1
Dec. 7	17 01.25	-18 35.3	2.669	1.688	+3.02	-7.4	17.1	4.3
Dec. 17	17 31.79	-19 40.5	2.654	1.674	+3.09	-5.4	16.9	4.1
Dec. 27	18 02.93	-20 24.4	2.641	1.665	+3.14	-3.2	16.8	5.6
Jan. 6	18 34.37	-20 46.1	2.631	1.663	+3.15	-0.9	16.6	7.9
Jan. 16	19 05.80	-20 45.3	2.624	1.667	+3.13	+1.3	16.6	10.6
Jan. 26	19 36.88	-20 23.0	2.619	1.676	+3.08	+3.4	16.5	13.4
Feb. 5	20 07.33	-19 40.9	2.615	1.692	+3.00	+5.2	16.5	16.3
Feb. 15	20 36.91	-18 41.6	2.612	1.713	+2.90	+6.8	16.5	19.4
Feb. 25	21 05.43	-17 28.2	2.610	1.739	+2.79	+8.0	16.6	22.7
Mar. 7	21 32.77	-16 04.0	2.606	1.770	+2.67	+8.9	16.6	26.1
Mar. 17	21 58.89	-14 32.2	2.602	1.805	+2.54	+9.5	16.7	29.6
Mar. 27	22 23.73	-12 56.3	2.594	1.844	+2.41	+9.7	16.9	33.4

## Comet C/2019 B3 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2021 Jan. 19.77837 TT  
 Peri. = 263.89277  
 Node = 358.42274 2000.0  
 Incl. = 66.53671  
 q = 6.8235086 AU  
 e = 1.0028978

$$m1 = -8.0 + 5 \log(\Delta) + 25.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	12 43.88	-56 52.4	7.529	7.273	+0.11	-10.3	17.9	71.3
Jan. 12	12 44.31	-58 35.2	7.403	7.251	-0.05	-10.2	17.9	77.3
Jan. 22	12 43.05	-60 16.5	7.277	7.229	-0.23	-10.0	17.8	83.3
Feb. 1	12 39.80	-61 54.2	7.154	7.208	-0.44	-9.5	17.7	89.2
Feb. 11	12 34.33	-63 25.6	7.035	7.187	-0.68	-8.7	17.7	94.9
Feb. 21	12 26.48	-64 48.0	6.924	7.167	-0.92	-7.6	17.6	100.3
Mar. 2	12 16.24	-65 58.3	6.823	7.147	-1.15	-6.2	17.5	105.2
Mar. 12	12 03.90	-66 53.6	6.735	7.128	-1.33	-4.6	17.5	109.5
Mar. 22	11 50.02	-67 31.9	6.660	7.110	-1.44	-2.8	17.4	113.0
Apr. 1	11 35.46	-67 52.1	6.601	7.092	-1.46	-1.0	17.4	115.7
Apr. 11	11 21.22	-67 54.5	6.559	7.074	-1.37	+0.7	17.3	117.3
Apr. 21	11 08.24	-67 41.2	6.532	7.057	-1.20	+2.1	17.3	117.8
May 1	10 57.29	-67 15.3	6.521	7.041	-0.96	+3.1	17.3	117.3
May 11	10 48.79	-66 40.8	6.526	7.025	-0.71	+3.8	17.2	115.8
May 21	10 42.88	-66 01.4	6.544	7.010	-0.45	+4.0	17.2	113.5
May 31	10 39.52	-65 21.1	6.574	6.995	-0.20	+4.0	17.2	110.6
June 10	10 38.52	-64 43.0	6.615	6.981	+0.02	+3.6	17.2	107.1
June 20	10 39.61	-64 09.7	6.664	6.967	+0.22	+3.0	17.2	103.2
June 30	10 42.56	-63 43.2	6.720	6.954	+0.39	+2.2	17.2	99.1
July 10	10 47.12	-63 25.0	6.781	6.942	+0.54	+1.3	17.2	94.9
July 20	10 53.08	-63 16.0	6.844	6.930	+0.67	+0.4	17.2	90.6
July 30	11 00.26	-63 16.9	6.908	6.919	+0.78	-0.6	17.2	86.4
Aug. 9	11 08.52	-63 27.9	6.971	6.908	+0.88	-1.7	17.2	82.3
Aug. 19	11 17.75	-63 49.1	7.032	6.898	+0.97	-2.7	17.2	78.3
Aug. 29	11 27.87	-64 20.2	7.090	6.889	+1.06	-3.7	17.2	74.5
Sept. 8	11 38.80	-65 01.1	7.142	6.880	+1.14	-4.6	17.2	71.0
Sept. 18	11 50.53	-65 51.1	7.189	6.872	+1.22	-5.5	17.2	67.8
Sept. 28	12 03.06	-66 49.8	7.230	6.865	+1.30	-6.3	17.2	64.9
Oct. 8	12 16.39	-67 56.5	7.263	6.858	+1.38	-7.1	17.2	62.4
Oct. 18	12 30.60	-69 10.5	7.289	6.851	+1.47	-7.8	17.2	60.4
Oct. 28	12 45.78	-70 31.0	7.306	6.846	+1.58	-8.4	17.2	58.9
Nov. 7	13 02.07	-71 57.0	7.316	6.841	+1.70	-8.9	17.2	57.9
Nov. 17	13 19.71	-73 27.7	7.318	6.836	+1.85	-9.3	17.2	57.4
Nov. 27	13 39.03	-75 01.9	7.312	6.833	+2.04	-9.6	17.2	57.5
Dec. 7	14 00.51	-76 38.3	7.299	6.830	+2.30	-9.7	17.2	58.1
Dec. 17	14 24.94	-78 15.6	7.278	6.827	+2.64	-9.7	17.2	59.2
Dec. 27	14 53.48	-79 51.9	7.251	6.825	+3.14	-9.5	17.2	60.8
Jan. 6	15 28.00	-81 24.8	7.218	6.824	+3.89	-9.0	17.1	62.7
Jan. 16	16 11.49	-82 51.0	7.180	6.824	+5.00	-8.1	17.1	65.0
Jan. 26	17 08.19	-84 05.4	7.138	6.824	+6.58	-6.5	17.1	67.6
Feb. 5	18 22.41	-85 00.3	7.092	6.824	+8.42	-4.1	17.1	70.4
Feb. 15	19 52.43	-85 26.7	7.043	6.826	+9.41	-0.8	17.1	73.3
Feb. 25	21 24.22	-85 20.6	6.993	6.828	+8.58	+2.2	17.1	76.4
Mar. 7	22 42.13	-84 48.5	6.942	6.830	+6.78	+4.2	17.1	79.5
Mar. 17	23 42.31	-84 02.2	6.890	6.834	+5.17	+5.0	17.1	82.6
Mar. 27	00 28.50	-83 11.1	6.840	6.837	+4.03	+5.1	17.0	85.7

## Comet 102P/Shoemaker

Epoch = 2020 July 10.0 TT  
 T = 2021 Jan. 22. 71386 TT  
 Peri. = 20. 52555 e = 0. 4576784  
 Node = 339. 37421 2000. 0 a = 3. 8165115 AU  
 Incl. = 25. 87801 n = 0. 13219171  
 q = 2. 0697766 AU P = 7. 46 years

$$m1 = 15.2 + 5 \log(\Delta) + 7.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	m1	Elong.
2020/21	h m	° ' .			m		°
Jan. 2	17 17.64	-43 31.4	4.254	3.413	+1.89 -2.3	.	27.5
Jan. 12	17 36.68	-43 52.3	4.159	3.369	+1.91 -1.9	.	32.2
Jan. 22	17 55.85	-44 09.6	4.051	3.325	+1.92 -1.5	.	37.5
Feb. 1	18 15.02	-44 23.3	3.931	3.280	+1.91 -1.2	22.0	43.0
Feb. 11	18 34.06	-44 33.4	3.800	3.235	+1.89 -0.8	21.9	48.7
Feb. 21	18 52.84	-44 40.5	3.659	3.190	+1.86 -0.6	21.8	54.6
Mar. 2	19 11.19	-44 45.3	3.510	3.145	+1.81 -0.4	21.7	60.6
Mar. 12	19 28.96	-44 48.4	3.355	3.100	+1.74 -0.3	21.5	66.8
Mar. 22	19 46.00	-44 51.2	3.194	3.055	+1.66 -0.3	21.4	73.0
Apr. 1	20 02.11	-44 54.7	3.030	3.009	+1.55 -0.4	21.2	79.3
Apr. 11	20 17.09	-45 00.3	2.865	2.964	+1.43 -0.7	21.0	85.7
Apr. 21	20 30.74	-45 09.5	2.700	2.919	+1.28 -1.2	20.8	92.3
May 1	20 42.74	-45 23.6	2.537	2.874	+1.10 -1.7	20.7	99.1
May 11	20 52.80	-45 43.7	2.378	2.829	+0.89 -2.4	20.5	106.0
May 21	21 00.55	-46 10.5	2.226	2.784	+0.63 -3.0	20.3	113.1
May 31	21 05.50	-46 43.6	2.083	2.740	+0.32 -3.6	20.1	120.5
June 10	21 07.22	-47 21.0	1.951	2.696	-0.02 -3.9	19.9	127.9
June 20	21 05.24	-47 58.9	1.832	2.652	-0.41 -3.6	19.7	135.2
June 30	20 59.29	-48 30.7	1.731	2.609	-0.81 -2.5	19.5	142.1
July 10	20 49.56	-48 47.0	1.649	2.567	-1.16 -0.4	19.4	147.8
July 20	20 36.80	-48 37.8	1.588	2.526	-1.39 +2.7	19.2	151.0
July 30	20 22.53	-47 54.6	1.551	2.485	-1.43 +6.4	19.1	150.4
Aug. 9	20 08.74	-46 34.2	1.537	2.445	-1.28 +10.0	19.0	146.2
Aug. 19	19 57.23	-44 39.8	1.545	2.407	-0.97 +13.0	19.0	139.6
Aug. 29	19 49.29	-42 19.2	1.575	2.370	-0.57 +15.1	19.0	131.8
Sept. 8	19 45.43	-39 42.2	1.622	2.334	-0.16 +16.3	19.0	123.5
Sept. 18	19 45.56	-36 57.1	1.683	2.300	+0.22 +16.7	19.0	115.3
Sept. 28	19 49.32	-34 09.7	1.757	2.268	+0.55 +16.7	19.1	107.4
Oct. 8	19 56.16	-31 23.3	1.838	2.238	+0.83 +16.5	19.1	99.9
Oct. 18	20 05.53	-28 38.7	1.926	2.209	+1.06 +16.4	19.2	92.7
Oct. 28	20 16.99	-25 55.8	2.017	2.183	+1.24 +16.2	19.3	85.9
Nov. 7	20 30.09	-23 13.8	2.109	2.159	+1.39 +16.2	19.3	79.4
Nov. 17	20 44.50	-20 31.5	2.202	2.138	+1.50 +16.3	19.4	73.3
Nov. 27	20 59.95	-17 47.8	2.293	2.120	+1.59 +16.5	19.4	67.4
Dec. 7	21 16.20	-15 01.8	2.382	2.104	+1.66 +16.7	19.5	61.8
Dec. 17	21 33.10	-12 13.0	2.468	2.091	+1.72 +17.1	19.6	56.4
Dec. 27	21 50.50	-09 20.8	2.549	2.081	+1.76 +17.4	19.6	51.3
Jan. 6	22 08.30	-06 25.2	2.627	2.074	+1.80 +17.7	19.7	46.4
Jan. 16	22 26.44	-03 26.5	2.700	2.070	+1.83 +18.0	19.7	41.6
Jan. 26	22 44.88	+00 25.0	2.768	2.070	+1.86 +18.3	19.8	37.1
Feb. 5	23 03.57	+02 38.7	2.831	2.073	+1.88 +18.5	19.8	32.8
Feb. 15	23 22.53	+05 43.8	2.889	2.078	+1.91 +18.6	19.9	28.8
Feb. 25	23 41.75	+08 49.4	2.942	2.087	+1.94 +18.5	19.9	25.0
Mar. 7	00 01.26	+11 54.4	2.990	2.099	+1.97 +18.4	20.0	21.5
Mar. 17	00 21.08	+14 57.7	3.034	2.114	+2.00 +18.2	20.0	18.5
Mar. 27	00 41.24	+17 58.1	3.072	2.131	+2.04 +17.8	20.1	16.1

## Comet P/2007 B1 (Christensen)

Epoch = 2020 July 10.0 TT  
 T = 2021 Jan. 25.57090 TT  
 Peri. = 46.75907 e = 0.5808245  
 Node = 77.66782 2000.0 a = 5.8178553 AU  
 Incl. = 12.37709 n = 0.07023599  
 q = 2.4387024 AU P = 14.03 years

$$m_1 = 11.5 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	01 29.16	+00 28.4	3.565	3.852	-0.40 -3.5	.	5.5/28	99.6
Jan. 12	01 31.60	+00 24.3	3.666	3.802	-0.39 -3.4	.	7.6/41	90.4
Jan. 22	01 35.60	+01 24.3	3.766	3.751	-0.39 -3.5	.	9.6/49	81.6
Feb. 1	01 41.05	+02 30.4	3.863	3.700	-0.38 -3.5	.	11.6/53	73.2
Feb. 11	01 47.82	+03 41.4	3.953	3.649	-0.39 -3.5	.	13.3/57	65.1
Feb. 21	01 55.78	+04 56.0	4.034	3.599	-0.39 -3.5	.	14.9/59	57.4
Mar. 2	02 04.83	+06 13.5	4.104	3.548	-0.40 -3.6	.	16.3/61	49.9
Mar. 12	02 14.85	+07 32.6	4.162	3.498	-0.41 -3.6	.	17.5/63	42.7
Mar. 22	02 25.74	+08 52.6	4.206	3.448	-0.42 -3.6	.	18.6/64	35.8
Apr. 1	02 37.45	+10 12.8	4.236	3.398	-0.44 -3.7	.	19.6/66	29.1
Apr. 11	02 49.89	+11 32.1	4.251	3.349	-0.46 -3.7	.	20.4/67	22.7
Apr. 21	03 03.01	+12 50.1	4.252	3.300	-0.48 -3.7	.	21.2/69	16.4
May 1	03 16.76	+14 06.0	4.237	3.252	-0.50 -3.7	.	21.8/70	10.5
May 11	03 31.08	+15 19.0	4.208	3.204	-0.53 -3.7	.	22.3/71	5.2
May 21	03 45.95	+16 28.7	4.165	3.156	-0.56 -3.7	.	22.8/73	4.0
May 31	04 01.33	+17 34.5	4.109	3.110	-0.59 -3.7	22.0	23.2/74	8.5
June 10	04 17.15	+18 35.8	4.040	3.064	-0.63 -3.6	21.8	23.6/76	13.9
June 20	04 33.39	+19 32.3	3.958	3.018	-0.67 -3.5	21.7	23.9/77	19.4
June 30	04 50.00	+20 23.4	3.866	2.974	-0.71 -3.4	21.5	24.1/78	24.9
July 10	05 06.90	+21 09.0	3.763	2.931	-0.75 -3.3	21.4	24.2/80	30.3
July 20	05 24.06	+21 48.8	3.651	2.889	-0.80 -3.1	21.2	24.3/81	35.8
July 30	05 41.38	+22 22.9	3.530	2.848	-0.85 -2.9	21.1	24.3/83	41.3
Aug. 9	05 58.79	+22 51.3	3.402	2.808	-0.90 -2.7	20.9	24.2/84	46.9
Aug. 19	06 16.20	+23 14.3	3.267	2.770	-0.96 -2.4	20.7	24.0/85	52.5
Aug. 29	06 33.48	+23 32.6	3.127	2.733	-1.02 -2.1	20.5	23.7/86	58.2
Sept. 8	06 50.53	+23 46.8	2.983	2.698	-1.08 -1.7	20.3	23.2/87	64.0
Sept. 18	07 07.21	+23 58.1	2.836	2.664	-1.15 -1.3	20.1	22.5/87	69.9
Sept. 28	07 23.36	+24 07.8	2.687	2.633	-1.22 -0.9	20.0	21.6/87	76.1
Oct. 8	07 38.82	+24 17.7	2.538	2.603	-1.30 -0.4	19.8	20.5/87	82.5
Oct. 18	07 53.37	+24 29.8	2.390	2.576	-1.38 +0.1	19.6	19.1/86	89.1
Oct. 28	08 06.78	+24 46.5	2.245	2.551	-1.48 +0.7	19.4	17.4/83	96.1
Nov. 7	08 18.80	+25 10.3	2.105	2.528	-1.59 +1.3	19.2	15.4/79	103.5
Nov. 17	08 29.13	+25 43.8	1.972	2.507	-1.70 +1.9	19.0	13.1/72	111.4
Nov. 27	08 37.43	+26 29.2	1.848	2.489	-1.84 +2.6	18.8	10.8/61	119.7
Dec. 7	08 43.39	+27 28.1	1.737	2.474	-1.98 +3.2	18.6	9.0/42	128.5
Dec. 17	08 46.72	+28 40.2	1.642	2.461	-2.14 +3.7	18.4	8.2/17	137.8
Dec. 27	08 47.26	+30 03.0	1.565	2.451	-2.29 +4.0	18.3	8.8/352	147.3
Jan. 6	08 45.16	+31 31.0	1.511	2.444	-2.43 +4.1	18.2	9.8/333	156.6
Jan. 16	08 40.83	+32 56.2	1.480	2.440	-2.53 +3.9	18.2	10.4/321	163.7
Jan. 26	08 35.20	+34 09.8	1.475	2.439	-2.59 +3.3	18.2	9.7/311	164.6
Feb. 5	08 29.45	+35 04.2	1.496	2.440	-2.58 +2.7	18.2	7.8/303	158.5
Feb. 15	08 24.80	+35 35.5	1.541	2.445	-2.50 +2.1	18.3	4.8/292	149.6
Feb. 25	08 22.29	+35 43.3	1.608	2.452	-2.39 +1.6	18.4	1.4/252	140.3
Mar. 7	08 22.48	+35 30.0	1.693	2.462	-2.24 +1.5	18.5	3.2/138	131.2
Mar. 17	08 25.54	+34 58.9	1.793	2.475	-2.08 +1.5	18.7	6.9/125	122.6
Mar. 27	08 31.35	+34 13.2	1.906	2.491	-1.93 +1.7	18.8	10.4/120	114.5

## Comet P/2005 XA54 (LONEOS-Hill)

Epoch = 2020 July 10.0 TT  
 T = 2021 Jan. 29.32011 TT  
 Peri. = 15.14587 e = 0.7101608  
 Node = 143.67222 2000.0 a = 6.0514461 AU  
 Incl. = 17.11854 n = 0.06620874  
 q = 1.7539463 AU P = 14.89 years

$$m_1 = 12.5 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	02 32.33	-05 26.6	3.562	4.031	-0.37 -0.9	.	4.3/327	111.7
Jan. 12	02 31.55	-04 45.8	3.638	3.965	-0.36 -0.9	.	4.6/ 3	102.3
Jan. 22	02 32.46	-03 56.0	3.719	3.898	-0.35 -1.0	.	6.1/ 27	93.1
Feb. 1	02 35.02	-02 58.8	3.801	3.831	-0.34 -1.1	.	7.9/ 41	84.3
Feb. 11	02 39.16	-01 56.3	3.880	3.764	-0.34 -1.2	.	9.9/ 49	75.9
Feb. 21	02 44.74	+00 49.9	3.953	3.696	-0.34 -1.3	.	11.7/ 54	67.9
Mar. 2	02 51.68	+00 19.0	4.017	3.628	-0.35 -1.5	.	13.4/ 59	60.2
Mar. 12	02 59.84	+01 29.1	4.070	3.559	-0.36 -1.6	.	14.9/ 62	52.9
Mar. 22	03 09.12	+02 39.2	4.110	3.490	-0.37 -1.7	.	16.3/ 65	45.9
Apr. 1	03 19.42	+03 48.5	4.136	3.421	-0.39 -1.8	.	17.6/ 67	39.2
Apr. 11	03 30.67	+04 55.9	4.148	3.352	-0.41 -1.9	.	18.7/ 69	32.9
Apr. 21	03 42.79	+06 00.8	4.145	3.282	-0.43 -2.0	.	19.8/ 71	27.0
May 1	03 55.73	+07 02.2	4.126	3.211	-0.46 -2.1	.	20.8/ 73	21.7
May 11	04 09.43	+07 59.5	4.093	3.141	-0.49 -2.2	.	21.6/ 75	17.1
May 21	04 23.84	+08 52.0	4.045	3.071	-0.52 -2.3	.	22.5/ 77	13.7
May 31	04 38.93	+09 39.1	3.983	3.000	-0.56 -2.3	.	23.3/ 79	12.4
June 10	04 54.66	+10 19.9	3.908	2.930	-0.60 -2.4	.	24.0/ 81	13.4
June 20	05 11.01	+10 54.1	3.820	2.859	-0.65 -2.4	.	24.7/ 83	16.3
June 30	05 27.93	+11 21.0	3.721	2.789	-0.70 -2.4	22.0	25.4/ 85	20.2
July 10	05 45.40	+11 40.1	3.612	2.719	-0.75 -2.3	21.8	26.1/ 87	24.4
July 20	06 03.38	+11 50.9	3.494	2.649	-0.81 -2.3	21.6	26.8/ 89	28.9
July 30	06 21.84	+11 53.2	3.367	2.580	-0.87 -2.2	21.3	27.5/ 90	33.4
Aug. 9	06 40.74	+11 46.6	3.234	2.512	-0.94 -2.0	21.0	28.1/ 92	37.9
Aug. 19	07 00.07	+11 31.0	3.095	2.445	-1.02 -1.9	20.8	28.8/ 94	42.4
Aug. 29	07 19.76	+11 06.4	2.951	2.379	-1.10 -1.7	20.5	29.4/ 96	46.9
Sept. 8	07 39.80	+10 33.2	2.804	2.314	-1.18 -1.5	20.2	30.1/ 97	51.4
Sept. 18	08 00.16	+09 51.7	2.656	2.250	-1.27 -1.3	19.9	30.7/ 99	55.8
Sept. 28	08 20.79	+09 02.7	2.506	2.189	-1.37 -1.0	19.6	31.2/100	60.2
Oct. 8	08 41.68	+08 07.3	2.357	2.130	-1.48 -0.7	19.3	31.8/101	64.6
Oct. 18	09 02.80	+07 06.9	2.210	2.074	-1.60 -0.4	19.0	32.2/101	69.1
Oct. 28	09 24.11	+06 03.5	2.064	2.021	-1.73 -0.1	18.7	32.6/101	73.5
Nov. 7	09 45.59	+04 59.4	1.923	1.971	-1.87 +0.3	18.3	32.8/101	77.9
Nov. 17	10 07.20	+03 57.6	1.786	1.925	-2.01 +0.7	18.0	32.9/100	82.5
Nov. 27	10 28.86	+03 01.6	1.655	1.884	-2.17 +1.1	17.7	32.8/ 99	87.1
Dec. 7	10 50.48	+02 15.7	1.530	1.847	-2.34 +1.5	17.4	32.5/ 97	91.9
Dec. 17	11 11.93	+01 44.7	1.412	1.816	-2.52 +2.1	17.1	31.9/ 94	96.9
Dec. 27	11 32.96	+01 33.9	1.303	1.791	-2.71 +2.9	16.9	31.0/ 90	102.2
Jan. 6	11 53.29	+01 48.7	1.204	1.772	-2.91 +3.9	16.6	29.9/ 84	107.8
Jan. 16	12 12.52	+02 34.3	1.115	1.760	-3.11 +5.2	16.4	28.3/ 77	113.9
Jan. 26	12 30.12	+03 54.6	1.037	1.754	-3.32 +7.0	16.2	26.7/ 68	120.4
Feb. 5	12 45.55	+05 50.7	0.973	1.755	-3.52 +9.2	16.1	24.9/ 57	127.3
Feb. 15	12 58.20	+08 19.7	0.924	1.763	-3.72 +11.7	16.0	23.1/ 45	134.5
Feb. 25	13 07.61	+11 12.7	0.892	1.778	-3.89 +14.1	16.0	21.2/ 31	141.8
Mar. 7	13 13.58	+14 14.6	0.878	1.799	-4.02 +16.0	16.0	18.9/ 18	148.3
Mar. 17	13 16.27	+17 06.6	0.883	1.826	-4.09 +16.9	16.2	16.0/ 6	153.0
Mar. 27	13 16.40	+19 29.1	0.908	1.859	-4.07 +16.7	16.3	12.1/354	154.4

## Comet P/2009 U4 (McNaught)

Epoch = 2020 July 10.0 TT  
 T = 2021 Feb. 1.14828 TT  
 Peri. = 259.85227 e = 0.6759556  
 Node = 55.36000 2000.0 a = 5.0809071 AU  
 Incl. = 10.08177 n = 0.08605819  
 q = 1.6464395 AU P = 11.45 years

$$m_1 = 14.5 + 5 \log(\Delta) + 7.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° ' "			for T=+1 day			°
Jan. 2	14 09.88	-07 09.0	4.201	3.942	-0.41 +3.3	.	12.2/108	68.1
Jan. 12	14 17.33	-07 44.9	3.992	3.879	-0.45 +3.5	21.9	11.0/107	76.3
Jan. 22	14 23.96	-08 15.0	3.777	3.815	-0.48 +3.7	21.7	9.5/106	84.7
Feb. 1	14 29.58	-08 38.8	3.561	3.751	-0.52 +3.9	21.6	7.7/105	93.4
Feb. 11	14 33.97	-08 55.8	3.347	3.686	-0.57 +4.2	21.4	5.5/104	102.4
Feb. 21	14 36.91	-09 05.8	3.137	3.621	-0.61 +4.5	21.2	3.1/101	111.7
Mar. 2	14 38.17	-09 08.3	2.937	3.555	-0.66 +4.8	21.0	0.4/67	121.4
Mar. 12	14 37.55	-09 03.5	2.751	3.489	-0.71 +5.1	20.8	2.7/289	131.4
Mar. 22	14 34.93	-08 51.6	2.582	3.422	-0.75 +5.5	20.6	5.8/286	142.0
Apr. 1	14 30.29	-08 33.3	2.435	3.355	-0.79 +5.8	20.4	8.7/284	152.8
Apr. 11	14 23.82	-08 10.4	2.313	3.287	-0.82 +6.1	20.2	11.2/283	163.9
Apr. 21	14 15.90	-07 45.0	2.218	3.219	-0.83 +6.4	20.0	12.9/281	173.6
May 1	14 07.15	-07 20.3	2.153	3.150	-0.82 +6.5	19.9	13.5/280	169.9
May 11	13 58.35	-07 00.1	2.117	3.081	-0.80 +6.6	19.8	12.8/277	159.0
May 21	13 50.28	-06 47.7	2.108	3.012	-0.76 +6.6	19.7	11.0/274	147.7
May 31	13 43.66	-06 45.9	2.122	2.942	-0.72 +6.5	19.6	8.3/267	136.6
June 10	13 39.04	-06 56.7	2.155	2.873	-0.68 +6.4	19.6	5.4/250	126.1
June 20	13 36.69	-07 20.7	2.202	2.803	-0.65 +6.3	19.6	3.5/206	116.2
June 30	13 36.76	-07 57.9	2.258	2.733	-0.62 +6.3	19.5	4.9/155	106.9
July 10	13 39.24	-08 47.5	2.319	2.663	-0.60 +6.2	19.5	7.9/135	98.3
July 20	13 44.02	-09 48.3	2.382	2.593	-0.60 +6.2	19.5	11.1/127	90.2
July 30	13 50.99	-10 59.3	2.444	2.523	-0.60 +6.2	19.5	14.2/122	82.7
Aug. 9	14 00.01	-12 18.9	2.501	2.454	-0.61 +6.3	19.4	17.0/120	75.6
Aug. 19	14 10.99	-13 45.7	2.553	2.386	-0.64 +6.3	19.4	19.7/117	69.0
Aug. 29	14 23.84	-15 18.3	2.598	2.318	-0.67 +6.4	19.3	22.2/115	62.8
Sept. 8	14 38.49	-16 55.0	2.636	2.252	-0.72 +6.4	19.2	24.5/114	57.0
Sept. 18	14 54.94	-18 34.1	2.665	2.186	-0.78 +6.4	19.2	26.7/112	51.5
Sept. 28	15 13.19	-20 13.7	2.687	2.123	-0.84 +6.4	19.1	28.8/110	46.3
Oct. 8	15 33.24	-21 51.5	2.701	2.061	-0.92 +6.3	19.0	30.8/108	41.5
Oct. 18	15 55.13	-23 24.9	2.707	2.002	-1.00 +6.0	18.9	32.8/106	36.9
Oct. 28	16 18.87	-24 51.2	2.707	1.945	-1.10 +5.6	18.8	34.6/104	32.6
Nov. 7	16 44.46	-26 07.0	2.702	1.892	-1.20 +5.1	18.7	36.4/101	28.5
Nov. 17	17 11.85	-27 09.0	2.693	1.842	-1.30 +4.4	18.6	38.2/98	24.8
Nov. 27	17 40.92	-27 53.5	2.680	1.797	-1.40 +3.4	18.6	39.8/95	21.3
Dec. 7	18 11.45	-28 17.0	2.666	1.757	-1.49 +2.2	18.5	41.3/92	18.1
Dec. 17	18 43.18	-28 16.6	2.653	1.722	-1.56 +0.9	18.4	42.6/88	15.2
Dec. 27	19 15.71	-27 50.1	2.640	1.694	-1.61 -0.6	18.3	43.7/85	12.6
Jan. 6	19 48.62	-26 56.4	2.630	1.671	-1.64 -2.2	18.3	44.6/81	10.3
Jan. 16	20 21.50	-25 36.0	2.623	1.656	-1.64 -3.8	18.2	45.3/78	8.4
Jan. 26	20 53.93	-23 50.4	2.621	1.648	-1.61 -5.2	18.2	45.6/75	7.0
Feb. 5	21 25.58	-21 42.8	2.623	1.647	-1.56 -6.5	18.2	45.6/72	6.3
Feb. 15	21 56.25	-19 17.0	2.631	1.653	-1.50 -7.6	18.2	45.3/70	6.5
Feb. 25	22 25.77	-16 37.3	2.643	1.667	-1.43 -8.3	18.3	44.7/68	7.6
Mar. 7	22 54.09	-13 48.5	2.660	1.688	-1.35 -8.9	18.3	43.8/67	9.3
Mar. 17	23 21.21	-10 54.9	2.679	1.715	-1.28 -9.1	18.4	42.7/66	11.4
Mar. 27	23 47.15	-08 00.4	2.701	1.749	-1.20 -9.2	18.5	41.4/65	13.8

## Comet 265P/LINEAR

Epoch = 2020 July 10.0 TT  
 T = 2021 Feb. 9.01666 TT  
 Peri. = 33.41062 e = 0.6477404  
 Node = 342.94147 2000.0 a = 4.2546991 AU  
 Incl. = 14.36132 n = 0.11230544  
 q = 1.4987586 AU P = 8.78 years

$$m_1 = 15.0 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	17 02.91	-34 32.8	4.743	3.878	+1.37	-2.4	.	25.4
Jan. 12	17 16.69	-34 56.3	4.616	3.819	+1.38	-2.3	.	32.1
Jan. 22	17 30.47	-35 18.4	4.474	3.759	+1.37	-2.1	.	38.9
Feb. 1	17 44.14	-35 39.2	4.316	3.698	+1.36	-2.0	.	45.9
Feb. 11	17 57.57	-35 59.0	4.145	3.637	+1.33	-1.9	.	53.0
Feb. 21	18 10.65	-36 18.2	3.962	3.575	+1.28	-1.9	.	60.2
Mar. 2	18 23.22	-36 37.4	3.771	3.513	+1.22	-1.9	.	67.5
Mar. 12	18 35.12	-36 57.3	3.573	3.449	+1.15	-2.1	.	74.8
Mar. 22	18 46.17	-37 18.9	3.371	3.385	+1.05	-2.3	.	82.3
Apr. 1	18 56.15	-37 43.2	3.166	3.320	+0.93	-2.6	.	90.0
Apr. 11	19 04.82	-38 11.1	2.963	3.255	+0.79	-3.0	.	97.8
Apr. 21	19 11.90	-38 43.7	2.764	3.189	+0.61	-3.5	.	105.9
May 1	19 17.05	-39 21.5	2.571	3.122	+0.40	-4.1	.	114.2
May 11	19 19.92	-40 04.6	2.388	3.055	+0.15	-4.6	.	122.7
May 21	19 20.11	-40 52.2	2.218	2.986	-0.14	-4.9	.	131.5
May 31	19 17.29	-41 41.7	2.065	2.918	-0.46	-4.9	.	140.3
June 10	19 11.27	-42 28.6	1.932	2.849	-0.78	-4.3	.	148.8
June 20	19 02.13	-43 06.9	1.820	2.779	-1.07	-3.1	.	155.9
June 30	18 50.46	-43 29.1	1.733	2.709	-1.27	-1.1	.	159.5
July 10	18 37.42	-43 28.7	1.672	2.639	-1.32	+1.4	.	157.2
July 20	18 24.51	-43 02.7	1.636	2.568	-1.22	+4.0	.	150.3
July 30	18 13.38	-42 12.4	1.622	2.497	-0.96	+6.2	22.0	141.4
Aug. 9	18 05.36	-41 03.1	1.629	2.426	-0.60	+7.7	21.8	131.9
Aug. 19	18 01.16	-39 41.6	1.652	2.355	-0.19	+8.6	21.7	122.5
Aug. 29	18 01.09	-38 14.0	1.686	2.285	+0.22	+8.9	21.5	113.5
Sept. 8	18 05.01	-36 44.4	1.728	2.215	+0.60	+9.0	21.4	105.1
Sept. 18	18 12.59	-35 14.4	1.774	2.145	+0.95	+9.0	21.2	97.2
Sept. 28	18 23.48	-33 44.0	1.821	2.077	+1.25	+9.1	21.1	89.9
Oct. 8	18 37.23	-32 11.6	1.867	2.010	+1.52	+9.4	20.9	83.2
Oct. 18	18 53.48	-30 34.8	1.910	1.944	+1.75	+10.0	20.7	76.9
Oct. 28	19 11.89	-28 50.9	1.950	1.881	+1.94	+10.9	20.6	71.2
Nov. 7	19 32.10	-26 57.2	1.986	1.820	+2.11	+12.0	20.4	65.8
Nov. 17	19 53.83	-24 51.2	2.017	1.763	+2.25	+13.4	20.2	60.9
Nov. 27	20 16.82	-22 30.9	2.044	1.709	+2.36	+14.9	20.0	56.5
Dec. 7	20 40.83	-19 54.8	2.067	1.660	+2.45	+16.5	19.9	52.4
Dec. 17	21 05.66	-17 02.3	2.088	1.616	+2.52	+18.2	19.7	48.6
Dec. 27	21 31.16	-13 53.4	2.108	1.578	+2.58	+19.8	19.6	45.2
Jan. 6	21 57.19	-10 29.2	2.127	1.547	+2.63	+21.2	19.5	42.2
Jan. 16	22 23.70	-06 51.6	2.148	1.523	+2.68	+22.4	19.4	39.5
Jan. 26	22 50.64	-03 03.5	2.171	1.507	+2.72	+23.3	19.4	37.1
Feb. 5	23 18.00	+00 51.5	2.198	1.499	+2.76	+23.7	19.3	34.9
Feb. 15	23 45.80	+04 49.2	2.230	1.500	+2.81	+23.7	19.4	32.9
Feb. 25	00 14.07	+08 44.9	2.269	1.510	+2.85	+23.3	19.5	31.0
Mar. 7	00 42.82	+12 33.7	2.314	1.527	+2.90	+22.3	19.6	29.3
Mar. 17	01 12.08	+16 10.9	2.365	1.552	+2.95	+20.9	19.7	27.5
Mar. 27	01 41.81	+19 32.3	2.424	1.585	+3.00	+19.1	19.9	25.7

Comet P/2013 A2 (Scotti)

Epoch = 2020 July 10.0 TT  
 T = 2021 Feb. 15.62325 TT  
 Peri. = 134.54810 e = 0.4543247  
 Node = 355.81592 2000.0 a = 4.0129984 AU  
 Incl. = 3.36127 n = 0.12260286  
 q = 2.1897941 AU P = 8.04 years

$$m_1 = 13.6 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot. /PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	00 37.27	+05 59.2	3.417	3.558	-0.43 -3.3	.	7.2/67	90.2
Jan. 12	00 42.43	+06 31.5	3.526	3.515	-0.42 -3.2	.	9.6/67	81.4
Jan. 22	00 49.02	+07 12.6	3.631	3.472	-0.42 -3.1	.	11.8/67	73.0
Feb. 1	00 56.90	+08 01.6	3.729	3.429	-0.42 -3.1	.	13.7/67	64.9
Feb. 11	01 05.92	+08 57.2	3.817	3.386	-0.42 -3.0	.	15.4/68	57.2
Feb. 21	01 15.96	+09 58.3	3.895	3.343	-0.43 -3.0	.	16.9/68	49.8
Mar. 2	01 26.93	+11 03.9	3.959	3.299	-0.44 -3.0	.	18.1/68	42.6
Mar. 12	01 38.73	+12 12.7	4.009	3.255	-0.45 -3.0	.	19.2/69	35.7
Mar. 22	01 51.28	+13 24.0	4.045	3.211	-0.47 -3.0	.	20.2/69	29.1
Apr. 1	02 04.53	+14 36.6	4.066	3.168	-0.49 -2.9	.	21.1/70	22.6
Apr. 11	02 18.42	+15 49.6	4.072	3.124	-0.51 -2.9	.	21.8/70	16.4
Apr. 21	02 32.93	+17 02.2	4.063	3.080	-0.54 -2.8	.	22.4/71	10.4
May 1	02 48.01	+18 13.4	4.040	3.037	-0.56 -2.8	.	23.0/72	4.7
May 11	03 03.62	+19 22.4	4.002	2.993	-0.59 -2.7	.	23.5/73	2.5
May 21	03 19.76	+20 28.4	3.950	2.950	-0.63 -2.6	.	23.9/74	7.5
May 31	03 36.38	+21 30.6	3.886	2.907	-0.66 -2.5	.	24.3/76	13.0
June 10	03 53.45	+22 28.2	3.809	2.864	-0.70 -2.3	.	24.6/77	18.4
June 20	04 10.94	+23 20.5	3.721	2.822	-0.75 -2.1	.	24.9/79	23.9
June 30	04 28.79	+24 06.9	3.623	2.780	-0.79 -1.9	.	25.0/80	29.2
July 10	04 46.96	+24 46.7	3.515	2.739	-0.84 -1.6	.	25.2/82	34.5
July 20	05 05.37	+25 19.7	3.399	2.698	-0.89 -1.2	.	25.3/83	39.9
July 30	05 23.94	+25 45.3	3.275	2.659	-0.94 -0.9	.	25.2/85	45.2
Aug. 9	05 42.58	+26 03.3	3.144	2.620	-1.00 -0.4	.	25.2/87	50.6
Aug. 19	06 01.18	+26 13.9	3.008	2.582	-1.06 +0.1	.	24.9/88	56.0
Aug. 29	06 19.62	+26 17.0	2.867	2.545	-1.12 +0.6	22.0	24.6/90	61.5
Sept. 8	06 37.74	+26 13.2	2.723	2.509	-1.19 +1.2	21.8	24.1/92	67.1
Sept. 18	06 55.40	+26 03.1	2.576	2.474	-1.25 +1.9	21.6	23.4/93	72.8
Sept. 28	07 12.39	+25 47.7	2.429	2.441	-1.33 +2.6	21.3	22.4/94	78.8
Oct. 8	07 28.54	+25 28.3	2.282	2.409	-1.41 +3.4	21.1	21.2/96	85.0
Oct. 18	07 43.59	+25 06.3	2.136	2.379	-1.50 +4.2	20.9	19.6/97	91.4
Oct. 28	07 57.27	+24 43.9	1.993	2.351	-1.61 +5.1	20.7	17.6/97	98.3
Nov. 7	08 09.29	+24 22.9	1.855	2.324	-1.72 +6.0	20.4	15.1/97	105.5
Nov. 17	08 19.30	+24 05.6	1.723	2.300	-1.85 +7.0	20.2	12.1/97	113.2
Nov. 27	08 26.92	+23 54.3	1.601	2.278	-2.00 +8.0	20.0	8.5/95	121.5
Dec. 7	08 31.81	+23 50.5	1.490	2.258	-2.17 +8.9	19.8	4.5/89	130.5
Dec. 17	08 33.66	+23 54.8	1.394	2.240	-2.35 +9.7	19.6	0.9/10	140.2
Dec. 27	08 32.38	+24 06.5	1.316	2.225	-2.52 +10.2	19.4	4.3/290	150.6
Jan. 6	08 28.26	+24 22.6	1.258	2.213	-2.67 +10.5	19.3	7.7/283	161.4
Jan. 16	08 21.96	+24 38.4	1.224	2.203	-2.77 +10.3	19.2	9.7/278	172.0
Jan. 26	08 14.70	+24 48.9	1.216	2.196	-2.80 +9.8	19.1	9.9/273	172.6
Feb. 5	08 07.92	+24 50.1	1.232	2.191	-2.76 +9.1	19.2	8.2/267	162.1
Feb. 15	08 02.93	+24 40.2	1.272	2.190	-2.64 +8.4	19.2	5.1/252	151.2
Feb. 25	08 00.70	+24 19.4	1.332	2.191	-2.48 +7.8	19.3	2.7/195	140.9
Mar. 7	08 01.64	+23 48.9	1.410	2.195	-2.30 +7.4	19.5	5.1/134	131.2
Mar. 17	08 05.75	+23 10.0	1.503	2.202	-2.12 +7.1	19.6	9.1/119	122.3
Mar. 27	08 12.75	+22 23.4	1.607	2.211	-1.95 +7.0	19.8	12.8/113	114.2

## Comet P/2013 EW90 (Tenagra)

Epoch = 2020 July 10.0 TT  
 T = 2021 Feb. 15.86708 TT  
 Peri. = 346.36385 e = 0.1949320  
 Node = 160.29771 2000.0 a = 4.1163119 AU  
 Incl. = 31.78705 n = 0.11801621  
 q = 3.3139110 AU P = 8.35 years

$$m_1 = 14.7 + 5 \log(\Delta) + 5.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot. /PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	05 00.37	-17 58.2	2.965	3.691	-0.73 -1.0	19.9	9.4/303	131.5
Jan. 12	04 55.46	-16 57.6	3.013	3.675	-0.70 -0.9	19.9	9.2/320	125.7
Jan. 22	04 52.12	-15 40.0	3.079	3.660	-0.68 -0.9	20.0	9.2/338	119.1
Feb. 1	04 50.61	-14 09.9	3.160	3.644	-0.65 -1.0	20.0	9.5/356	112.0
Feb. 11	04 50.99	-12 32.0	3.252	3.629	-0.63 -1.0	20.1	10.3/12	104.7
Feb. 21	04 53.24	-10 50.2	3.353	3.615	-0.60 -1.1	20.1	11.3/25	97.3
Mar. 2	04 57.25	-09 07.9	3.459	3.600	-0.58 -1.2	20.2	12.5/36	90.1
Mar. 12	05 02.88	-07 28.0	3.567	3.586	-0.56 -1.3	20.2	13.7/44	83.1
Mar. 22	05 09.95	-05 52.5	3.676	3.572	-0.55 -1.4	20.3	14.9/52	76.2
Apr. 1	05 18.31	-04 22.9	3.782	3.558	-0.54 -1.5	20.3	16.0/57	69.5
Apr. 11	05 27.78	-03 00.4	3.883	3.544	-0.53 -1.6	20.4	16.9/62	63.1
Apr. 21	05 38.20	-01 45.8	3.978	3.531	-0.52 -1.6	20.4	17.8/67	56.9
May 1	05 49.46	+00 39.7	4.065	3.518	-0.51 -1.7	20.5	18.5/71	50.9
May 11	06 01.39	+00 17.5	4.144	3.505	-0.51 -1.7	20.5	19.1/74	45.1
May 21	06 13.90	+01 05.8	4.212	3.493	-0.51 -1.7	20.5	19.7/77	39.6
May 31	06 26.88	+01 44.9	4.270	3.481	-0.51 -1.7	20.6	20.1/80	34.4
June 10	06 40.20	+02 14.9	4.316	3.469	-0.51 -1.7	20.6	20.4/83	29.5
June 20	06 53.80	+02 36.1	4.350	3.457	-0.51 -1.7	20.6	20.6/85	25.2
June 30	07 07.57	+02 48.7	4.370	3.446	-0.51 -1.7	20.6	20.7/88	21.7
July 10	07 21.44	+02 52.9	4.378	3.436	-0.51 -1.7	20.6	20.8/90	19.4
July 20	07 35.32	+02 49.3	4.373	3.425	-0.51 -1.7	20.6	20.8/92	18.7
July 30	07 49.15	+02 38.2	4.353	3.416	-0.52 -1.7	20.6	20.7/94	19.8
Aug. 9	08 02.83	+02 20.4	4.320	3.406	-0.52 -1.7	20.5	20.5/96	22.6
Aug. 19	08 16.32	+01 56.4	4.273	3.397	-0.53 -1.7	20.5	20.2/98	26.4
Aug. 29	08 29.53	+01 27.1	4.213	3.388	-0.54 -1.7	20.5	19.8/99	31.1
Sept. 8	08 42.38	+00 53.2	4.139	3.380	-0.55 -1.8	20.4	19.3/101	36.3
Sept. 18	08 54.80	+00 15.7	4.052	3.372	-0.56 -1.8	20.4	18.6/102	42.0
Sept. 28	09 06.70	+00 24.4	3.952	3.365	-0.57 -1.9	20.3	17.8/103	48.0
Oct. 8	09 17.98	-01 05.7	3.842	3.358	-0.59 -2.0	20.3	16.9/104	54.3
Oct. 18	09 28.54	-01 47.1	3.720	3.352	-0.60 -2.0	20.2	15.7/105	61.0
Oct. 28	09 38.25	-02 27.0	3.590	3.346	-0.63 -2.1	20.1	14.3/106	67.9
Nov. 7	09 46.98	-03 03.5	3.452	3.340	-0.65 -2.3	20.0	12.7/106	75.3
Nov. 17	09 54.58	-03 34.9	3.308	3.335	-0.68 -2.4	19.9	10.7/105	83.0
Nov. 27	10 00.87	-03 58.7	3.162	3.331	-0.71 -2.5	19.8	8.4/103	91.1
Dec. 7	10 05.68	-04 12.5	3.016	3.327	-0.75 -2.6	19.7	5.9/97	99.7
Dec. 17	10 08.83	-04 13.5	2.873	3.324	-0.79 -2.7	19.6	3.3/78	108.8
Dec. 27	10 10.20	-03 58.9	2.738	3.321	-0.83 -2.8	19.5	2.5/12	118.4
Jan. 6	10 09.70	-03 26.0	2.615	3.318	-0.88 -2.8	19.4	4.9/332	128.6
Jan. 16	10 07.35	-02 33.0	2.509	3.316	-0.92 -2.9	19.3	8.1/323	139.2
Jan. 26	10 03.36	-01 19.2	2.425	3.315	-0.95 -2.9	19.2	11.1/320	150.1
Feb. 5	09 58.10	+00 13.7	2.367	3.314	-0.98 -2.9	19.2	13.4/320	160.9
Feb. 15	09 52.11	+02 01.9	2.338	3.314	-0.99 -2.9	19.1	14.7/321	169.3
Feb. 25	09 46.06	+03 59.3	2.341	3.314	-0.99 -2.9	19.1	14.8/324	167.4
Mar. 7	09 40.64	+05 58.6	2.375	3.315	-0.98 -3.0	19.2	13.8/328	157.8
Mar. 17	09 36.43	+07 53.0	2.437	3.316	-0.95 -3.0	19.2	12.0/336	147.0
Mar. 27	09 33.88	+09 36.9	2.525	3.318	-0.91 -3.0	19.3	9.9/347	136.2

## Comet 17P/Holmes

Epoch = 2020 July 10.0 TT  
 T = 2021 Feb. 19.88511 TT  
 Peri. = 24.49542 e = 0.4282513  
 Node = 326.62925 2000.0 a = 3.6383194 AU  
 Incl. = 19.02639 n = 0.14202109  
 q = 2.0802044 AU P = 6.94 years

$$m1 = 8.2 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	16 26.59	-37 15.6	4.236	3.456	+1.61	-4.3	19.4	33.2
Jan. 12	16 42.68	-37 57.9	4.118	3.416	+1.61	-4.1	19.3	39.4
Jan. 22	16 58.74	-38 37.9	3.987	3.375	+1.60	-3.9	19.1	45.8
Feb. 1	17 14.64	-39 15.5	3.844	3.334	+1.58	-3.6	19.0	52.3
Feb. 11	17 30.23	-39 50.9	3.692	3.292	+1.54	-3.4	18.8	58.9
Feb. 21	17 45.36	-40 24.6	3.531	3.251	+1.48	-3.3	18.6	65.6
Mar. 2	17 59.84	-40 57.3	3.364	3.209	+1.40	-3.2	18.4	72.5
Mar. 12	18 13.45	-41 29.6	3.193	3.166	+1.31	-3.2	18.2	79.5
Mar. 22	18 25.99	-42 02.5	3.020	3.124	+1.18	-3.4	18.0	86.7
Apr. 1	18 37.15	-42 36.8	2.846	3.081	+1.03	-3.5	17.8	94.0
Apr. 11	18 46.65	-43 13.3	2.676	3.039	+0.85	-3.8	17.6	101.5
Apr. 21	18 54.13	-43 52.6	2.510	2.996	+0.62	-4.1	17.3	109.3
May 1	18 59.19	-44 34.4	2.353	2.953	+0.36	-4.3	17.1	117.2
May 11	19 01.44	-45 17.7	2.206	2.911	+0.06	-4.3	16.9	125.4
May 21	19 00.54	-45 59.9	2.073	2.868	-0.28	-4.0	16.6	133.7
May 31	18 56.25	-46 36.5	1.957	2.825	-0.61	-3.1	16.4	141.9
June 10	18 48.69	-47 01.4	1.861	2.783	-0.92	-1.6	16.2	149.3
June 20	18 38.42	-47 07.6	1.787	2.741	-1.14	+0.7	16.0	154.8
June 30	18 26.55	-46 49.1	1.737	2.699	-1.22	+3.3	15.9	156.3
July 10	18 14.62	-46 03.4	1.712	2.658	-1.13	+6.0	15.7	153.0
July 20	18 04.19	-44 52.3	1.710	2.617	-0.91	+8.3	15.6	146.3
July 30	17 56.53	-43 21.5	1.731	2.577	-0.58	+9.9	15.6	138.1
Aug. 9	17 52.38	-41 38.7	1.770	2.537	-0.21	+10.6	15.5	129.4
Aug. 19	17 51.93	-39 51.0	1.825	2.499	+0.16	+10.8	15.5	120.7
Aug. 29	17 55.05	-38 03.3	1.892	2.461	+0.50	+10.6	15.5	112.4
Sept. 8	18 01.38	-36 18.3	1.968	2.424	+0.79	+10.3	15.4	104.4
Sept. 18	18 10.51	-34 36.9	2.051	2.388	+1.05	+10.0	15.4	96.8
Sept. 28	18 22.05	-32 58.4	2.136	2.354	+1.27	+9.7	15.4	89.6
Oct. 8	18 35.57	-31 21.4	2.223	2.321	+1.45	+9.7	15.4	82.8
Oct. 18	18 50.74	-29 44.0	2.309	2.289	+1.60	+9.8	15.4	76.4
Oct. 28	19 07.26	-28 04.4	2.393	2.259	+1.71	+10.1	15.4	70.2
Nov. 7	19 24.84	-26 21.0	2.475	2.231	+1.81	+10.6	15.4	64.3
Nov. 17	19 43.26	-24 32.2	2.552	2.205	+1.88	+11.2	15.4	58.6
Nov. 27	20 02.32	-22 36.9	2.625	2.181	+1.93	+11.9	15.4	53.1
Dec. 7	20 21.84	-20 34.2	2.693	2.160	+1.97	+12.7	15.4	47.9
Dec. 17	20 41.68	-18 23.8	2.756	2.140	+2.00	+13.5	15.4	42.8
Dec. 27	21 01.72	-16 05.5	2.813	2.124	+2.01	+14.3	15.4	37.8
Jan. 6	21 21.86	-13 39.5	2.865	2.109	+2.02	+15.0	15.3	33.0
Jan. 16	21 42.06	-11 06.2	2.911	2.098	+2.02	+15.7	15.3	28.4
Jan. 26	22 02.25	-08 26.2	2.951	2.089	+2.02	+16.3	15.3	23.9
Feb. 5	22 22.41	-05 40.5	2.985	2.083	+2.01	+16.8	15.4	19.6
Feb. 15	22 42.55	-02 50.0	3.015	2.081	+2.01	+17.3	15.4	15.6
Feb. 25	23 02.65	+00 04.1	3.039	2.081	+2.01	+17.6	15.4	12.0
Mar. 7	23 22.73	+03 00.5	3.058	2.084	+2.01	+17.7	15.4	9.0
Mar. 17	23 42.82	+05 58.1	3.072	2.089	+2.01	+17.8	15.4	7.5
Mar. 27	00 02.95	+08 55.4	3.081	2.098	+2.01	+17.7	15.5	8.1

## Comet 246P/NEAT

Epoch = 2020 July 10.0 TT  
 T = 2021 Feb. 22.69499 TT  
 Peri. = 176.26848 e = 0.2867761  
 Node = 78.74784 2000.0 a = 4.0156697 AU  
 Incl. = 15.98723 n = 0.12248054  
 q = 2.8640716 AU P = 8.05 years

$$m_1 = 6.4 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	13 01.44	+11 36.2	3.391	3.551	+0.69	+0.1	15.9	91.2
Jan. 12	13 07.74	+11 42.6	3.226	3.525	+0.56	+1.3	15.8	99.6
Jan. 22	13 12.61	+12 00.7	3.066	3.500	+0.40	+2.5	15.6	108.2
Feb. 1	13 15.85	+12 30.6	2.914	3.475	+0.23	+3.6	15.5	117.1
Feb. 11	13 17.25	+13 10.9	2.774	3.450	+0.03	+4.5	15.3	126.2
Feb. 21	13 16.70	+13 59.8	2.650	3.425	-0.16	+5.2	15.2	135.4
Mar. 2	13 14.17	+14 53.8	2.546	3.400	-0.36	+5.5	15.1	144.4
Mar. 12	13 09.79	+15 48.0	2.464	3.376	-0.53	+5.2	15.0	152.3
Mar. 22	13 03.90	+16 36.9	2.409	3.352	-0.65	+4.4	14.9	157.6
Apr. 1	12 57.02	+17 14.9	2.380	3.328	-0.72	+3.0	14.8	157.9
Apr. 11	12 49.83	+17 36.9	2.379	3.304	-0.71	+1.2	14.8	153.1
Apr. 21	12 43.03	+17 40.2	2.403	3.281	-0.63	-0.8	14.8	145.5
May 1	12 37.30	+17 23.5	2.450	3.258	-0.49	-2.7	14.8	136.7
May 11	12 33.11	+16 47.8	2.517	3.235	-0.32	-4.5	14.8	127.7
May 21	12 30.76	+15 55.3	2.600	3.213	-0.13	-6.1	14.8	118.8
May 31	12 30.36	+14 48.5	2.695	3.191	+0.07	-7.4	14.9	110.3
June 10	12 31.88	+13 30.1	2.798	3.169	+0.25	-8.4	14.9	102.1
June 20	12 35.20	+12 02.5	2.906	3.149	+0.43	-9.2	14.9	94.2
June 30	12 40.19	+10 27.7	3.017	3.128	+0.58	-9.8	15.0	86.7
July 10	12 46.65	+08 47.5	3.128	3.108	+0.72	-10.3	15.0	79.5
July 20	12 54.42	+07 03.1	3.236	3.089	+0.84	-10.6	15.1	72.6
July 30	13 03.36	+05 15.8	3.340	3.070	+0.95	-10.9	15.1	66.0
Aug. 9	13 13.32	+03 26.5	3.438	3.052	+1.05	-11.0	15.1	59.5
Aug. 19	13 24.20	+01 36.1	3.530	3.035	+1.13	-11.1	15.2	53.3
Aug. 29	13 35.90	+00 14.6	3.613	3.018	+1.21	-11.1	15.2	47.1
Sept. 8	13 48.34	-02 04.8	3.687	3.002	+1.28	-11.0	15.2	41.1
Sept. 18	14 01.46	-03 53.8	3.752	2.987	+1.35	-10.8	15.2	35.2
Sept. 28	14 15.19	-05 40.9	3.805	2.972	+1.41	-10.6	15.2	29.3
Oct. 8	14 29.49	-07 25.3	3.848	2.959	+1.46	-10.3	15.2	23.6
Oct. 18	14 44.31	-09 06.5	3.878	2.946	+1.51	-9.9	15.2	17.9
Oct. 28	14 59.61	-10 43.7	3.897	2.934	+1.55	-9.5	15.2	12.4
Nov. 7	15 15.33	-12 16.2	3.902	2.923	+1.59	-9.0	15.2	7.5
Nov. 17	15 31.43	-13 43.5	3.896	2.913	+1.63	-8.4	15.2	5.3
Nov. 27	15 47.84	-15 05.1	3.876	2.903	+1.66	-7.8	15.1	8.3
Dec. 7	16 04.50	-16 20.4	3.844	2.895	+1.68	-7.2	15.1	13.5
Dec. 17	16 21.34	-17 29.2	3.799	2.888	+1.69	-6.5	15.1	19.1
Dec. 27	16 38.26	-18 31.3	3.742	2.881	+1.69	-5.8	15.0	25.0
Jan. 6	16 55.17	-19 26.7	3.673	2.876	+1.69	-5.2	15.0	31.0
Jan. 16	17 11.97	-20 15.5	3.594	2.871	+1.67	-4.5	14.9	37.1
Jan. 26	17 28.52	-20 58.1	3.503	2.868	+1.64	-3.9	14.8	43.4
Feb. 5	17 44.71	-21 35.1	3.403	2.866	+1.59	-3.4	14.8	49.7
Feb. 15	18 00.41	-22 07.3	3.295	2.864	+1.54	-3.0	14.7	56.1
Feb. 25	18 15.44	-22 35.8	3.179	2.864	+1.46	-2.7	14.6	62.8
Mar. 7	18 29.65	-23 01.9	3.057	2.865	+1.37	-2.5	14.5	69.5
Mar. 17	18 42.88	-23 27.2	2.931	2.867	+1.26	-2.5	14.5	76.5
Mar. 27	18 54.92	-23 53.3	2.802	2.869	+1.13	-2.7	14.4	83.7

## Comet C/2019 T3 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2021 Mar. 2.49092 TT  
 Peri. = 112.25836  
 Node = 139.51804 2000.0  
 Incl. = 121.86263  
 q = 5.9465488 AU  
 e = 0.9990760

$$m1 = -2.9 + 5 \log(\Delta) + 20.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	01 21.57	+79 55.6	6.184	6.647	-2.23	-12.1	17.5	114.1
Jan. 12	01 04.91	+77 53.7	6.216	6.617	-1.09	-12.2	17.5	110.0
Jan. 22	00 57.31	+75 54.4	6.267	6.587	-0.42	-11.6	17.5	104.8
Feb. 1	00 55.18	+74 03.1	6.331	6.558	0.00	-10.6	17.4	99.0
Feb. 11	00 56.46	+72 23.0	6.406	6.529	+0.26	-9.3	17.4	92.8
Feb. 21	00 59.95	+70 55.8	6.486	6.501	+0.44	-8.0	17.4	86.5
Mar. 2	01 04.89	+69 42.3	6.568	6.473	+0.55	-6.6	17.4	80.2
Mar. 12	01 10.77	+68 42.7	6.647	6.447	+0.62	-5.2	17.4	74.1
Mar. 22	01 17.23	+67 56.7	6.719	6.420	+0.67	-3.9	17.4	68.4
Apr. 1	01 24.03	+67 23.8	6.781	6.394	+0.69	-2.6	17.4	63.3
Apr. 11	01 30.92	+67 03.3	6.831	6.369	+0.69	-1.4	17.4	58.8
Apr. 21	01 37.72	+66 54.5	6.865	6.345	+0.67	-0.3	17.3	55.1
May 1	01 44.26	+66 56.7	6.883	6.321	+0.63	+0.8	17.3	52.5
May 11	01 50.32	+67 08.9	6.884	6.298	+0.57	+1.8	17.3	51.0
May 21	01 55.71	+67 30.6	6.866	6.275	+0.49	+2.7	17.2	50.8
May 31	02 00.17	+68 00.9	6.831	6.253	+0.38	+3.5	17.2	51.7
June 10	02 03.40	+68 39.0	6.777	6.232	+0.24	+4.2	17.1	53.8
June 20	02 05.03	+69 24.1	6.707	6.212	+0.06	+4.9	17.1	56.9
June 30	02 04.56	+70 15.0	6.623	6.192	-0.18	+5.3	17.0	60.9
July 10	02 01.40	+71 10.1	6.525	6.173	-0.49	+5.7	17.0	65.5
July 20	01 54.80	+72 07.0	6.416	6.154	-0.88	+5.7	16.9	70.6
July 30	01 43.91	+73 02.6	6.300	6.137	-1.36	+5.3	16.9	76.1
Aug. 9	01 27.90	+73 52.1	6.180	6.120	-1.91	+4.4	16.8	81.9
Aug. 19	01 06.26	+74 29.2	6.059	6.104	-2.47	+2.7	16.7	87.8
Aug. 29	00 39.37	+74 46.0	5.941	6.088	-2.92	+0.3	16.7	93.6
Sept. 8	00 09.01	+74 35.1	5.831	6.074	-3.12	-2.9	16.6	99.1
Sept. 18	23 38.16	+73 51.0	5.733	6.060	-2.98	-6.3	16.5	104.3
Sept. 28	23 10.05	+72 32.7	5.651	6.047	-2.56	-9.6	16.5	108.7
Oct. 8	22 46.84	+70 43.6	5.588	6.034	-2.01	-12.4	16.4	112.0
Oct. 18	22 29.25	+68 29.9	5.547	6.023	-1.46	-14.4	16.4	114.1
Oct. 28	22 16.97	+65 59.1	5.531	6.012	-0.96	-15.7	16.4	114.6
Nov. 7	22 09.21	+63 18.7	5.539	6.002	-0.56	-16.3	16.4	113.4
Nov. 17	22 05.08	+60 35.4	5.571	5.993	-0.24	-16.3	16.4	110.8
Nov. 27	22 03.80	+57 55.0	5.626	5.985	0.00	-15.7	16.4	106.7
Dec. 7	22 04.71	+55 22.2	5.700	5.977	+0.19	-14.7	16.4	101.6
Dec. 17	22 07.28	+53 00.5	5.790	5.970	+0.33	-13.5	16.4	95.8
Dec. 27	22 11.11	+50 52.4	5.892	5.964	+0.44	-12.0	16.5	89.5
Jan. 6	22 15.85	+48 59.4	6.001	5.959	+0.51	-10.5	16.5	82.9
Jan. 16	22 21.25	+47 22.0	6.112	5.955	+0.57	-8.9	16.5	76.2
Jan. 26	22 27.08	+46 00.3	6.221	5.952	+0.60	-7.3	16.6	69.7
Feb. 5	22 33.17	+44 53.7	6.324	5.949	+0.62	-5.9	16.6	63.5
Feb. 15	22 39.37	+44 01.4	6.416	5.948	+0.62	-4.5	16.6	57.7
Feb. 25	22 45.52	+43 22.4	6.495	5.947	+0.61	-3.2	16.6	52.7
Mar. 7	22 51.52	+42 55.5	6.558	5.947	+0.59	-2.1	16.7	48.5
Mar. 17	22 57.24	+42 39.5	6.602	5.947	+0.55	-1.0	16.7	45.5
Mar. 27	23 02.57	+42 33.2	6.627	5.949	+0.51	-0.2	16.7	43.9

## Comet P/2016 G1 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2021 Mar. 22.48802 TT  
 Peri. = 111.28556 e = 0.2110192  
 Node = 204.06035 2000.0 a = 2.5825792 AU  
 Incl. = 10.96951 n = 0.23747812  
 q = 2.0376054 AU P = 4.15 years

$$m_1 = 13.0 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	13 39.99	-13 24.7	2.958	2.827	-0.76 +1.9	.	17.0/107	72.7
Jan. 12	13 50.71	-14 10.0	2.802	2.808	-0.81 +1.9	22.0	15.3/105	80.2
Jan. 22	14 00.35	-14 46.0	2.644	2.789	-0.86 +1.9	21.8	13.3/103	88.0
Feb. 1	14 08.66	-15 11.5	2.485	2.769	-0.93 +2.0	21.6	11.0/100	96.1
Feb. 11	14 15.35	-15 24.8	2.328	2.749	-1.00 +2.0	21.4	8.2/94	104.7
Feb. 21	14 20.12	-15 24.6	2.177	2.729	-1.09 +2.2	21.2	5.3/81	113.7
Mar. 2	14 22.67	-15 09.0	2.035	2.708	-1.17 +2.4	21.0	3.0/36	123.2
Mar. 12	14 22.78	-14 36.8	1.905	2.687	-1.26 +2.6	20.8	4.6/336	133.4
Mar. 22	14 20.34	-13 47.3	1.793	2.665	-1.35 +2.9	20.7	8.1/317	144.2
Apr. 1	14 15.47	-12 40.8	1.701	2.644	-1.42 +3.2	20.5	11.6/310	155.6
Apr. 11	14 08.60	-11 20.1	1.635	2.622	-1.48 +3.4	20.3	14.3/307	167.3
Apr. 21	14 00.48	-09 50.4	1.595	2.599	-1.50 +3.6	20.2	15.5/306	177.7
May 1	13 52.08	-08 19.0	1.583	2.577	-1.48 +3.5	20.2	15.0/306	167.8
May 11	13 44.46	-06 54.4	1.598	2.554	-1.44 +3.3	20.1	12.8/307	156.0
May 21	13 38.48	-05 43.5	1.638	2.531	-1.37 +3.0	20.1	9.4/310	144.6
May 31	13 34.75	-04 51.0	1.697	2.508	-1.30 +2.7	20.1	5.4/320	133.8
June 10	13 33.59	-04 19.0	1.773	2.485	-1.22 +2.4	20.2	2.1/10	123.8
June 20	13 34.99	-04 06.9	1.860	2.462	-1.15 +2.1	20.2	4.2/88	114.5
June 30	13 38.88	-04 13.3	1.955	2.439	-1.09 +1.9	20.3	7.9/101	106.0
July 10	13 45.02	-04 35.4	2.054	2.416	-1.03 +1.7	20.3	11.3/105	98.0
July 20	13 53.20	-05 10.8	2.155	2.393	-0.99 +1.5	20.4	14.4/107	90.7
July 30	14 03.19	-05 56.8	2.255	2.370	-0.96 +1.4	20.4	17.1/107	83.8
Aug. 9	14 14.80	-06 50.9	2.352	2.348	-0.93 +1.3	20.4	19.4/107	77.3
Aug. 19	14 27.85	-07 50.8	2.446	2.325	-0.91 +1.3	20.4	21.4/107	71.1
Aug. 29	14 42.23	-08 54.5	2.535	2.303	-0.90 +1.2	20.5	23.2/106	65.3
Sept. 8	14 57.81	-09 59.7	2.619	2.282	-0.90 +1.1	20.5	24.8/105	59.7
Sept. 18	15 14.50	-11 04.6	2.696	2.261	-0.90 +1.0	20.5	26.2/104	54.2
Sept. 28	15 32.24	-12 07.5	2.766	2.240	-0.90 +0.9	20.5	27.5/103	49.0
Oct. 8	15 50.93	-13 06.4	2.828	2.220	-0.91 +0.7	20.5	28.6/101	44.0
Oct. 18	16 10.52	-13 59.8	2.884	2.201	-0.92 +0.5	20.4	29.6/100	39.0
Oct. 28	16 30.94	-14 45.9	2.931	2.182	-0.93 +0.3	20.4	30.5/98	34.2
Nov. 7	16 52.09	-15 23.3	2.971	2.165	-0.94 0.0	20.4	31.3/96	29.6
Nov. 17	17 13.92	-15 50.6	3.003	2.148	-0.95 -0.3	20.4	32.0/94	25.0
Nov. 27	17 36.31	-16 06.5	3.027	2.132	-0.97 -0.6	20.3	32.7/92	20.6
Dec. 7	17 59.15	-16 10.1	3.044	2.117	-0.98 -0.9	20.3	33.2/89	16.4
Dec. 17	18 22.34	-16 00.7	3.053	2.103	-0.99 -1.3	20.3	33.7/87	12.5
Dec. 27	18 45.75	-15 37.9	3.055	2.091	-0.99 -1.6	20.2	34.0/85	9.3
Jan. 6	19 09.25	-15 01.6	3.050	2.079	-1.00 -2.0	20.2	34.4/83	7.5
Jan. 16	19 32.74	-14 11.9	3.039	2.069	-1.00 -2.4	20.2	34.6/81	8.1
Jan. 26	19 56.11	-13 09.5	3.020	2.060	-1.01 -2.7	20.1	34.7/79	10.6
Feb. 5	20 19.26	-11 55.2	2.996	2.053	-1.01 -3.0	20.1	34.7/77	14.0
Feb. 15	20 42.14	-10 30.0	2.966	2.047	-1.01 -3.3	20.0	34.7/75	17.7
Feb. 25	21 04.66	-08 55.3	2.930	2.042	-1.01 -3.5	20.0	34.5/73	21.6
Mar. 7	21 26.79	-07 12.5	2.888	2.039	-1.01 -3.7	19.9	34.3/72	25.6
Mar. 17	21 48.51	-05 23.1	2.842	2.038	-1.01 -3.8	19.9	34.0/71	29.7
Mar. 27	22 09.78	-03 28.8	2.790	2.038	-1.02 -3.9	19.9	33.6/70	33.8

## Comet 10P/Tempel

Epoch = 2020 July 10.0 TT  
 T = 2021 Mar. 24.29996 TT  
 Peri. = 195.51457 e = 0.5385025  
 Node = 117.81027 2000.0 a = 3.0607139 AU  
 Incl. = 12.03976 n = 0.18406447  
 q = 1.4125118 AU P = 5.35 years

H = 13.6 , G = 0.15 (r > 2.0 AU)  
 m1 = 9.4 + 5 log(Delta) + 22.5 log(r) (r < 2.0 AU & pre -T)  
 m1 = 10.2 + 5 log(Delta) + 17.5 log(r) (r < 2.0 AU & post-T)

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion	Mag.	Elong.
2020/21	h m	° '			m		°
Jan. 2	12 52.36	+05 46.2	3.503	3.655	+0.54	+0.5	20.0
Jan. 12	12 57.17	+05 56.3	3.311	3.613	+0.41	+1.7	19.8
Jan. 22	13 00.56	+06 19.2	3.123	3.570	+0.25	+3.0	19.7
Jan. 1	13 02.27	+06 55.6	2.943	3.526	+0.07	+4.4	19.5
Feb. 11	13 02.12	+07 45.4	2.776	3.482	-0.12	+5.7	19.3
Feb. 21	12 59.97	+08 47.6	2.627	3.436	-0.33	+6.8	19.1
Mar. 2	12 55.78	+09 59.6	2.500	3.390	-0.53	+7.6	18.8
Mar. 12	12 49.70	+11 17.1	2.398	3.343	-0.70	+7.8	18.6
Mar. 22	12 42.10	+12 34.5	2.325	3.294	-0.82	+7.5	18.4
Apr. 1	12 33.54	+13 45.0	2.282	3.245	-0.88	+6.4	18.4
Apr. 11	12 24.82	+14 42.5	2.268	3.195	-0.85	+4.8	18.5
Apr. 21	12 16.70	+15 22.5	2.280	3.144	-0.75	+2.9	18.6
May 1	12 09.90	+15 42.5	2.316	3.092	-0.58	+0.9	18.7
May 11	12 04.95	+15 42.3	2.369	3.039	-0.38	-1.1	18.8
May 21	12 02.13	+15 23.3	2.437	2.986	-0.16	-2.9	18.8
May 31	12 01.56	+14 47.7	2.513	2.931	+0.07	-4.4	18.9
June 10	12 03.18	+13 57.7	2.593	2.875	+0.28	-5.7	19.0
June 20	12 06.84	+12 55.6	2.673	2.819	+0.47	-6.8	19.0
June 30	12 12.40	+11 43.1	2.751	2.762	+0.65	-7.7	19.0
July 10	12 19.65	+10 22.0	2.824	2.704	+0.81	-8.5	19.0
July 20	12 28.44	+08 53.4	2.890	2.645	+0.96	-9.2	19.0
July 30	12 38.63	+07 18.3	2.947	2.585	+1.09	-9.8	19.0
Aug. 9	12 50.09	+05 37.8	2.995	2.525	+1.21	-10.3	19.0
Aug. 19	13 02.74	+03 52.5	3.031	2.464	+1.33	-10.8	18.9
Aug. 29	13 16.53	+02 03.3	3.057	2.402	+1.44	-11.1	18.8
Sept. 8	13 31.41	+00 10.9	3.071	2.340	+1.55	-11.4	18.7
Sept. 18	13 47.39	-01 43.7	3.074	2.277	+1.66	-11.6	18.6
Sept. 28	14 04.46	-03 39.8	3.066	2.215	+1.77	-11.6	18.5
Oct. 8	14 22.66	-05 36.3	3.047	2.152	+1.88	-11.6	18.3
Oct. 18	14 42.04	-07 32.0	3.018	2.089	+2.00	-11.5	18.2
Oct. 28	15 02.64	-09 25.6	2.980	2.027	+2.13	-11.2	18.0
Nov. 7	15 24.53	-11 15.5	2.933	1.965	+2.26	-10.7	18.3
Nov. 17	15 47.79	-13 00.0	2.880	1.904	+2.40	-10.1	18.0
Nov. 27	16 12.47	-14 36.9	2.821	1.844	+2.55	-9.2	17.6
Dec. 7	16 38.62	-16 03.9	2.757	1.785	+2.70	-8.1	17.3
Dec. 17	17 06.27	-17 18.6	2.690	1.729	+2.85	-6.7	16.9
Dec. 27	17 35.39	-18 18.3	2.622	1.675	+2.99	-5.0	16.5
Jan. 6	18 05.92	-19 00.2	2.555	1.624	+3.13	-3.1	16.2
Jan. 16	18 37.72	-19 22.0	2.489	1.577	+3.24	-1.0	15.8
Jan. 26	19 10.60	-19 21.4	2.427	1.535	+3.34	+1.3	15.5
Feb. 5	19 44.28	-18 57.4	2.369	1.498	+3.40	+3.7	15.2
Feb. 15	20 18.49	-18 09.3	2.317	1.466	+3.44	+6.1	15.0
Feb. 25	20 52.88	-16 58.2	2.272	1.442	+3.44	+8.3	14.8
Mar. 7	21 27.13	-15 25.8	2.234	1.424	+3.41	+10.3	14.6
Mar. 17	22 00.99	-13 35.4	2.203	1.415	+3.35	+11.9	14.5
Mar. 27	22 34.18	-11 31.0	2.179	1.413	+3.28	+13.0	14.5

## Comet C/2016 Q2 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2021 May 11.57640 TT  
 Peri. = 84.50363  
 Node = 322.29846 2000.0  
 Incl. = 109.38903  
 q = 7.0822467 AU  
 e = 0.9996954

$$m1 = 4.9 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	19 26.61	+20 21.0	8.434	7.762	+0.33	+2.5	18.4	44.4
Jan. 12	19 29.97	+20 49.3	8.432	7.737	+0.34	+3.3	18.4	42.6
Jan. 22	19 33.37	+21 25.8	8.409	7.712	+0.34	+4.1	18.4	42.5
Feb. 1	19 36.68	+22 10.6	8.365	7.687	+0.32	+4.9	18.4	44.0
Feb. 11	19 39.78	+23 03.4	8.303	7.662	+0.29	+5.7	18.3	46.9
Feb. 21	19 42.55	+24 04.1	8.223	7.638	+0.25	+6.5	18.3	51.0
Mar. 2	19 44.86	+25 12.1	8.126	7.615	+0.20	+7.2	18.3	55.9
Mar. 12	19 46.58	+26 26.9	8.017	7.592	+0.14	+7.8	18.2	61.4
Mar. 22	19 47.59	+27 47.9	7.897	7.569	+0.06	+8.4	18.2	67.3
Apr. 1	19 47.75	+29 13.8	7.770	7.547	-0.04	+8.8	18.1	73.5
Apr. 11	19 46.93	+30 43.6	7.639	7.525	-0.14	+9.1	18.1	79.7
Apr. 21	19 45.03	+32 15.7	7.508	7.504	-0.26	+9.3	18.0	85.9
May 1	19 41.92	+33 48.0	7.380	7.483	-0.38	+9.2	18.0	92.0
May 11	19 37.53	+35 18.5	7.259	7.463	-0.51	+8.8	17.9	97.7
May 21	19 31.83	+36 44.6	7.149	7.443	-0.64	+8.3	17.9	103.0
May 31	19 24.83	+38 03.5	7.053	7.423	-0.77	+7.4	17.8	107.6
June 10	19 16.64	+39 12.4	6.973	7.405	-0.88	+6.3	17.8	111.4
June 20	19 07.44	+40 09.0	6.911	7.386	-0.97	+4.9	17.8	114.2
June 30	18 57.52	+40 51.0	6.869	7.368	-1.02	+3.3	17.8	115.8
July 10	18 47.23	+41 17.3	6.847	7.351	-1.03	+1.7	17.7	116.1
July 20	18 36.96	+41 27.6	6.845	7.334	-1.01	+0.2	17.7	115.1
July 30	18 27.11	+41 22.3	6.862	7.318	-0.95	-1.3	17.7	112.9
Aug. 9	18 18.04	+41 03.4	6.897	7.302	-0.85	-2.6	17.7	109.7
Aug. 19	18 10.03	+40 33.0	6.946	7.286	-0.73	-3.6	17.7	105.7
Aug. 29	18 03.28	+39 54.0	7.008	7.272	-0.60	-4.3	17.7	101.2
Sept. 8	17 57.88	+39 09.3	7.079	7.257	-0.46	-4.7	17.8	96.2
Sept. 18	17 53.85	+38 21.7	7.155	7.243	-0.33	-4.8	17.8	91.0
Sept. 28	17 51.16	+37 34.0	7.234	7.230	-0.20	-4.7	17.8	85.8
Oct. 8	17 49.72	+36 48.7	7.312	7.218	-0.08	-4.3	17.8	80.7
Oct. 18	17 49.41	+36 07.6	7.386	7.205	+0.03	-3.8	17.8	75.8
Oct. 28	17 50.12	+35 32.5	7.452	7.194	+0.12	-3.1	17.8	71.2
Nov. 7	17 51.69	+35 05.0	7.509	7.183	+0.20	-2.3	17.8	67.1
Nov. 17	17 53.98	+34 46.0	7.555	7.172	+0.26	-1.4	17.8	63.7
Nov. 27	17 56.86	+34 36.7	7.588	7.163	+0.31	-0.4	17.9	61.1
Dec. 7	18 00.16	+34 37.7	7.606	7.153	+0.35	+0.7	17.9	59.3
Dec. 17	18 03.76	+34 49.6	7.610	7.144	+0.37	+1.8	17.8	58.5
Dec. 27	18 07.49	+35 12.7	7.598	7.136	+0.37	+2.9	17.8	58.7
Jan. 6	18 11.21	+35 47.2	7.572	7.129	+0.37	+4.1	17.8	59.8
Jan. 16	18 14.77	+36 33.2	7.532	7.122	+0.34	+5.2	17.8	61.9
Jan. 26	18 18.00	+37 30.6	7.480	7.115	+0.30	+6.3	17.8	64.7
Feb. 5	18 20.75	+38 38.9	7.418	7.109	+0.24	+7.4	17.8	68.1
Feb. 15	18 22.83	+39 57.5	7.348	7.104	+0.16	+8.4	17.7	71.9
Feb. 25	18 24.06	+41 25.3	7.272	7.099	+0.07	+9.2	17.7	76.0
Mar. 7	18 24.23	+43 01.1	7.194	7.095	-0.05	+10.0	17.7	80.3
Mar. 17	18 23.14	+44 43.2	7.116	7.091	-0.19	+10.5	17.7	84.5
Mar. 27	18 20.56	+46 29.2	7.042	7.088	-0.35	+10.7	17.6	88.6

## Comet P/2013 02 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2021 May 22.57447 TT  
 Peri. = 214.23305 e = 0.4468372  
 Node = 207.15679 2000.0 a = 3.7904093 AU  
 Incl. = 13.31751 n = 0.13355954  
 q = 2.0967134 AU P = 7.38 years

$$m_1 = 7.5 + 5 \log(\Delta) + 30.0 \log(r(t+50))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	19 50.84	-10 05.3	4.795	3.886	-0.35 -0.8	.	17.4/ 82	20.0
Jan. 12	20 02.60	-09 37.7	4.792	3.847	-0.36 -0.9	.	17.8/ 80	14.4
Jan. 22	20 14.56	-09 03.9	4.770	3.808	-0.37 -1.0	.	18.2/ 78	10.8
Feb. 1	20 26.66	-08 24.1	4.729	3.768	-0.39 -1.1	.	18.5/ 77	11.3
Feb. 11	20 38.79	-07 38.6	4.671	3.728	-0.40 -1.1	.	18.7/ 75	15.4
Feb. 21	20 50.87	-06 47.7	4.594	3.688	-0.42 -1.2	.	18.7/ 73	21.0
Mar. 2	21 02.84	-05 52.0	4.501	3.647	-0.43 -1.3	.	18.6/ 72	27.2
Mar. 12	21 14.61	-04 52.0	4.392	3.606	-0.45 -1.4	.	18.5/ 70	33.6
Mar. 22	21 26.12	-03 48.3	4.269	3.565	-0.47 -1.6	.	18.2/ 69	40.1
Apr. 1	21 37.29	-02 41.4	4.132	3.523	-0.50 -1.7	.	17.8/ 67	46.7
Apr. 11	21 48.02	-01 32.2	3.984	3.481	-0.52 -1.8	.	17.2/ 66	53.4
Apr. 21	21 58.26	+00 21.3	3.826	3.439	-0.55 -1.9	.	16.5/ 64	60.2
May 1	22 07.90	+00 50.3	3.660	3.396	-0.59 -2.1	.	15.6/ 63	67.0
May 11	22 16.83	+02 01.6	3.487	3.353	-0.63 -2.2	.	14.6/ 61	74.0
May 21	22 24.93	+03 11.7	3.311	3.310	-0.67 -2.4	.	13.3/ 59	81.1
May 31	22 32.05	+04 19.0	3.132	3.266	-0.72 -2.5	.	11.8/ 56	88.5
June 10	22 38.05	+05 22.2	2.954	3.223	-0.77 -2.7	.	10.0/ 53	96.0
June 20	22 42.74	+06 19.5	2.779	3.179	-0.83 -3.0	.	7.9/ 47	103.8
June 30	22 45.93	+07 08.7	2.609	3.135	-0.90 -3.2	.	5.5/ 38	112.0
July 10	22 47.44	+07 47.2	2.448	3.091	-0.96 -3.5	.	3.3/ 14	120.5
July 20	22 47.13	+08 12.4	2.298	3.047	-1.04 -3.8	.	2.6/309	129.4
July 30	22 44.91	+08 21.2	2.164	3.002	-1.10 -4.2	.	4.8/269	138.7
Aug. 9	22 40.88	+08 11.1	2.049	2.958	-1.16 -4.5	.	7.7/254	148.1
Aug. 19	22 35.28	+07 40.5	1.955	2.914	-1.21 -4.8	21.9	10.3/246	157.1
Aug. 29	22 28.63	+06 49.3	1.887	2.870	-1.24 -5.0	21.6	12.1/239	163.8
Sept. 8	22 21.64	+05 40.3	1.845	2.827	-1.25 -5.1	21.3	12.8/233	164.0
Sept. 18	22 15.14	+04 18.7	1.829	2.783	-1.23 -5.0	21.1	12.3/226	157.3
Sept. 28	22 09.94	+02 51.3	1.839	2.740	-1.19 -4.7	20.9	10.8/216	147.9
Oct. 8	22 06.70	+01 25.5	1.872	2.698	-1.15 -4.3	20.8	8.8/200	137.8
Oct. 18	22 05.82	+00 07.7	1.925	2.656	-1.10 -3.9	20.6	7.2/174	127.9
Oct. 28	22 07.50	+00 57.4	1.992	2.614	-1.06 -3.5	20.5	7.3/141	118.3
Nov. 7	22 11.72	-01 46.8	2.071	2.573	-1.02 -3.1	20.4	9.3/116	109.2
Nov. 17	22 18.32	-02 19.4	2.156	2.533	-0.98 -2.8	20.3	12.0/101	100.7
Nov. 27	22 27.10	-02 34.7	2.246	2.494	-0.96 -2.5	20.2	14.8/ 92	92.6
Dec. 7	22 37.80	-02 33.4	2.337	2.456	-0.94 -2.3	20.1	17.5/ 87	85.0
Dec. 17	22 50.18	-02 16.6	2.427	2.419	-0.93 -2.2	20.0	20.0/ 83	77.9
Dec. 27	23 04.01	-01 45.3	2.513	2.384	-0.93 -2.2	19.9	22.2/ 80	71.1
Jan. 6	23 19.10	-01 01.2	2.596	2.349	-0.93 -2.2	19.9	24.1/ 78	64.7
Jan. 16	23 35.28	+00 05.8	2.673	2.317	-0.93 -2.2	19.8	25.8/ 76	58.5
Jan. 26	23 52.41	+00 59.3	2.744	2.286	-0.94 -2.2	19.7	27.3/ 75	52.7
Feb. 5	00 10.38	+02 12.3	2.808	2.257	-0.95 -2.2	19.7	28.6/ 74	47.2
Feb. 15	00 29.11	+03 31.4	2.866	2.229	-0.96 -2.2	19.6	29.8/ 74	41.8
Feb. 25	00 48.54	+04 54.9	2.916	2.205	-0.97 -2.1	19.6	30.8/ 74	36.8
Mar. 7	01 08.60	+06 20.8	2.960	2.182	-0.99 -2.1	19.6	31.6/ 74	31.9
Mar. 17	01 29.27	+07 47.4	2.998	2.162	-1.01 -2.0	19.6	32.4/ 75	27.2
Mar. 27	01 50.50	+09 12.7	3.029	2.144	-1.02 -1.8	19.6	33.0/ 75	22.8

## Comet 7P/Pons-Winnecke

Epoch = 2020 July 10.0 TT  
 T = 2021 May 27.08504 TT  
 Peri. = 172.57257 e = 0.6385425  
 Node = 93.38005 2000.0 a = 3.4151066 AU  
 Incl. = 22.36433 n = 0.15617002  
 q = 1.2344159 AU P = 6.31 years

$$m_1 = 10.9 + 5 \log(\Delta) + 10.0 \log(r(t-50))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	08 37.76	+31 32.3	3.376	4.281	-0.73	+6.2	20.1	154.0
Jan. 12	08 29.78	+32 33.5	3.287	4.237	-0.87	+5.9	20.0	163.0
Jan. 22	08 20.65	+33 29.7	3.230	4.192	-0.95	+5.2	19.9	166.3
Feb. 1	08 11.01	+34 17.1	3.205	4.147	-0.96	+4.1	19.8	160.4
Feb. 11	08 01.64	+34 53.0	3.212	4.100	-0.89	+2.9	19.8	150.6
Feb. 21	07 53.26	+35 16.4	3.247	4.053	-0.76	+1.7	19.8	139.8
Mar. 2	07 46.51	+35 27.8	3.305	4.004	-0.57	+0.5	19.8	129.1
Mar. 12	07 41.78	+35 28.9	3.382	3.955	-0.35	-0.4	19.8	118.6
Mar. 22	07 39.26	+35 21.7	3.472	3.905	-0.13	-1.1	19.8	108.5
Apr. 1	07 39.00	+35 08.0	3.570	3.854	+0.10	-1.7	19.8	98.9
Apr. 11	07 40.89	+34 49.4	3.671	3.802	+0.30	-2.1	19.8	89.8
Apr. 21	07 44.76	+34 26.9	3.770	3.749	+0.49	-2.4	19.8	81.1
May 1	07 50.40	+34 01.2	3.864	3.695	+0.65	-2.7	19.8	72.8
May 11	07 57.62	+33 32.7	3.950	3.640	+0.80	-3.0	19.8	65.0
May 21	08 06.19	+33 01.2	4.025	3.584	+0.93	-3.3	19.8	57.5
May 31	08 15.96	+32 26.9	4.087	3.527	+1.04	-3.6	19.8	50.3
June 10	08 26.75	+31 49.5	4.135	3.469	+1.13	-3.9	19.7	43.4
June 20	08 38.41	+31 09.0	4.167	3.410	+1.21	-4.2	19.7	36.9
June 30	08 50.84	+30 25.2	4.183	3.350	+1.28	-4.6	19.6	30.7
July 10	09 03.92	+29 38.0	4.182	3.289	+1.34	-4.9	19.6	24.9
July 20	09 17.57	+28 47.3	4.165	3.226	+1.39	-5.3	19.5	19.7
July 30	09 31.72	+27 53.3	4.130	3.163	+1.44	-5.6	19.4	15.5
Aug. 9	09 46.31	+26 56.1	4.078	3.099	+1.48	-5.9	19.3	13.1
Aug. 19	10 01.31	+25 55.7	4.010	3.034	+1.52	-6.2	19.2	13.3
Aug. 29	10 16.67	+24 52.5	3.926	2.967	+1.56	-6.5	19.0	15.9
Sept. 8	10 32.38	+23 46.7	3.827	2.900	+1.59	-6.7	18.9	19.9
Sept. 18	10 48.43	+22 38.8	3.714	2.831	+1.62	-6.9	18.8	24.6
Sept. 28	11 04.81	+21 29.3	3.588	2.761	+1.66	-7.0	18.6	29.6
Oct. 8	11 21.54	+20 18.8	3.450	2.691	+1.69	-7.1	18.4	34.8
Oct. 18	11 38.63	+19 07.8	3.302	2.619	+1.73	-7.1	18.2	40.0
Oct. 28	11 56.10	+17 57.2	3.145	2.546	+1.77	-7.0	18.0	45.3
Nov. 7	12 13.99	+16 47.8	2.981	2.473	+1.81	-6.8	17.8	50.5
Nov. 17	12 32.33	+15 40.5	2.812	2.398	+1.86	-6.6	17.6	55.7
Nov. 27	12 51.16	+14 36.4	2.638	2.323	+1.91	-6.2	17.3	60.8
Dec. 7	13 10.54	+13 36.5	2.463	2.247	+1.97	-5.7	17.0	65.8
Dec. 17	13 30.51	+12 41.8	2.288	2.171	+2.03	-5.1	16.8	70.7
Dec. 27	13 51.13	+11 53.6	2.114	2.094	+2.10	-4.4	16.5	75.3
Jan. 6	14 12.46	+11 12.6	1.944	2.016	+2.17	-3.7	16.1	79.7
Jan. 16	14 34.56	+10 39.8	1.780	1.939	+2.25	-2.8	15.8	83.9
Jan. 26	14 57.47	+10 15.4	1.621	1.862	+2.34	-2.0	15.5	87.7
Feb. 5	15 21.27	+09 59.3	1.471	1.786	+2.43	-1.2	15.1	91.1
Feb. 15	15 46.01	+09 50.5	1.329	1.711	+2.53	-0.5	14.7	94.1
Feb. 25	16 11.74	+09 46.8	1.197	1.638	+2.63	-0.2	14.3	96.6
Mar. 7	16 38.57	+09 44.5	1.075	1.568	+2.75	-0.3	13.9	98.6
Mar. 17	17 06.56	+09 38.2	0.963	1.501	+2.87	-1.1	13.5	100.1
Mar. 27	17 35.85	+09 20.1	0.861	1.439	+3.01	-2.8	13.1	101.2

Comet P/2014 W12 (Gibbs)

Epoch = 2020 July 10.0 TT  
 T = 2021 June 20.26606 TT  
 Peri. = 36.91814 e = 0.5241456  
 Node = 299.28921 2000.0 a = 3.5186647 AU  
 Incl. = 8.51403 n = 0.14932662  
 q = 1.6743721 AU P = 6.60 years

$$m_1 = 12.6 + 5 \log(\Delta) + 15.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot./PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	13 51.52	-19 53.5	4.367	4.102	-0.39 +2.0	.	11.1/120	68.0
Jan. 12	13 57.96	-20 46.7	4.179	4.062	-0.41 +2.1	.	9.7/122	76.4
Jan. 22	14 03.38	-21 36.1	3.986	4.022	-0.44 +2.2	.	8.2/125	85.0
Feb. 1	14 07.57	-22 21.0	3.791	3.981	-0.48 +2.3	.	6.4/131	93.9
Feb. 11	14 10.32	-23 00.4	3.598	3.940	-0.51 +2.4	.	4.4/144	103.1
Feb. 21	14 11.44	-23 33.1	3.410	3.898	-0.54 +2.6	.	2.9/176	112.6
Mar. 2	14 10.75	-23 57.7	3.232	3.855	-0.58 +2.7	.	3.1/231	122.4
Mar. 12	14 08.14	-24 12.5	3.068	3.811	-0.61 +3.0	.	5.1/260	132.6
Mar. 22	14 03.65	-24 15.8	2.924	3.767	-0.64 +3.2	.	7.5/273	142.9
Apr. 1	13 57.43	-24 06.2	2.802	3.722	-0.65 +3.5	.	9.8/280	153.3
Apr. 11	13 49.90	-23 43.1	2.707	3.677	-0.66 +3.7	.	11.5/285	162.9
Apr. 21	13 41.59	-23 07.2	2.641	3.631	-0.66 +3.9	.	12.4/290	168.2
May 1	13 33.20	-22 20.8	2.605	3.584	-0.64 +4.0	.	12.4/294	164.0
May 11	13 25.46	-21 27.9	2.597	3.536	-0.62 +4.0	.	11.4/299	154.6
May 21	13 18.97	-20 33.2	2.616	3.488	-0.59 +3.9	.	9.5/304	144.3
May 31	13 14.20	-19 41.3	2.658	3.439	-0.56 +3.8	.	7.1/313	133.8
June 10	13 11.42	-18 56.3	2.719	3.390	-0.53 +3.6	.	4.6/330	123.7
June 20	13 10.71	-18 21.1	2.794	3.340	-0.51 +3.4	.	3.0/12	114.1
June 30	13 12.08	-17 57.2	2.878	3.289	-0.49 +3.2	.	3.9/64	104.8
July 10	13 15.40	-17 45.2	2.968	3.238	-0.48 +3.0	.	6.2/85	96.1
July 20	13 20.54	-17 44.8	3.058	3.186	-0.47 +2.8	.	8.7/94	87.8
July 30	13 27.35	-17 55.4	3.147	3.133	-0.47 +2.7	.	11.1/98	79.9
Aug. 9	13 35.67	-18 15.8	3.231	3.080	-0.47 +2.6	.	13.2/101	72.4
Aug. 19	13 45.40	-18 44.8	3.309	3.027	-0.48 +2.4	.	15.2/103	65.2
Aug. 29	13 56.42	-19 21.1	3.377	2.973	-0.50 +2.3	.	17.0/104	58.3
Sept. 8	14 08.64	-20 03.2	3.435	2.918	-0.52 +2.2	.	18.7/104	51.6
Sept. 18	14 22.00	-20 49.8	3.482	2.863	-0.54 +2.1	.	20.2/104	45.1
Sept. 28	14 36.45	-21 39.5	3.517	2.808	-0.57 +2.0	.	21.6/104	38.9
Oct. 8	14 51.95	-22 30.8	3.538	2.752	-0.60 +1.8	21.9	22.8/103	32.8
Oct. 18	15 08.47	-23 22.2	3.547	2.696	-0.63 +1.7	21.8	24.1/102	26.9
Oct. 28	15 26.01	-24 12.3	3.542	2.640	-0.67 +1.5	21.7	25.2/101	21.1
Nov. 7	15 44.52	-24 59.4	3.524	2.583	-0.71 +1.2	21.5	26.3/100	15.6
Nov. 17	16 04.00	-25 42.0	3.493	2.527	-0.76 +0.9	21.4	27.3/98	10.4
Nov. 27	16 24.42	-26 18.4	3.450	2.470	-0.81 +0.6	21.2	28.3/97	5.9
Dec. 7	16 45.74	-26 46.9	3.395	2.414	-0.87 +0.1	21.0	29.3/95	4.7
Dec. 17	17 07.91	-27 05.9	3.329	2.358	-0.92 -0.4	20.8	30.2/93	8.0
Dec. 27	17 30.86	-27 13.8	3.253	2.303	-0.98 -1.0	20.6	31.1/90	12.5
Jan. 6	17 54.50	-27 09.0	3.168	2.248	-1.03 -1.7	20.4	32.1/88	17.2
Jan. 16	18 18.75	-26 50.2	3.076	2.194	-1.09 -2.5	20.2	33.0/85	21.9
Jan. 26	18 43.48	-26 16.0	2.977	2.141	-1.14 -3.3	19.9	33.8/83	26.4
Feb. 5	19 08.56	-25 25.5	2.874	2.089	-1.19 -4.3	19.7	34.7/80	30.8
Feb. 15	19 33.88	-24 17.9	2.767	2.038	-1.24 -5.3	19.4	35.6/78	35.0
Feb. 25	19 59.31	-22 52.7	2.658	1.990	-1.28 -6.4	19.2	36.4/75	39.1
Mar. 7	20 24.73	-21 10.0	2.548	1.943	-1.32 -7.5	19.0	37.3/73	43.0
Mar. 17	20 50.07	-19 09.8	2.439	1.900	-1.36 -8.7	18.7	38.1/70	46.7
Mar. 27	21 15.21	-16 53.0	2.332	1.858	-1.40 -9.8	18.5	38.8/68	50.2

## Comet C/2019 F1 (ATLAS-Africano)

Epoch = 2020 July 10.0 TT  
 T = 2021 June 22.74634 TT  
 Peri. = 251.10783  
 Node = 38.72600 2000.0  
 Incl. = 54.17520  
 q = 3.5959874 AU  
 e = 1.0035297

$$m_1 = 3.4 + 5 \log(\Delta) + 12.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' .5			m	'		°
Jan. 2	14 49.45	-11 47.5	6.336	5.864	+0.46	-5.1	17.0	57.4
Jan. 12	14 53.79	-12 38.2	6.128	5.802	+0.40	-5.0	16.9	66.2
Jan. 22	14 57.44	-13 27.2	5.909	5.739	+0.32	-4.8	16.7	75.3
Feb. 1	15 00.23	-14 14.5	5.685	5.677	+0.23	-4.6	16.6	84.6
Feb. 11	15 02.01	-15 00.2	5.458	5.615	+0.12	-4.5	16.5	94.1
Feb. 21	15 02.66	-15 44.4	5.234	5.554	0.00	-4.3	16.3	103.8
Mar. 2	15 02.02	-16 27.0	5.017	5.493	-0.14	-4.2	16.1	113.8
Mar. 12	15 00.01	-17 07.9	4.812	5.432	-0.28	-4.0	16.0	124.1
Mar. 22	14 56.59	-17 47.1	4.624	5.371	-0.42	-3.8	15.9	134.7
Apr. 1	14 51.78	-18 24.1	4.457	5.311	-0.55	-3.6	15.7	145.4
Apr. 11	14 45.72	-18 58.7	4.317	5.251	-0.67	-3.3	15.6	156.4
Apr. 21	14 38.63	-19 30.6	4.206	5.191	-0.75	-3.0	15.5	167.2
May 1	14 30.86	-19 59.7	4.127	5.132	-0.80	-2.8	15.4	175.0
May 11	14 22.82	-20 26.2	4.081	5.073	-0.80	-2.5	15.3	168.1
May 21	14 14.96	-20 50.9	4.066	5.015	-0.76	-2.4	15.2	157.3
May 31	14 07.72	-21 14.8	4.081	4.958	-0.67	-2.4	15.1	146.5
June 10	14 01.48	-21 39.2	4.121	4.900	-0.56	-2.5	15.1	135.8
June 20	13 56.50	-22 05.4	4.184	4.844	-0.42	-2.8	15.1	125.4
June 30	13 52.96	-22 34.8	4.263	4.788	-0.27	-3.2	15.1	115.4
July 10	13 50.95	-23 08.4	4.354	4.733	-0.12	-3.6	15.0	105.8
July 20	13 50.45	-23 46.9	4.453	4.678	+0.03	-4.1	15.0	96.5
July 30	13 51.44	-24 30.9	4.554	4.624	+0.18	-4.7	15.0	87.6
Aug. 9	13 53.83	-25 20.7	4.653	4.571	+0.31	-5.3	15.0	79.1
Aug. 19	13 57.53	-26 16.2	4.747	4.519	+0.44	-5.9	15.0	70.9
Aug. 29	14 02.46	-27 17.4	4.834	4.468	+0.56	-6.4	14.9	63.0
Sept. 8	14 08.50	-28 24.2	4.909	4.417	+0.66	-7.0	14.9	55.5
Sept. 18	14 15.60	-29 36.3	4.972	4.368	+0.76	-7.5	14.9	48.2
Sept. 28	14 23.66	-30 53.4	5.021	4.319	+0.86	-8.0	14.8	41.3
Oct. 8	14 32.61	-32 15.3	5.053	4.272	+0.94	-8.4	14.8	34.9
Oct. 18	14 42.42	-33 41.6	5.069	4.225	+1.03	-8.9	14.7	29.0
Oct. 28	14 53.03	-35 12.3	5.067	4.180	+1.10	-9.3	14.7	24.2
Nov. 7	15 04.40	-36 46.9	5.048	4.136	+1.18	-9.7	14.6	20.8
Nov. 17	15 16.51	-38 25.3	5.011	4.094	+1.25	-10.0	14.6	19.7
Nov. 27	15 29.32	-40 07.4	4.958	4.052	+1.32	-10.4	14.5	21.1
Dec. 7	15 42.81	-41 53.1	4.888	4.012	+1.39	-10.8	14.4	24.5
Dec. 17	15 56.98	-43 42.2	4.804	3.974	+1.45	-11.1	14.3	29.2
Dec. 27	16 11.80	-45 34.9	4.706	3.937	+1.52	-11.5	14.2	34.7
Jan. 6	16 27.28	-47 31.2	4.596	3.902	+1.58	-11.8	14.1	40.6
Jan. 16	16 43.42	-49 31.1	4.477	3.868	+1.65	-12.2	14.0	46.6
Jan. 26	17 00.21	-51 34.8	4.349	3.836	+1.72	-12.6	13.9	52.8
Feb. 5	17 17.68	-53 42.5	4.217	3.806	+1.79	-13.0	13.8	59.1
Feb. 15	17 35.85	-55 54.2	4.082	3.777	+1.86	-13.4	13.7	65.3
Feb. 25	17 54.74	-58 09.9	3.947	3.751	+1.93	-13.8	13.6	71.4
Mar. 7	18 14.42	-60 29.6	3.815	3.726	+2.01	-14.2	13.4	77.4
Mar. 17	18 34.97	-62 52.7	3.687	3.704	+2.11	-14.5	13.3	83.2
Mar. 27	18 56.47	-65 18.7	3.567	3.683	+2.21	-14.7	13.2	88.8

## Comet 15P/Finlay

Epoch = 2020 July 10.0 TT  
 T = 2021 July 13.57964 TT  
 Peri. = 347.83898 e = 0.7169573  
 Node = 13.72087 2000.0 a = 3.5042066 AU  
 Incl. = 6.79778 n = 0.15025174  
 q = 0.9918401 AU P = 6.56 years

$$m_1 = 11.8 + 5 \log(\Delta) + 15.0 \log(r(t-20))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	14 22.77	-15 50.8	5.125	4.747	+0.58	-3.5	.	62.2
Jan. 12	14 28.20	-16 24.2	4.932	4.704	+0.50	-3.1	.	70.9
Jan. 22	14 32.75	-16 53.6	4.730	4.660	+0.40	-2.7	.	79.9
Feb. 1	14 36.22	-17 18.3	4.524	4.616	+0.28	-2.2	.	89.2
Feb. 11	14 38.45	-17 37.8	4.316	4.571	+0.15	-1.6	.	98.7
Feb. 21	14 39.26	-17 51.6	4.112	4.524	0.00	-1.0	.	108.5
Mar. 2	14 38.50	-17 58.8	3.916	4.477	-0.17	-0.3	.	118.7
Mar. 12	14 36.07	-17 58.7	3.733	4.429	-0.34	+0.4	.	129.3
Mar. 22	14 31.96	-17 50.9	3.569	4.380	-0.50	+1.2	.	140.2
Apr. 1	14 26.26	-17 34.9	3.427	4.330	-0.65	+2.0	.	151.4
Apr. 11	14 19.22	-17 10.9	3.312	4.280	-0.76	+2.8	.	162.8
Apr. 21	14 11.22	-16 40.0	3.227	4.228	-0.83	+3.4	.	173.9
May 1	14 02.78	-16 03.8	3.174	4.175	-0.85	+3.8	.	172.5
May 11	13 54.47	-15 25.1	3.152	4.121	-0.80	+3.9	.	161.2
May 21	13 46.86	-14 46.9	3.160	4.066	-0.70	+3.7	.	149.8
May 31	13 40.40	-14 12.3	3.194	4.011	-0.57	+3.1	.	138.6
June 10	13 35.46	-13 44.1	3.250	3.954	-0.40	+2.4	.	127.7
June 20	13 32.21	-13 24.0	3.323	3.896	-0.23	+1.5	.	117.3
June 30	13 30.75	-13 13.2	3.407	3.837	-0.05	+0.5	.	107.4
July 10	13 31.05	-13 12.2	3.499	3.776	+0.12	-0.4	.	98.0
July 20	13 33.03	-13 20.7	3.592	3.715	+0.29	-1.4	.	89.0
July 30	13 36.58	-13 38.3	3.683	3.653	+0.44	-2.2	.	80.3
Aug. 9	13 41.58	-14 04.2	3.769	3.589	+0.58	-3.0	.	72.1
Aug. 19	13 47.92	-14 37.4	3.846	3.524	+0.70	-3.7	.	64.1
Aug. 29	13 55.48	-15 17.2	3.912	3.458	+0.82	-4.3	.	56.4
Sept. 8	14 04.17	-16 02.5	3.965	3.390	+0.93	-4.8	.	49.0
Sept. 18	14 13.90	-16 52.5	4.003	3.322	+1.03	-5.2	.	41.8
Sept. 28	14 24.63	-17 46.1	4.025	3.252	+1.12	-5.5	.	34.7
Oct. 8	14 36.29	-18 42.5	4.029	3.180	+1.22	-5.8	.	27.9
Oct. 18	14 48.85	-19 40.8	4.016	3.108	+1.30	-5.9	.	21.1
Oct. 28	15 02.29	-20 40.1	3.985	3.034	+1.39	-6.0	.	14.6
Nov. 7	15 16.57	-21 39.5	3.935	2.958	+1.48	-5.9	.	8.4
Nov. 17	15 31.71	-22 38.2	3.867	2.881	+1.56	-5.8	22.0	3.7
Nov. 27	15 47.70	-23 35.2	3.782	2.803	+1.65	-5.6	21.8	6.1
Dec. 7	16 04.55	-24 29.5	3.680	2.723	+1.73	-5.3	21.5	11.7
Dec. 17	16 22.27	-25 20.3	3.563	2.642	+1.82	-4.8	21.3	17.6
Dec. 27	16 40.88	-26 06.5	3.431	2.559	+1.91	-4.3	21.0	23.4
Jan. 6	17 00.41	-26 47.0	3.287	2.475	+2.01	-3.7	20.7	29.1
Jan. 16	17 20.91	-27 20.8	3.131	2.389	+2.10	-3.0	20.4	34.7
Jan. 26	17 42.41	-27 46.5	2.966	2.301	+2.21	-2.1	20.1	40.1
Feb. 5	18 04.99	-28 02.8	2.794	2.213	+2.32	-1.1	19.7	45.2
Feb. 15	18 28.73	-28 08.1	2.617	2.122	+2.44	+0.1	19.3	50.1
Feb. 25	18 53.73	-28 00.5	2.437	2.031	+2.57	+1.6	18.9	54.6
Mar. 7	19 20.11	-27 37.4	2.258	1.938	+2.72	+3.3	18.5	58.8
Mar. 17	19 48.05	-26 56.1	2.080	1.845	+2.88	+5.3	18.0	62.5
Mar. 27	20 17.70	-25 52.7	1.908	1.751	+3.07	+7.7	17.5	65.6

## Comet P/2014 E1 (Larson)

Epoch = 2020 July 10.0 TT  
 T = 2021 July 20.19392 TT  
 Peri. = 186.01343 e = 0.4235740  
 Node = 39.03554 2000.0 a = 3.7122888 AU  
 Incl. = 15.97619 n = 0.13779753  
 q = 2.1398598 AU P = 7.15 years

$$m_1 = 14.0 + 5 \log(\Delta) + 7.5 \log(r(t+30))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Variation	m1	Mot. /PA	Elong.
2020/21	h m	° '			for T=+1 day			°
Jan. 2	06 41.95	+41 26.1	3.085	4.030	-0.73 -0.8	20.9	11.4/280	161.5
Jan. 12	06 32.06	+41 39.7	3.074	3.996	-0.72 -1.1	20.9	10.8/273	156.6
Jan. 22	06 22.86	+41 39.7	3.091	3.961	-0.70 -1.3	20.8	9.6/266	148.1
Feb. 1	06 15.14	+41 27.4	3.135	3.926	-0.68 -1.5	20.8	7.7/257	138.2
Feb. 11	06 09.50	+41 05.8	3.202	3.890	-0.64 -1.6	20.9	5.5/243	128.2
Feb. 21	06 06.25	+40 38.0	3.286	3.854	-0.61 -1.5	20.9	3.7/215	118.3
Mar. 2	06 05.51	+40 06.7	3.383	3.817	-0.59 -1.5	20.9	3.3/168	108.7
Mar. 12	06 07.19	+39 34.2	3.488	3.780	-0.56 -1.4	20.9	4.7/134	99.4
Mar. 22	06 11.11	+39 01.6	3.597	3.743	-0.54 -1.2	21.0	6.7/119	90.7
Apr. 1	06 17.06	+38 29.5	3.705	3.705	-0.53 -1.0	21.0	8.8/111	82.3
Apr. 11	06 24.78	+37 57.8	3.810	3.667	-0.52 -0.8	21.0	10.7/107	74.3
Apr. 21	06 34.04	+37 26.2	3.908	3.629	-0.52 -0.6	21.1	12.4/105	66.7
May 1	06 44.63	+36 54.2	3.997	3.590	-0.51 -0.4	21.1	13.9/103	59.4
May 11	06 56.34	+36 21.0	4.076	3.551	-0.51 -0.1	21.1	15.2/103	52.4
May 21	07 09.00	+35 46.0	4.143	3.512	-0.51 +0.1	21.1	16.4/103	45.7
May 31	07 22.46	+35 08.5	4.196	3.472	-0.52 +0.4	21.1	17.4/103	39.3
June 10	07 36.56	+34 28.1	4.236	3.432	-0.52 +0.7	21.0	18.3/103	33.2
June 20	07 51.18	+33 44.3	4.261	3.391	-0.53 +1.0	21.0	19.1/104	27.4
June 30	08 06.23	+32 56.8	4.271	3.351	-0.53 +1.3	21.0	19.8/104	22.0
July 10	08 21.60	+32 05.5	4.267	3.310	-0.54 +1.6	20.9	20.4/105	17.3
July 20	08 37.20	+31 10.1	4.247	3.269	-0.55 +1.9	20.9	21.0/106	13.7
July 30	08 52.97	+30 10.9	4.213	3.227	-0.56 +2.3	20.8	21.4/107	12.2
Aug. 9	09 08.83	+29 07.9	4.163	3.186	-0.57 +2.6	20.7	21.8/107	13.4
Aug. 19	09 24.74	+28 01.3	4.100	3.144	-0.58 +3.0	20.7	22.2/108	16.7
Aug. 29	09 40.64	+26 51.7	4.023	3.103	-0.59 +3.4	20.6	22.4/108	21.1
Sept. 8	09 56.48	+25 39.4	3.934	3.061	-0.60 +3.8	20.5	22.6/109	26.1
Sept. 18	10 12.23	+24 25.0	3.831	3.019	-0.62 +4.2	20.4	22.7/109	31.4
Sept. 28	10 27.84	+23 09.3	3.718	2.977	-0.63 +4.7	20.3	22.7/110	36.9
Oct. 8	10 43.26	+21 52.9	3.593	2.936	-0.65 +5.1	20.1	22.6/110	42.5
Oct. 18	10 58.46	+20 36.8	3.460	2.894	-0.67 +5.7	20.0	22.5/110	48.3
Oct. 28	11 13.37	+19 21.9	3.317	2.853	-0.70 +6.2	19.9	22.1/109	54.2
Nov. 7	11 27.94	+18 09.4	3.168	2.812	-0.73 +6.8	19.7	21.6/109	60.3
Nov. 17	11 42.07	+17 00.2	3.012	2.771	-0.76 +7.4	19.6	21.0/109	66.5
Nov. 27	11 55.66	+15 55.8	2.852	2.731	-0.80 +8.1	19.4	20.1/108	72.9
Dec. 7	12 08.60	+14 57.3	2.690	2.691	-0.85 +8.9	19.2	18.9/107	79.5
Dec. 17	12 20.71	+14 06.1	2.526	2.651	-0.90 +9.7	19.0	17.5/105	86.3
Dec. 27	12 31.79	+13 23.5	2.363	2.613	-0.96 +10.6	18.9	15.7/104	93.4
Jan. 6	12 41.61	+12 50.5	2.202	2.575	-1.04 +11.6	18.7	13.5/102	100.8
Jan. 16	12 49.87	+12 28.1	2.047	2.537	-1.12 +12.7	18.4	10.8/99	108.5
Jan. 26	12 56.22	+12 16.8	1.899	2.501	-1.22 +13.9	18.2	7.6/94	116.7
Feb. 5	13 00.31	+12 16.1	1.762	2.466	-1.33 +15.1	18.0	4.0/83	125.2
Feb. 15	13 01.80	+12 24.5	1.638	2.432	-1.45 +16.4	17.8	1.2/355	134.2
Feb. 25	13 00.41	+12 38.8	1.530	2.399	-1.58 +17.5	17.6	4.6/290	143.5
Mar. 7	12 56.13	+12 53.8	1.441	2.367	-1.70 +18.4	17.5	8.6/279	152.7
Mar. 17	12 49.23	+13 02.6	1.375	2.337	-1.79 +19.0	17.3	11.8/271	160.6
Mar. 27	12 40.47	+12 57.6	1.334	2.309	-1.85 +19.2	17.2	13.8/264	164.0

## Comet 173P/Mueller

Epoch = 2020 July 10.0 TT  
 T = 2021 Dec. 17.96450 TT  
 Peri. = 29.33886 e = 0.2605295  
 Node = 100.40086 2000.0 a = 5.7011683 AU  
 Incl. = 16.49723 n = 0.07240329  
 q = 4.2158458 AU P = 13.61 years

$$m_1 = -11.3 + 5 \log(\Delta) + 40.0 \log(r(t+500))$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° '			m	'		°
Jan. 2	02 52.33	+01 34.6	4.529	5.083	-0.14	+3.2	17.4	119.3
Jan. 12	02 51.50	+02 09.2	4.649	5.064	-0.01	+3.8	17.4	109.6
Jan. 22	02 51.99	+02 49.7	4.780	5.045	+0.12	+4.3	17.4	100.0
Feb. 1	02 53.76	+03 35.1	4.915	5.026	+0.25	+4.8	17.5	90.8
Feb. 11	02 56.75	+04 24.2	5.052	5.007	+0.36	+5.1	17.5	81.8
Feb. 21	03 00.86	+05 15.8	5.185	4.988	+0.47	+5.3	17.5	73.1
Mar. 2	03 06.00	+06 09.0	5.311	4.969	+0.57	+5.4	17.5	64.7
Mar. 12	03 12.05	+07 02.8	5.428	4.951	+0.65	+5.4	17.6	56.6
Mar. 22	03 18.90	+07 56.5	5.533	4.932	+0.73	+5.3	17.6	48.7
Apr. 1	03 26.45	+08 49.3	5.624	4.914	+0.79	+5.2	17.6	41.0
Apr. 11	03 34.60	+09 40.7	5.699	4.895	+0.84	+5.0	17.6	33.6
Apr. 21	03 43.26	+10 30.0	5.757	4.877	+0.89	+4.8	17.6	26.4
May 1	03 52.33	+11 16.8	5.797	4.859	+0.93	+4.5	17.6	19.5
May 11	04 01.73	+12 00.8	5.818	4.841	+0.95	+4.2	17.6	13.3
May 21	04 11.37	+12 41.6	5.820	4.823	+0.98	+3.9	17.6	8.8
May 31	04 21.19	+13 18.9	5.804	4.805	+0.99	+3.5	17.6	9.0
June 10	04 31.08	+13 52.6	5.768	4.787	+0.99	+3.2	17.5	13.6
June 20	04 40.99	+14 22.6	5.714	4.770	+0.99	+2.8	17.5	19.7
June 30	04 50.81	+14 48.8	5.642	4.752	+0.97	+2.4	17.5	26.3
July 10	05 00.45	+15 11.1	5.553	4.735	+0.95	+2.0	17.4	33.2
July 20	05 09.83	+15 29.9	5.448	4.718	+0.92	+1.7	17.4	40.2
July 30	05 18.83	+15 45.1	5.328	4.701	+0.88	+1.3	17.3	47.4
Aug. 9	05 27.36	+15 57.1	5.194	4.684	+0.82	+1.0	17.3	54.8
Aug. 19	05 35.28	+16 06.3	5.049	4.668	+0.75	+0.8	17.2	62.4
Aug. 29	05 42.48	+16 13.0	4.895	4.651	+0.67	+0.6	17.1	70.2
Sept. 8	05 48.80	+16 17.9	4.733	4.635	+0.58	+0.4	17.1	78.3
Sept. 18	05 54.12	+16 21.6	4.567	4.619	+0.47	+0.3	17.0	86.7
Sept. 28	05 58.26	+16 24.7	4.399	4.603	+0.35	+0.3	16.9	95.4
Oct. 8	06 01.11	+16 28.0	4.234	4.588	+0.21	+0.4	16.9	104.5
Oct. 18	06 02.52	+16 32.3	4.076	4.573	+0.06	+0.5	16.8	114.0
Oct. 28	06 02.40	+16 38.3	3.928	4.557	-0.10	+0.7	16.7	123.9
Nov. 7	06 00.74	+16 46.6	3.796	4.543	-0.25	+1.0	16.7	134.2
Nov. 17	05 57.58	+16 57.5	3.683	4.528	-0.39	+1.3	16.6	144.9
Nov. 27	05 53.11	+17 11.4	3.595	4.514	-0.51	+1.6	16.6	155.8
Dec. 7	05 47.62	+17 28.2	3.535	4.499	-0.59	+1.8	16.6	166.6
Dec. 17	05 41.54	+17 47.7	3.505	4.486	-0.62	+2.1	16.6	174.4
Dec. 27	05 35.37	+18 09.4	3.507	4.472	-0.60	+2.3	16.6	167.6
Jan. 6	05 29.63	+18 33.1	3.538	4.459	-0.53	+2.5	16.6	156.7
Jan. 16	05 24.78	+18 58.4	3.599	4.446	-0.42	+2.6	16.7	145.6
Jan. 26	05 21.21	+19 25.0	3.684	4.433	-0.28	+2.7	16.8	134.8
Feb. 5	05 19.16	+19 52.6	3.790	4.421	-0.12	+2.8	16.9	124.2
Feb. 15	05 18.76	+20 20.9	3.912	4.408	+0.05	+2.9	17.0	114.1
Feb. 25	05 20.04	+20 49.6	4.046	4.397	+0.22	+2.9	17.1	104.3
Mar. 7	05 22.92	+21 18.2	4.186	4.385	+0.37	+2.8	17.2	95.0
Mar. 17	05 27.32	+21 46.2	4.328	4.374	+0.52	+2.7	17.3	86.1
Mar. 27	05 33.09	+22 13.1	4.469	4.363	+0.65	+2.6	17.4	77.5

Comet C/2019 L3 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2022 Jan. 9.81731 TT  
 Peri. = 171.65417  
 Node = 290.78340 2000.0  
 Incl. = 48.36636  
 q = 3.5535284 AU  
 e = 1.0006009

$$m1 = 4.5 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .5			m	'		°
Jan. 2	22 17.52	+40 43.5	7.237	7.138	+0.57	-1.9	17.3	80.3
Jan. 12	22 23.60	+40 28.9	7.279	7.074	+0.65	-1.0	17.3	74.1
Jan. 22	22 30.38	+40 23.4	7.315	7.009	+0.71	0.0	17.3	68.2
Feb. 1	22 37.76	+40 27.3	7.343	6.945	+0.77	+0.9	17.2	62.6
Feb. 11	22 45.63	+40 40.3	7.361	6.880	+0.81	+1.8	17.2	57.4
Feb. 21	22 53.91	+41 02.4	7.368	6.816	+0.85	+2.7	17.2	52.8
Mar. 2	23 02.52	+41 33.0	7.362	6.751	+0.88	+3.5	17.1	48.8
Mar. 12	23 11.37	+42 11.9	7.343	6.687	+0.90	+4.3	17.1	45.7
Mar. 22	23 20.39	+42 58.3	7.309	6.622	+0.91	+5.0	17.0	43.6
Apr. 1	23 29.51	+43 52.0	7.260	6.558	+0.91	+5.7	17.0	42.5
Apr. 11	23 38.66	+44 52.0	7.197	6.494	+0.91	+6.3	16.9	42.5
Apr. 21	23 47.77	+45 58.1	7.120	6.429	+0.91	+6.9	16.8	43.6
May 1	23 56.77	+47 09.5	7.029	6.365	+0.89	+7.4	16.8	45.6
May 11	00 05.58	+48 25.6	6.925	6.301	+0.87	+7.8	16.7	48.5
May 21	00 14.11	+49 45.8	6.810	6.237	+0.83	+8.2	16.6	52.0
May 31	00 22.27	+51 09.5	6.683	6.173	+0.79	+8.5	16.5	56.0
June 10	00 29.93	+52 36.0	6.546	6.110	+0.73	+8.8	16.4	60.4
June 20	00 36.98	+54 04.6	6.402	6.046	+0.66	+8.9	16.3	65.2
June 30	00 43.24	+55 34.5	6.251	5.982	+0.58	+9.0	16.2	70.1
July 10	00 48.52	+57 04.5	6.095	5.919	+0.47	+9.0	16.1	75.3
July 20	00 52.63	+58 33.7	5.936	5.856	+0.34	+8.8	16.0	80.6
July 30	00 55.31	+60 00.5	5.775	5.793	+0.18	+8.5	15.9	86.0
Aug. 9	00 56.32	+61 23.1	5.615	5.730	0.00	+8.0	15.8	91.4
Aug. 19	00 55.43	+62 39.5	5.459	5.668	-0.20	+7.2	15.7	96.8
Aug. 29	00 52.45	+63 47.0	5.307	5.605	-0.41	+6.1	15.6	102.1
Sept. 8	00 47.36	+64 42.7	5.162	5.543	-0.62	+4.8	15.5	107.1
Sept. 18	00 40.32	+65 23.7	5.027	5.482	-0.80	+3.2	15.4	111.9
Sept. 28	00 31.77	+65 46.9	4.903	5.420	-0.91	+1.3	15.3	116.2
Oct. 8	00 22.46	+65 50.6	4.792	5.359	-0.94	-0.8	15.2	119.8
Oct. 18	00 13.30	+65 33.9	4.697	5.298	-0.87	-2.8	15.1	122.4
Oct. 28	00 05.26	+64 57.6	4.618	5.237	-0.71	-4.6	15.0	123.9
Nov. 7	23 59.14	+64 04.1	4.556	5.177	-0.48	-6.2	14.9	124.1
Nov. 17	23 55.47	+62 57.0	4.511	5.118	-0.22	-7.3	14.9	123.0
Nov. 27	23 54.50	+61 40.5	4.485	5.058	+0.05	-8.0	14.8	120.6
Dec. 7	23 56.21	+60 19.2	4.474	5.000	+0.31	-8.3	14.7	117.0
Dec. 17	00 00.45	+58 56.9	4.480	4.941	+0.55	-8.1	14.7	112.5
Dec. 27	00 06.99	+57 37.2	4.499	4.884	+0.77	-7.7	14.7	107.4
Jan. 6	00 15.54	+56 22.8	4.529	4.826	+0.96	-7.1	14.6	101.8
Jan. 16	00 25.85	+55 15.6	4.569	4.770	+1.12	-6.3	14.6	95.8
Jan. 26	00 37.70	+54 16.9	4.616	4.714	+1.26	-5.4	14.6	89.7
Feb. 5	00 50.84	+53 27.0	4.667	4.659	+1.38	-4.5	14.5	83.5
Feb. 15	01 05.14	+52 45.8	4.720	4.604	+1.49	-3.7	14.5	77.3
Feb. 25	01 20.42	+52 12.8	4.773	4.550	+1.58	-2.9	14.5	71.2
Mar. 7	01 36.57	+51 47.2	4.823	4.497	+1.66	-2.2	14.4	65.2
Mar. 17	01 53.47	+51 27.9	4.869	4.445	+1.73	-1.6	14.4	59.4
Mar. 27	02 11.03	+51 13.6	4.910	4.394	+1.79	-1.2	14.4	53.8

## Comet 99P/Kowal

Epoch = 2020 July 10.0 TT  
 T = 2022 Apr. 12.62977 TT  
 Peri. = 174.93111 e = 0.2302984  
 Node = 28.12198 2000.0 a = 6.1133971 AU  
 Incl. = 4.33801 n = 0.06520489  
 q = 4.7054915 AU P = 15.12 years

$$m_1 = -1.1 + 5 \log(\Delta) + 22.5 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' "			m	' "		°
Jan. 2	08 50.54	+23 01.5	4.663	5.548	-0.40	+2.0	19.0	151.6
Jan. 12	08 46.15	+23 22.3	4.586	5.532	-0.48	+2.1	18.9	162.5
Jan. 22	08 41.12	+23 43.0	4.538	5.515	-0.53	+2.0	18.9	172.5
Feb. 1	08 35.79	+24 01.8	4.522	5.499	-0.53	+1.7	18.8	172.0
Feb. 11	08 30.58	+24 17.3	4.537	5.483	-0.50	+1.3	18.8	161.8
Feb. 21	08 25.86	+24 28.5	4.582	5.467	-0.43	+0.9	18.8	150.9
Mar. 2	08 21.98	+24 34.8	4.654	5.452	-0.33	+0.3	18.8	140.1
Mar. 12	08 19.19	+24 35.9	4.748	5.436	-0.21	-0.2	18.8	129.6
Mar. 22	08 17.65	+24 32.1	4.861	5.420	-0.08	-0.6	18.8	119.4
Apr. 1	08 17.43	+24 23.7	4.988	5.404	+0.05	-1.1	18.9	109.5
Apr. 11	08 18.55	+24 10.9	5.123	5.389	+0.18	-1.5	18.9	100.0
Apr. 21	08 20.92	+23 54.3	5.263	5.373	+0.30	-1.9	18.9	90.8
May 1	08 24.48	+23 34.0	5.404	5.358	+0.42	-2.2	19.0	82.0
May 11	08 29.09	+23 10.3	5.541	5.342	+0.51	-2.5	19.0	73.5
May 21	08 34.63	+22 43.5	5.672	5.327	+0.60	-2.9	19.0	65.2
May 31	08 40.98	+22 13.6	5.793	5.312	+0.67	-3.1	19.0	57.2
June 10	08 48.01	+21 40.9	5.902	5.297	+0.74	-3.4	19.0	49.3
June 20	08 55.62	+21 05.4	5.997	5.282	+0.79	-3.7	19.1	41.7
June 30	09 03.69	+20 27.5	6.077	5.267	+0.83	-3.9	19.1	34.2
July 10	09 12.12	+19 47.2	6.140	5.252	+0.86	-4.1	19.0	26.8
July 20	09 20.83	+19 04.8	6.184	5.237	+0.88	-4.3	19.0	19.5
July 30	09 29.74	+18 20.6	6.210	5.223	+0.90	-4.5	19.0	12.3
Aug. 9	09 38.75	+17 34.9	6.216	5.208	+0.90	-4.6	19.0	5.7
Aug. 19	09 47.80	+16 48.0	6.203	5.194	+0.90	-4.7	19.0	4.3
Aug. 29	09 56.82	+16 00.4	6.169	5.180	+0.90	-4.8	18.9	10.6
Sept. 8	10 05.73	+15 12.6	6.116	5.166	+0.88	-4.8	18.9	17.7
Sept. 18	10 14.46	+14 25.0	6.044	5.152	+0.86	-4.7	18.8	25.1
Sept. 28	10 22.94	+13 38.3	5.953	5.138	+0.83	-4.6	18.8	32.6
Oct. 8	10 31.08	+12 53.0	5.845	5.124	+0.79	-4.4	18.7	40.3
Oct. 18	10 38.80	+12 09.9	5.721	5.111	+0.75	-4.2	18.6	48.2
Oct. 28	10 46.00	+11 29.8	5.582	5.097	+0.69	-3.8	18.5	56.2
Nov. 7	10 52.59	+10 53.3	5.431	5.084	+0.62	-3.4	18.5	64.5
Nov. 17	10 58.45	+10 21.4	5.271	5.071	+0.54	-2.9	18.4	73.0
Nov. 27	11 03.47	+09 54.8	5.104	5.058	+0.45	-2.3	18.3	81.8
Dec. 7	11 07.54	+09 34.4	4.934	5.045	+0.35	-1.7	18.2	90.8
Dec. 17	11 10.53	+09 20.7	4.764	5.033	+0.24	-1.0	18.1	100.2
Dec. 27	11 12.34	+09 14.5	4.599	5.020	+0.11	-0.2	18.0	109.9
Jan. 6	11 12.90	+09 15.8	4.444	5.008	-0.01	+0.6	17.9	120.0
Jan. 16	11 12.18	+09 24.7	4.303	4.996	-0.14	+1.3	17.8	130.3
Jan. 26	11 10.19	+09 40.5	4.180	4.984	-0.26	+1.9	17.7	141.0
Feb. 5	11 07.07	+10 02.0	4.081	4.973	-0.37	+2.4	17.6	151.9
Feb. 15	11 03.01	+10 27.5	4.009	4.961	-0.45	+2.7	17.6	162.9
Feb. 25	10 58.30	+10 54.7	3.965	4.950	-0.49	+2.7	17.5	173.4
Mar. 7	10 53.32	+11 21.3	3.953	4.939	-0.50	+2.5	17.5	172.8
Mar. 17	10 48.45	+11 44.9	3.971	4.928	-0.47	+2.1	17.5	162.3
Mar. 27	10 44.09	+12 03.5	4.018	4.917	-0.40	+1.5	17.5	151.5

## Comet C/2019 T4 (ATLAS)

Epoch = 2020 July 10.0 TT  
 T = 2022 June 9.48233 TT  
 Peri. = 351.21544  
 Node = 199.97033 2000.0  
 Incl. = 53.61671  
 q = 4.2420808 AU  
 e = 0.9956511

$$m_1 = 5.0 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m <sub>1</sub>	Elong.
2020/21	h m	° ' .8			m	'		°
Jan. 2	06 24.77	-35 58.8	7.520	8.068	-0.43	-0.1	18.4	120.8
Jan. 12	06 20.53	-35 53.9	7.473	8.009	-0.41	+1.2	18.4	120.0
Jan. 22	06 16.59	-35 36.8	7.441	7.951	-0.37	+2.3	18.4	118.0
Feb. 1	06 13.18	-35 08.6	7.426	7.892	-0.30	+3.4	18.3	114.9
Feb. 11	06 10.52	-34 30.7	7.424	7.833	-0.22	+4.2	18.3	111.1
Feb. 21	06 08.75	-33 45.1	7.434	7.774	-0.12	+4.9	18.3	106.6
Mar. 2	06 07.97	-32 53.7	7.454	7.716	-0.02	+5.4	18.2	101.7
Mar. 12	06 08.23	-31 58.8	7.481	7.657	+0.08	+5.6	18.2	96.5
Mar. 22	06 09.52	-31 02.4	7.513	7.599	+0.19	+5.6	18.2	91.1
Apr. 1	06 11.82	-30 06.4	7.548	7.540	+0.28	+5.5	18.2	85.8
Apr. 11	06 15.07	-29 12.5	7.583	7.482	+0.37	+5.2	18.1	80.4
Apr. 21	06 19.19	-28 22.1	7.616	7.424	+0.46	+4.8	18.1	75.2
May 1	06 24.09	-27 36.4	7.644	7.365	+0.53	+4.3	18.1	70.3
May 11	06 29.69	-26 56.4	7.667	7.307	+0.59	+3.7	18.1	65.6
May 21	06 35.90	-26 22.7	7.682	7.249	+0.65	+3.0	18.0	61.2
May 31	06 42.63	-25 56.2	7.688	7.191	+0.70	+2.3	18.0	57.3
June 10	06 49.78	-25 37.1	7.684	7.133	+0.74	+1.5	18.0	53.9
June 20	06 57.28	-25 25.7	7.669	7.076	+0.77	+0.7	17.9	51.1
June 30	07 05.03	-25 22.2	7.642	7.018	+0.79	-0.1	17.9	49.0
July 10	07 12.96	-25 26.8	7.604	6.960	+0.80	-0.9	17.8	47.7
July 20	07 20.98	-25 39.3	7.553	6.903	+0.80	-1.7	17.8	47.2
July 30	07 29.02	-25 59.9	7.490	6.846	+0.80	-2.5	17.7	47.5
Aug. 9	07 36.99	-26 28.1	7.415	6.789	+0.79	-3.2	17.7	48.7
Aug. 19	07 44.81	-27 03.9	7.328	6.732	+0.77	-4.0	17.6	50.7
Aug. 29	07 52.38	-27 46.8	7.229	6.675	+0.74	-4.7	17.5	53.3
Sept. 8	07 59.62	-28 36.3	7.120	6.618	+0.70	-5.3	17.5	56.6
Sept. 18	08 06.44	-29 32.0	7.000	6.562	+0.65	-5.9	17.4	60.4
Sept. 28	08 12.72	-30 33.2	6.872	6.506	+0.59	-6.4	17.3	64.6
Oct. 8	08 18.37	-31 38.8	6.737	6.450	+0.53	-6.8	17.2	69.2
Oct. 18	08 23.27	-32 47.9	6.595	6.394	+0.44	-7.1	17.2	74.1
Oct. 28	08 27.29	-33 59.1	6.450	6.338	+0.35	-7.2	17.1	79.2
Nov. 7	08 30.34	-35 10.8	6.301	6.283	+0.25	-7.1	17.0	84.4
Nov. 17	08 32.31	-36 21.2	6.153	6.228	+0.13	-6.9	16.9	89.8
Nov. 27	08 33.11	-37 28.0	6.006	6.173	+0.01	-6.4	16.8	95.2
Dec. 7	08 32.70	-38 28.9	5.863	6.119	-0.11	-5.7	16.7	100.5
Dec. 17	08 31.08	-39 21.2	5.726	6.065	-0.23	-4.6	16.6	105.5
Dec. 27	08 28.33	-40 02.2	5.599	6.011	-0.33	-3.4	16.5	110.3
Jan. 6	08 24.61	-40 29.2	5.482	5.957	-0.42	-1.9	16.4	114.5
Jan. 16	08 20.19	-40 40.1	5.378	5.904	-0.47	-0.1	16.4	118.0
Jan. 26	08 15.39	-40 33.4	5.290	5.851	-0.48	+1.7	16.3	120.5
Feb. 5	08 10.62	-40 08.7	5.217	5.799	-0.46	+3.5	16.2	121.9
Feb. 15	08 06.26	-39 26.4	5.161	5.747	-0.40	+5.1	16.2	122.1
Feb. 25	08 02.68	-38 28.2	5.122	5.695	-0.30	+6.6	16.1	121.0
Mar. 7	08 00.19	-37 16.6	5.101	5.644	-0.18	+7.8	16.1	118.7
Mar. 17	07 58.97	-35 54.8	5.096	5.594	-0.05	+8.6	16.0	115.3
Mar. 27	07 59.16	-34 26.2	5.105	5.543	+0.10	+9.1	16.0	111.1

## Comet C/2017 K2 (PANSTARRS)

Epoch = 2020 July 10.0 TT  
 T = 2022 Dec. 19.94326 TT  
 Peri. = 236.16462  
 Node = 88.26427 2000.0  
 Incl. = 87.54346  
 q = 1.7992284 AU  
 e = 1.0004320

$$m1 = 1.1 + 5 \log(\Delta) + 10.0 \log(r)$$

Oh TT	R. A. (2000)	Decl.	Delta	r	Daily motion		m1	Elong.
2020/21	h m	° ' .5			m	'		°
Jan. 2	17 50.04	+45 23.5	10.414	10.114	+0.54	0.0	16.2	69.6
Jan. 12	17 55.36	+45 26.8	10.327	10.044	+0.52	+0.8	16.2	70.7
Jan. 22	18 00.43	+45 38.1	10.232	9.974	+0.49	+1.6	16.1	72.2
Feb. 1	18 05.13	+45 57.2	10.130	9.905	+0.45	+2.3	16.1	74.1
Feb. 11	18 09.35	+46 23.4	10.021	9.834	+0.39	+3.0	16.0	76.3
Feb. 21	18 12.97	+46 56.0	9.907	9.764	+0.32	+3.6	16.0	78.8
Mar. 2	18 15.86	+47 34.3	9.789	9.694	+0.24	+4.1	15.9	81.6
Mar. 12	18 17.91	+48 16.9	9.668	9.623	+0.15	+4.5	15.9	84.4
Mar. 22	18 19.01	+49 02.6	9.546	9.552	+0.05	+4.7	15.8	87.4
Apr. 1	18 19.05	+49 50.0	9.424	9.481	-0.06	+4.8	15.7	90.2
Apr. 11	18 17.96	+50 37.1	9.304	9.410	-0.17	+4.6	15.7	93.0
Apr. 21	18 15.68	+51 22.2	9.186	9.338	-0.29	+4.3	15.6	95.6
May 1	18 12.21	+52 03.1	9.073	9.267	-0.41	+3.8	15.6	98.0
May 11	18 07.59	+52 37.8	8.966	9.195	-0.52	+3.1	15.5	99.9
May 21	18 01.92	+53 04.3	8.866	9.123	-0.62	+2.1	15.4	101.5
May 31	17 55.40	+53 20.7	8.775	9.050	-0.69	+1.0	15.4	102.6
June 10	17 48.28	+53 25.6	8.691	8.978	-0.73	-0.2	15.3	103.2
June 20	17 40.86	+53 17.8	8.618	8.905	-0.75	-1.5	15.3	103.2
June 30	17 33.47	+52 57.1	8.554	8.832	-0.72	-2.8	15.2	102.7
July 10	17 26.45	+52 23.5	8.499	8.759	-0.67	-4.0	15.2	101.5
July 20	17 20.09	+51 37.9	8.453	8.685	-0.59	-5.2	15.1	99.9
July 30	17 14.64	+50 41.6	8.416	8.612	-0.49	-6.2	15.1	97.7
Aug. 9	17 10.26	+49 36.2	8.387	8.538	-0.37	-7.0	15.0	95.1
Aug. 19	17 07.06	+48 23.8	8.365	8.464	-0.25	-7.6	15.0	92.2
Aug. 29	17 05.07	+47 06.3	8.347	8.389	-0.13	-7.9	14.9	88.9
Sept. 8	17 04.28	+45 45.8	8.333	8.315	-0.01	-8.1	14.9	85.5
Sept. 18	17 04.64	+44 24.3	8.321	8.240	+0.10	-8.1	14.9	81.9
Sept. 28	17 06.07	+43 03.7	8.309	8.165	+0.20	-7.9	14.8	78.3
Oct. 8	17 08.47	+41 45.6	8.296	8.089	+0.29	-7.6	14.8	74.7
Oct. 18	17 11.75	+40 31.5	8.279	8.014	+0.37	-7.1	14.7	71.2
Oct. 28	17 15.79	+39 22.8	8.257	7.938	+0.44	-6.5	14.7	68.0
Nov. 7	17 20.48	+38 20.5	8.228	7.862	+0.50	-5.8	14.6	65.1
Nov. 17	17 25.70	+37 25.5	8.190	7.786	+0.55	-5.1	14.6	62.6
Nov. 27	17 31.34	+36 38.8	8.143	7.709	+0.58	-4.2	14.5	60.7
Dec. 7	17 37.28	+36 00.8	8.085	7.632	+0.61	-3.3	14.5	59.5
Dec. 17	17 43.42	+35 32.1	8.016	7.555	+0.62	-2.3	14.4	58.9
Dec. 27	17 49.62	+35 12.9	7.935	7.477	+0.62	-1.4	14.3	59.1
Jan. 6	17 55.78	+35 03.5	7.841	7.400	+0.61	-0.4	14.3	60.1
Jan. 16	18 01.78	+35 03.6	7.736	7.322	+0.59	+0.5	14.2	61.8
Jan. 26	18 07.48	+35 13.4	7.619	7.243	+0.55	+1.5	14.1	64.1
Feb. 5	18 12.76	+35 32.2	7.491	7.165	+0.50	+2.4	14.0	67.1
Feb. 15	18 17.49	+35 59.7	7.353	7.086	+0.44	+3.2	13.9	70.6
Feb. 25	18 21.52	+36 35.1	7.207	7.007	+0.36	+3.9	13.8	74.4
Mar. 7	18 24.72	+37 17.3	7.055	6.927	+0.27	+4.6	13.7	78.6
Mar. 17	18 26.94	+38 05.2	6.898	6.848	+0.16	+5.0	13.6	83.0
Mar. 27	18 28.03	+38 57.2	6.738	6.768	+0.04	+5.4	13.5	87.5

## Orbital elements:

Comet 95P/(2060) Chiron

Epoch 1996 Feb. 7.0 TT = JDT 2450120.5

T 1996 Feb. 14.74504 TT

		(2000.0)	P	Sato	Q
q	8.4539293				
n	0.01942785	Peri. 339.55383	-0.98660438	+0.15200977	
a	13.7041746	Node 209.38434	-0.12782244	-0.94583866	
e	0.3831128	Incl. 6.92994	-0.10135686	-0.28684886	
P	50.73				

From 2441 observations 1941 Jan. 23–2020 Jan. 15, mean residual 0".41.

Comet 174P/(60558) Echeclus

Epoch 2015 Apr. 8.0 TT = JDT 2457120.5

T 2015 Apr. 22.53260 TT

		(2000.0)	P	Sato	Q
q	5.8170650				
n	0.02822877	Peri. 162.93183	+0.91553941	+0.40213226	
a	10.6825464	Node 173.33669	-0.37731585	+0.86619945	
e	0.4554608	Incl. 4.34370	-0.13935687	+0.29662799	
P	34.92				

From 3821 observations 1979 Sept. 23–2020 Jan. 19, mean residual 0".40.

Comet C/2011 KP36 (Spacewatch)

Epoch 2016 May 12.0 TT = JDT 2457520.5

T 2016 May 26.89716 TT

		(2000.0)	P	Sato	Q
q	4.8833088				
n	0.00414024	Peri. 180.59783	+0.99445339	+0.09830691	
a	38.4106824	Node 173.40038	-0.09509854	+0.99227939	
e	0.8728659	Incl. 18.98678	-0.04493027	+0.07561326	
P	238.06				

From 3634 observations 2011 May 21–2020 Jan. 21, mean residual 0".41.

Comet C/2014 OE4 (PANSTARRS)

Epoch 2016 Nov. 28.0 TT = JDT 2457720.5

T 2016 Dec. 10.74933 TT

		(2000.0)	P	Sato	Q
q	6.2443154				
z	+0.0000846	Peri. 65.74334	-0.08368260	+0.50406403	
	+/-0.0000003	Node 240.40004	-0.74841540	+0.53775476	
e	0.9994713	Incl. 81.34887	+0.65792979	+0.67582489	

From 1766 observations 2014 May 8–2020 Jan. 21, mean residual 0".46.

Comet C/2014 B1 (Schwartz)

Epoch 2017 Sept. 4.0 TT = JDT 2458000.5

T 2017 Sept. 10.53254 TT

		(2000.0)	P	Sato	Q
q	9.5565982				
z	-0.0003927	Peri. 345.84152	-0.85029208	-0.50400396	
	+/-0.0000006	Node 161.39569	+0.51719354	-0.85353129	
e	1.0037530	Incl. 28.37225	+0.09754091	+0.13215272	

From 1020 observations 2014 Jan. 28–2019 Dec. 31, mean residual 0".49.

Comet C/2016 A1 (PANSTARRS)

Epoch 2017 Nov. 23.0 TT = JDT 2458080.5

T 2017 Nov. 23.37342 TT

		(2000.0)	P	Sato	Q
q	5.3277622				
z	-0.0003724	Peri. 10.32042	-0.53513186	+0.51121116	
	+/-0.0000003	Node 128.17453	+0.70123240	-0.17512623	
e	1.0019838	Incl. 121.18573	+0.47107008	+0.84142377	

From 2083 observations 2016 Jan. 1–2020 Jan. 1, mean residual 0".52.

Comet C/2015 01 (PANSTARRS)

Epoch 2018 Feb. 11.0 TT = JDT 2458160.5

T 2018 Feb. 19.02771 TT

		(2000.0)	P	Sato	Q
q	3.7296427				
z	-0.0000002	Peri. 89.59350	-0.52094616	-0.50152685	
	+/-0.0000007	Node 299.85576	-0.59863992	+0.79148783	
e	1.0000008	Incl. 127.21109	+0.60847789	+0.34931052	

From 3873 observations 2015 June 15–2020 Jan. 23, mean residual 0".56.

Nongravitational parameters Y1 = +5.25, Y2 = -2.2193.

Comet C/2015 XY1 (Lemmon)  
 Epoch 2018 May 2.0 TT = JDT 2458240.5  
 T 2018 Apr. 29.91252 TT  

	(2000.0)	P	Sato	Q
q	7.9279728			
z	-0.0005216	Peri. 196.35158	+0.04278195	+0.86105051
	+/-0.0000009	Node 281.61654	+0.96478258	+0.09615230
e	1.0041350	Incl. 148.84784	+0.25954630	-0.49934632

 From 670 observations 2015 Dec. 4-2020 Jan. 20, mean residual 0".57.

Comet C/2016 R2 (PANSTARRS)  
 Epoch 2018 May 2.0 TT = JDT 2458240.5  
 T 2018 May 9.58372 TT  

	(2000.0)	P	Sato	Q
q	2.6023716			
z	+0.0013998	Peri. 33.19217	-0.14726343	-0.52443157
	+/-0.0000002	Node 80.56877	+0.61562591	-0.71221376
e	0.9963571	Incl. 58.22384	+0.77415646	+0.46660807

 From 4163 observations 2016 Aug. 30-2020 Jan. 5, mean residual 0".50.

Comet 159P/LONEOS  
 Epoch 2018 June 11.0 TT = JDT 2458280.5  
 T 2018 May 22.80010 TT  

	(2000.0)	P	Sato	Q
q	3.6252072			
n	0.06943706	Peri. 4.76224	+0.50884837	-0.79664198
a	5.8623960	Node 55.02424	+0.77608908	+0.26053593
e	0.3816168	Incl. 23.46270	+0.37250379	+0.54541964

 P 14.19  
 From 730 observations 1989 Dec. 17-2020 Jan. 4, mean residual 0".53.

Comet C/2016 N6 (PANSTARRS)  
 Epoch 2018 July 21.0 TT = JDT 2458320.5  
 T 2018 July 18.21067 TT  

	(2000.0)	P	Sato	Q
q	2.6690706			
z	+0.0004672	Peri. 162.80587	-0.53335026	+0.08479661
	+/-0.0000002	Node 298.97627	+0.61778886	+0.71869313
e	0.9987531	Incl. 105.83229	+0.57781867	-0.69013747

 From 3044 observations 2016 June 27-2020 Jan. 24, mean residual 0".43.

Epoch 2018 Aug. 30.0 TT = JDT 2458360.5  
 T 2018 Aug. 10.17291 TT  

	(2000.0)	P	Sato	Q
q	2.2104969			
z	+0.0004079	Peri. 209.82581	+0.02468664	-0.03424846
	+/-0.0000001	Node 92.20360	-0.59786095	+0.80048760
e	0.9990983	Incl. 90.99967	-0.80121960	-0.59836998

 From 3204 observations 2016 June 22-2020 Jan. 26, mean residual 0".52.

Comet C/2018 L2 (ATLAS)  
 Epoch 2018 Nov. 18.0 TT = JDT 2458440.5  
 T 2018 Dec. 2.57877 TT  

	(2000.0)	P	Sato	Q
q	1.7116812			
z	+0.0041103	Peri. 56.22971	+0.03220283	+0.56732591
	+/-0.0000007	Node 243.01854	-0.89265197	+0.38666438
e	0.9929644	Incl. 67.42370	+0.44959475	+0.72707082

 From 704 observations 2018 June 4-2020 Jan. 20, mean residual 0".70.

Comet C/2018 A3 (ATLAS)  
 Epoch 2018 Dec. 28.0 TT = JDT 2458480.5  
 T 2019 Jan. 12.86339 TT  

	(2000.0)	P	Sato	Q
q	3.2767174			
z	+0.0020060	Peri. 86.42655	-0.24776720	+0.95551873
	+/-0.0000004	Node 194.27957	+0.40380108	+0.25195805
e	0.9934268	Incl. 139.56199	+0.88065663	+0.15330069

 From 1459 observations 2018 Jan. 10-2020 Jan. 21, mean residual 0".51.

Comet C/2017 B3 (LINEAR)

Epoch 2019 Feb. 6.0 TT = JDT 2458520.5

T 2019 Feb. 2.50591 TT

		(2000.0)	P	Sato	Q
q	3.9211437				
z	-0.0005327	Peri.	284.74998	+0.27591949	+0.96068700
	+/-0.0000005	Node	2.17724	-0.19811235	+0.08820221
e	1.0020889	Incl.	54.17875	-0.94054236	+0.26325058

From 750 observations 2016 Apr. 1-2020 Jan. 7, mean residual 0".44.

Comet C/2010 U3 (Boattini)

Epoch 2019 Mar. 18.0 TT = JDT 2458560.5

T 2019 Feb. 26.62063 TT

		(2000.0)	P	Sato	Q
q	8.4455365				
z	+0.0001950	Peri.	88.08625	-0.36204624	-0.74305759
	+/-0.0000003	Node	43.06726	+0.07255996	-0.62443371
e	0.9983529	Incl.	55.51175	+0.92933179	-0.24072385

From 2036 observations 2005 Nov. 5-2020 Jan. 22, mean residual 0".63.

Comet 29P/Schwassmann-Wachmann

Epoch 2019 Mar. 18.0 TT = JDT 2458560.5

T 2019 Mar. 7.75639 TT

		(2000.0)	P	Sato	Q
q	5.7668177				
n	0.06662630	Peri.	47.77446	+0.99270158	-0.00956971
a	6.0261361	Node	312.39456	-0.05135106	+0.86841774
e	0.0430323	Incl.	9.36831	+0.10911755	+0.49574091

P 14.79

From 29950 observations 1902 Mar. 5-2020 Jan. 23, mean residual 0".64.

Comet 78P/Gehrels

Epoch 2019 Mar. 18.0 TT = JDT 2458560.5

T 2019 Apr. 2.70068 TT

		(2000.0)	P	Sato	Q
q	2.0138460				
n	0.13625351	Peri.	192.68425	+0.72924700	-0.68201044
a	3.7402812	Node	210.54794	+0.63691154	+0.70612279
e	0.4615790	Incl.	6.24885	+0.25008498	+0.19040053

P 7.23

From 4900 observations 2011 May 7-2020 Jan. 19, mean residual 0".56.

Nongravitational parameters A1 = -0.50, A2 = -1.6359.

Comet 261P/Larson

Epoch 2019 June 6.0 TT = JDT 2458640.5

T 2019 June 18.66014 TT

		(2000.0)	P	Sato	Q
q	2.0133910				
n	0.15131140	Peri.	67.10745	+0.99471911	+0.02811958
a	3.4878272	Node	291.16439	-0.06817050	+0.89996242
e	0.4227377	Incl.	6.07597	+0.07672466	+0.43505969

P 6.51

From 823 observations 2005 July 3-2020 Jan. 20, mean residual 0".69.

Nongravitational parameters A1 = +0.74, A2 = +0.1500.

Comet C/2019 K5 (Young)

Epoch 2019 May 17.0 TT = JDT 2458620.5

T 2019 June 22.74436 TT

		(2000.0)	P	Sato	Q
q	2.0350422				
z	+0.0066448	Peri.	174.91321	+0.99066848	+0.13567653
	+/-0.0000021	Node	177.18870	-0.13250282	+0.98101584
e	0.9864776	Incl.	15.31565	-0.03192109	+0.13856336

From 548 observations 2018 June 17-2020 Jan. 18, mean residual 0".46.

Comet C/2018 A6 (Gibbs)

Epoch 2019 July 16.0 TT = JDT 2458680.5

T 2019 July 14.26757 TT

		(2000.0)	P	Sato	Q
q	3.0177651				
n	0.01637788	Peri.	264.52768	-0.16525540	+0.93045684
a	15.3566875	Node	340.38605	+0.22092879	-0.28822609
e	0.8034885	Incl.	76.95487	-0.96118735	-0.22622068

P 60.18

From 424 observations 2017 Apr. 3-2019 Dec. 26, mean residual 0".47.

Comet C/2019 K8 (ATLAS)

Epoch 2019 July 16.0 TT = JDT 2458680.5

T 2019 July 21.21596 TT

q	3.1950527	(2000.0)	P	Sato	Q
z	+0.0006996	Peri.	85.35204	-0.02318472	-0.36219499
	+/-0.0000046	Node	291.04648	-0.48368824	+0.81977737
e	0.9977648	Incl.	93.22218	+0.87493323	+0.44359874

From 473 observations 2019 May 27-2020 Jan. 1, mean residual 0".50.

Comet C/2020 A3 (ATLAS)

Epoch 2019 July 16.0 TT = JDT 2458680.5

T 2019 July 28.60032 TT

q	5.8377177	(2000.0)	P	Sato	Q
z	-0.0039592	Peri.	271.08302	-0.73100591	-0.49217517
	+/-0.0013462	Node	120.39139	-0.15533068	+0.79448846
e	1.0231127	Incl.	146.77433	-0.66445672	+0.35574104

From 36 observations 2020 Jan. 3-20, mean residual 0".51.

Comet C/2018 D04 (Lemmon)

Epoch 2019 Aug. 25.0 TT = JDT 2458720.5

T 2019 Aug. 18.40499 TT

q	2.4059610	(2000.0)	P	Sato	Q
n	0.00749554	Peri.	175.97270	+0.25993978	+0.91236372
a	25.8583407	Node	251.13285	+0.87634461	-0.08534646
e	0.9069561	Incl.	160.47472	+0.40552613	-0.40038534

P 131.49

From 710 observations 2016 Apr. 5-2020 Jan. 20, mean residual 0".41.

Comet C/2018 W2 (Africano)

Epoch 2019 Aug. 25.0 TT = JDT 2458720.5

T 2019 Sept. 5.72952 TT

q	1.4546666	(2000.0)	P	Sato	Q
z	-0.0005220	Peri.	157.97320	+0.92110253	+0.38824921
	+/-0.0000004	Node	181.84962	+0.04815174	-0.04006003
e	1.0007594	Incl.	116.61562	+0.38633086	-0.92068330

From 1908 observations 2018 Nov. 27-2019 Dec. 31, mean residual 0".56.

Comet 260P/McNaught

Epoch 2019 Aug. 25.0 TT = JDT 2458720.5

T 2019 Sept. 9.95667 TT

q	1.4167202	(2000.0)	P	Sato	Q
n	0.14302600	Peri.	18.38904	+0.98887944	-0.14077036
a	3.6212573	Node	349.35549	+0.08128805	+0.78172801
e	0.6087767	Incl.	15.05225	+0.12453797	+0.60752368

P 6.89

From 6111 observations 2005 May 20-2020 Jan. 20, mean residual 0".45.

Nongravitational parameters A1 = +0.00, A2 = -0.0034.

Comet 384P/Kowalski

Epoch 2019 Oct. 4.0 TT = JDT 2458760.5

T 2019 Oct. 11.41129 TT

q	1.1163624	(2000.0)	P	Sato	Q
n	0.19934711	Peri.	37.64368	+0.84867449	-0.52876227
a	2.9022139	Node	354.23489	+0.44925483	+0.73334916
e	0.6153411	Incl.	7.28130	+0.27914462	+0.42732830

P 4.94

From 355 observations 2019 July 27-2020 Jan. 19, mean residual 0".46.

Comet 76P/West-Kohoutek-Ikemura

Epoch 2019 Nov. 13.0 TT = JDT 2458800.5

T 2019 Oct. 26.14069 TT

q	1.6047980	(2000.0)	P	Sato	Q
n	0.15214090	Peri.	0.01967	+0.10206425	-0.85751700
a	3.4751381	Node	84.12499	+0.91262156	-0.12099016
e	0.5382060	Incl.	30.45703	+0.39585955	+0.50002598

P 6.48

From 708 observations 1993 July 20-2020 Jan. 19, mean residual 0".78.

Nongravitational parameters A1 = +0.02, A2 = -0.0218.

## Comet 68P/Klemola

Epoch 2019 Nov. 13.0 TT = JDT 2458800.5

T 2019 Nov. 9.03747 TT

		(2000.0)	P	Sato	Q
q	1.7938514				
n	0.08952500	Peri.	153.05770	+0.85006977	+0.52641096
a	4.9488750	Node	175.08244	-0.51125531	+0.83231658
e	0.6375234	Incl.	11.11085	-0.12648871	+0.17361052
P	11.01				

From 1734 observations 1987 Feb. 16–2020 Jan. 2, mean residual 0".57.

Nongravitational parameters A1 = +0.11, A2 = -0.0019.

## Comet C/2018 N2 (ASASSN)

Epoch 2019 Nov. 13.0 TT = JDT 2458800.5

T 2019 Nov. 10.96137 TT

		(2000.0)	P	Sato	Q
q	3.1246383				
z	-0.0000504	Peri.	24.39595	+0.78558458	-0.45744770
+/-	-0.0000003	Node	25.25926	+0.27011618	-0.35227819
e	1.0001573	Incl.	77.53195	+0.55668134	+0.81648128

From 2942 observations 2018 July 10–2020 Jan. 25, mean residual 0".38.

## Comet 155P/Shoemaker

Epoch 2019 Nov. 13.0 TT = JDT 2458800.5

T 2019 Nov. 15.01933 TT

		(2000.0)	P	Sato	Q
q	1.8018456				
n	0.05825845	Peri.	14.66671	-0.37084812	-0.92209376
a	6.5901721	Node	97.19771	+0.84044705	-0.38385660
e	0.7265860	Incl.	6.39593	+0.39512078	-0.04896120
P	16.92				

From 1219 observations 2002 Sept. 4–2020 Jan. 26, mean residual 0".66.

## Comet 160P/LINEAR

Epoch 2019 Nov. 13.0 TT = JDT 2458800.5

T 2019 Dec. 2.27547 TT

		(2000.0)	P	Sato	Q
q	1.7873486				
n	0.13455956	Peri.	12.64480	+0.96673157	+0.22554606
a	3.7716062	Node	333.36888	-0.25181293	+0.75626443
e	0.5261041	Incl.	15.61580	-0.04494808	+0.61416048
P	7.32				

From 826 observations 1996 Sept. 8–2020 Jan. 26, mean residual 0".64.

## Comet C/2018 F4 (PANSTARRS)

Epoch 2019 Dec. 23.0 TT = JDT 2458840.5

T 2019 Dec. 4.09269 TT

		(2000.0)	P	Sato	Q
q	3.4398665				
z	-0.0004369	Peri.	263.21176	-0.01437560	+0.89948237
+/-	-0.0000019	Node	26.50749	+0.16996065	+0.43260791
e	1.0015028	Incl.	78.09841	-0.98534599	+0.06149690

From 271 observations 2018 Mar. 17–2020 Jan. 24, mean residual 0".64.

## Comet 2I/Borisov

Epoch 2019 Dec. 23.0 TT = JDT 2458840.5

T 2019 Dec. 8.55563 TT

		(2000.0)	P	Sato	Q
q	2.0065349				
z	-1.1744601	Peri.	209.12572	-0.81468651	-0.19308205
+/-	-0.0000219	Node	308.14794	+0.56666557	-0.46537721
e	3.3565952	Incl.	44.05285	-0.12319103	-0.86379591

From 2346 observations 2019 Aug. 30–2020 Jan. 6, mean residual 0".67.

## Comet P/2019 Y3 (Catalina)

Epoch 2019 Dec. 23.0 TT = JDT 2458840.5

T 2019 Dec. 13.45888 TT

		(2000.0)	P	Sato	Q
q	0.9119670				
n	0.19001892	Peri.	2.26556	-0.78183384	-0.56132933
a	2.9964347	Node	139.37900	+0.56528374	-0.82180973
e	0.6956493	Incl.	24.63445	+0.26304019	+0.09766347
P	5.19				

From 79 observations 2019 Dec. 17–2020 Jan. 8, mean residual 0".62.

## Comet 289P/Blanpain

Epoch 2019 Dec. 23.0 TT = JDT 2458840.5

T 2019 Dec. 20.98682 TT

		(2000.0)	P	Sato	Q
q	0.9588844				
n	0.18531731	Peri.	9.84614	+0.19560807	-0.97598463
a	3.0469037	Node	68.92295	+0.89262497	+0.13670356
e	0.6852922	Incl.	5.89733	+0.40615041	+0.16960581
P	5.32				

From 162 observations 2004 Jan. 19–2020 Jan. 21, mean residual 0".85.

Nongravitational parameters A1 = +0.01, A2 = -0.0072.

## Comet C/2020 A2 (Iwamoto)

Epoch 2019 Dec. 23.0 TT = JDT 2458840.5

T 2020 Jan. 8.33630 TT

		(2000.0)	P	Sato	Q
q	0.9782108				
z	+0.0000976	Peri.	68.21942	-0.35092991	-0.44374207
	+/-0.0004546	Node	286.37068	-0.76685794	+0.64153925
e	0.9999045	Incl.	120.74757	+0.53737984	+0.62571589

From 92 observations 2020 Jan. 9–29, mean residual 0".59.

## Comet 101P/Chernykh

Epoch 2020 Feb. 1.0 TT = JDT 2458880.5

T 2020 Jan. 12.53039 TT

		(2000.0)	P	Sato	Q
q	2.3448254				
n	0.07061596	Peri.	277.69801	+0.82624105	-0.55774915
a	5.7969668	Node	116.23451	+0.54531038	+0.75674899
e	0.5955082	Incl.	5.05296	+0.14128809	+0.34094994
P	13.96				

From 893 observations 1992 Oct. 25–2020 Jan. 26, mean residual 0".67.

Nongravitational parameters A1 = +2.78, A2 = -0.4704.

## Comet 114P/Wiseman-Skiff

Epoch 2020 Feb. 1.0 TT = JDT 2458880.5

T 2020 Jan. 14.08444 TT

		(2000.0)	P	Sato	Q
q	1.5794033				
n	0.14751053	Peri.	172.81336	+0.10042598	-0.94426958
a	3.5474861	Node	271.05962	+0.89653188	+0.22251096
e	0.5547824	Incl.	18.27230	+0.43144550	-0.24257749
P	6.68				

From 1313 observations 1986 Dec. 28–2020 Jan. 29, mean residual 0".59.

Nongravitational parameters A1 = +0.33, A2 = +0.0019.

## Comet P/2019 Y2 (Fuls)

Epoch 2020 Feb. 1.0 TT = JDT 2458880.5

T 2020 Jan. 31.85125 TT

		(2000.0)	P	Sato	Q
q	2.1247831				
n	0.15353838	Peri.	92.34874	-0.98933479	-0.11881322
a	3.4540192	Node	80.83616	+0.07441846	-0.90958617
e	0.3848375	Incl.	4.89623	+0.12521411	-0.39816632
P	6.42				

From 163 observations 2019 Dec. 21–2020 Jan. 22, mean residual 0".62.

## Comet 112P/Urata-Nijima

Epoch 2020 Feb. 1.0 TT = JDT 2458880.5

T 2020 Feb. 7.96397 TT

		(2000.0)	P	Sato	Q
q	1.4466213				
n	0.14885323	Peri.	21.49955	+0.61391624	-0.75917598
a	3.5261210	Node	31.84988	+0.65126719	+0.33234152
e	0.5897414	Incl.	24.19084	+0.44604697	+0.55964359
P	6.62				

From 386 observations 1986 Oct. 4–2020 Jan. 21, mean residual 0".66.

Nongravitational parameters A1 = +0.04, A2 = +0.0067.

Comet C/2019 K1 (ATLAS)

Epoch 2020 Feb. 1.0 TT = JDT 2458880.5

T 2020 Feb. 12.95944 TT

	(2000.0)	P	Sato	Q
q	2.0126240			
z	+0.0000918	Peri. 265.70490	+0.02608826	+0.28887235
+/-	-0.0000044	Node 73.37496	+0.31731122	+0.90543656
e	0.9998153	Incl. 87.14960	-0.94796255	+0.31102638

From 187 observations 2019 May 16–Dec. 26, mean residual 0".63.

Comet 203P/Korlevic

Epoch 2020 Mar. 12.0 TT = JDT 2458920.5

T 2020 Mar. 5.04469 TT

	(2000.0)	P	Sato	Q
q	3.1997782			
n	0.09762994	Peri. 154.87765	+0.08267674	-0.99538906
a	4.6710448	Node 290.34911	+0.90535802	+0.09541591
e	0.3149759	Incl. 2.97328	+0.41652300	-0.00981947

P 10.10

From 885 observations 1999 Nov. 3–2020 Jan. 19, mean residual 0".75.

Nongravitational parameters A1 = +10.38, A2 = +2.6904.

Comet 228P/LINEAR

Epoch 2020 Mar. 12.0 TT = JDT 2458920.5

T 2020 Mar. 10.69754 TT

	(2000.0)	P	Sato	Q
q	3.4358528			
n	0.11555958	Peri. 115.30195	-0.82743654	-0.55707168
a	4.1744451	Node 30.98884	+0.45293087	-0.73662869
e	0.1769318	Incl. 7.90956	+0.33196747	-0.38347010

P 8.53

From 285 observations 2001 Dec. 9–2020 Jan. 19, mean residual 0".75.

Nongravitational parameters Y1 = +0.07, Y2 = -0.0134.

Comet C/2019 Y1 (ATLAS)

Epoch 2020 Mar. 12.0 TT = JDT 2458920.5

T 2020 Mar. 15.57126 TT

	(2000.0)	P	Sato	Q
q	0.8371542			
z	+0.0051604	Peri. 57.55146	+0.33205282	-0.80053513
+/-	-0.0004342	Node 31.38240	+0.12428374	-0.48714991
e	0.9956800	Incl. 73.33817	+0.93503715	+0.34903936

From 133 observations 2019 Dec. 16–2020 Jan. 29, mean residual 0".60.

Comet 390P/Gibbs

Epoch 2020 Mar. 12.0 TT = JDT 2458920.5

T 2020 Mar. 22.22594 TT

	(2000.0)	P	Sato	Q
q	1.6997756			
n	0.07061016	Peri. 232.33666	+0.88995809	-0.43134373
a	5.7972844	Node 152.28117	+0.44897698	+0.88563977
e	0.7067980	Incl. 18.55920	-0.07996419	+0.17200225

P 13.96

From 191 observations 2006 Nov. 16–2020 Jan. 11, mean residual 0".67.

Comet C/2017 K5 (PANSTARRS)

Epoch 2020 Mar. 12.0 TT = JDT 2458920.5

T 2020 Mar. 24.15596 TT

	(2000.0)	P	Sato	Q
q	7.6787016			
z	-0.0008332	Peri. 171.83511	+0.19343721	+0.16058692
+/-	-0.0000035	Node 102.37349	-0.94682399	+0.28908198
e	1.0063979	Incl. 82.26372	-0.25711160	-0.94373908

From 70 observations 2017 May 27–2019 Oct. 26, mean residual 0".48.

Comet 392P/LINEAR

Epoch 2020 Mar. 12.0 TT = JDT 2458920.5

T 2020 Mar. 31.84857 TT

	(2000.0)	P	Sato	Q
q	1.9502379			
n	0.06461661	Peri. 71.99648	-0.11839196	-0.99230822
a	6.1504459	Node 24.88825	+0.87543234	-0.12149632
e	0.6829111	Incl. 4.92937	+0.46861664	-0.02372837

P 15.25

From 208 observations 1989 Nov. 22–2020 Jan. 22, mean residual 0".53.

## Comet 210P/Christensen

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 Apr. 7.90107 TT

		(2000.0)	P	Sato	Q
q	0.5279931				
n	0.17495974	Peri.	345.90987	+0.17413275	-0.96854715
a	3.1659979	Node	93.83578	+0.91983965	+0.09555009
e	0.8332301	Incl.	10.26183	+0.35152923	+0.22975335
P	5.63				

From 261 observations 2008 Dec. 30–2014 Aug. 19, mean residual 0".64.

## Comet P/2005 T2 (Christensen)

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 Apr. 8.53554 TT

		(2000.0)	P	Sato	Q
q	2.2442578				
n	0.13060767	Peri.	58.79992	+0.74542894	+0.65126025
a	3.8473077	Node	260.15921	-0.65008849	+0.66313147
e	0.4166680	Incl.	8.29293	-0.14737926	+0.36894002
P	7.55				

From 69 observations 2005 Oct. 7–Nov. 25, mean residual 0".62.

From CHB 2019.

## Comet 313P/Gibbs

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 Apr. 15.16834 TT

		(2000.0)	P	Sato	Q
q	2.4188911				
n	0.17537440	Peri.	254.60693	+0.98297054	-0.01477754
a	3.1610055	Node	105.97195	+0.07787797	+0.93632425
e	0.2347716	Incl.	10.98330	-0.16644499	+0.35082549
P	5.62				

From 109 observations 2003 Sept. 22–2019 Sept. 19, mean residual 0".66.

## Comet 266P/Christensen

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 Apr. 19.51649 TT

		(2000.0)	P	Sato	Q
q	2.3352265				
n	0.14825855	Peri.	97.84754	-0.22230022	-0.97496432
a	3.5355437	Node	5.00571	+0.86932987	-0.20063000
e	0.3395000	Incl.	3.42554	+0.44141613	-0.09587582
P	6.65				

From 360 observations 2007 Apr. 6–2020 Jan. 29, mean residual 0".77.

Nongravitational parameters A1 = +1.46, A2 = +0.5843.

## Comet 124P/Mrkos

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 Apr. 26.89047 TT

		(2000.0)	P	Sato	Q
q	1.6475256				
n	0.16307521	Peri.	183.85564	-0.99734470	+0.07274680
a	3.3180079	Node	0.37084	-0.04453864	-0.57254508
e	0.5034594	Incl.	31.51285	-0.05761815	-0.81663948
P	6.04				

From 2032 observations 1991 Mar. 18–2020 Jan. 15, mean residual 0".48.

Nongravitational parameters A1 = -0.01, A2 = -0.0016.

## Comet C/2017 T2 (PANSTARRS)

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 May 4.95283 TT

		(2000.0)	P	Sato	Q
q	1.6150916				
z	+0.0002356	Peri.	92.99499	-0.50996304	-0.40634303
	+/-0.0000003	Node	64.37795	-0.16278833	-0.81987691
e	0.9996195	Incl.	57.23056	+0.84465239	-0.40334500

From 3068 observations 2017 Sept. 15–2020 Jan. 29, mean residual 0".44.

## Comet A/2019 C1

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 May 5.73797 TT

		(2000.0)	P	Sato	Q
q	6.5812668				
z	+0.0012008	Peri.	319.19124	-0.92230943	-0.22380672
	+/-0.0000040	Node	212.39685	+0.19030217	-0.97256676
e	0.9920970	Incl.	36.01655	-0.33634864	+0.06343861

From 165 observations 2019 Jan. 14–2020 Jan. 22, mean residual 0".42.

## Comet 87P/Bus

Epoch 2020 Apr. 21.0 TT = JDT 2458960.5

T 2020 May 9.26209 TT

		(2000.0)	P	Sato	Q
q	2.0998362				
n	0.15462967	Peri.	24.93104	-0.89266330	+0.45072171
a	3.4377490	Node	181.86091	-0.42077182	-0.83451069
e	0.3891828	Incl.	2.60252	-0.16156519	-0.31692562
P	6.37				

From 220 observations 1999 Nov. 13–2020 Jan. 5, mean residual 0".77.

Nongravitational parameters A1 = +1.83, A2 = -0.2141.

## Comet C/2019 K6

Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 May 20.17018 TT

		(2000.0)	P	Sato	Q
q	3.9286356				
z	+0.0006506	Peri.	187.61556	-0.78645765	-0.35805400
	+/-0.0000137	Node	42.93984	-0.52056810	+0.82278316
e	0.9974439	Incl.	132.37342	-0.33240521	-0.44139007

From 170 observations 2019 May 7–Aug. 25, mean residual 0".30.

## Comet 58P/Jackson-Neujmin

Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 May 25.04649 TT

		(2000.0)	P	Sato	Q
q	1.3775505				
n	0.11952431	Peri.	200.46353	+0.99671408	-0.00046531
a	4.0816136	Node	159.06382	+0.01615686	+0.98103052
e	0.6624985	Incl.	13.10167	-0.07937256	+0.19385278
P	8.25				

From 317 observations 1970 Sept. 30–1996 Feb. 17, mean residual 0".72.

Nongravitational parameters A1 = +0.34, A2 = -0.0317.

## Comet C/2019 Y4 (ATLAS)

Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 May 30.76029 TT

		(2000.0)	P	Sato	Q
q	0.2513561				
z	+0.0020760	Peri.	177.49873	+0.48119199	+0.62690558
	+/-0.0003813	Node	120.53686	-0.81612387	+0.57552526
e	0.9994782	Incl.	45.34932	-0.31999390	-0.52512862

From 181 observations 2019 Dec. 28–2020 Jan. 19, mean residual 0".51.

## Comet 36P/Whipple

Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 May 31.62925 TT

		(2000.0)	P	Sato	Q
q	3.0216239				
n	0.11742011	Peri.	200.76970	+0.92316155	-0.38437113
a	4.1302314	Node	181.86340	+0.37255926	+0.89820365
e	0.2684129	Incl.	9.95268	+0.09472246	+0.21328160
P	8.39				

From 560 observations 1948 July 18–2020 Jan. 13, mean residual 0".67.

Nongravitational parameters A1 = +0.89, A2 = -0.0484.

## Comet 84P/Giclas

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 June 3.81352 TT

		(2000.0)	P	Sato	Q
q	1.7188443				
n	0.14750293	Peri.	281.56274	+0.86023418	-0.49437189
a	3.5476080	Node	108.17455	+0.50388032	+0.78667627
e	0.5154920	Incl.	7.55231	+0.07811386	+0.36977949
P	6.68				

From 1178 observations 1978 Sept. 11–2014 Mar. 23, mean residual 0".64.

Nongravitational parameters A1 = +0.04 A2 = -0.0054.

## Comet C/2019 K7 (Smith)

Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 June 16.89649 TT

		(2000.0)	P	Sato	Q
q	4.4749892				
z	-0.0003292	Peri.	27.29121	+0.46156789	-0.44584335
	+/-0.0000061	Node	307.92393	-0.88099716	-0.12910467
e	1.0014730	Incl.	103.53230	+0.10391868	+0.88575148

From 253 observations 2019 May 30–Dec. 6, mean residual 0".47.

## Comet A/2019 U6

Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 June 18.82287 TT

		(2000.0)	P	Sato	Q
q	0.9142509				
z	+0.0023113	Peri.	329.66054	-0.68858247	+0.06105161
	+/-0.0000031	Node	235.70589	-0.35185158	-0.89942358
e	0.9978869	Incl.	61.00157	-0.63407779	+0.43279317

From 70 observations 2018 Nov. 6–2020 Jan. 24, mean residual 0".36.

## Comet P/2012 SB6 (Lemmon)

Epoch 2020 May 31.0 TT = JDT 2459000.5

T 2020 June 19.41307 TT

		(2000.0)	P	Sato	Q
q	2.2768248				
n	0.13174176	Peri.	14.39214	+0.92384083	-0.38181827
a	3.8251964	Node	8.20981	+0.32977495	+0.75801799
e	0.4047822	Incl.	10.92868	+0.19433633	+0.52879441
P	7.48				

From 184 observations 2012 Sept. 14–2013 Feb. 6, mean residual 0".59.  
From CHB 2019.

## Comet 2P/Encke

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 June 25.84555 TT

		(2000.0)	P	Sato	Q
q	0.3367213				
n	0.29891916	Peri.	186.56272	-0.94513512	-0.31471231
a	2.2153051	Node	334.55168	+0.30822859	-0.77023009
e	0.8480023	Incl.	11.76461	+0.10823467	-0.55470872
P	3.30				

From 1238 observations 2016 July 8–2019 Dec. 28, mean residual 0".67.

Nongravitational parameters A1 = -0.11, A2 = +0.0212.

## Comet 249P/LINEAR

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 June 29.49733 TT

		(2000.0)	P	Sato	Q
q	0.4967521				
n	0.21470510	Peri.	65.60545	+0.56207058	+0.81752730
a	2.7621111	Node	239.17646	-0.80186661	+0.50147198
e	0.8201549	Incl.	8.39688	-0.20269833	+0.28315185
P	4.59				

From 396 observations 2006 Oct. 19–2016 Mar. 5, mean residual 0".51.

## Comet 377P/Scotti

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 July 11.28555 TT

		(2000.0)	P	Sato	Q
q	5.0167225				
n	0.05666081	Peri.	354.96871	-0.75360751	+0.64755363
a	6.7134774	Node	226.05929	-0.59748110	-0.74642894
e	0.2527386	Incl.	9.02208	-0.27402929	-0.15335621
P	17.39				

From 84 observations 2002 Apr. 5–2019 Apr. 4, mean residual 0".42

## Comet C/2019 V1 (Borisov)

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 July 16.57253 TT

		(2000.0)	P	Sato	Q
q	3.0971186				
z	+0.0004251	Peri.	51.20176	-0.29082349	-0.38561630
	+/-0.0000523	Node	83.20550	+0.33735943	-0.89773445
e	0.9986833	Incl.	61.86265	+0.89532693	+0.21300923

From 102 observations 2019 Nov. 1–2020 Jan. 29, mean residual 0".74.

## Comet 178P/Hug-Bell

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 July 16.60745 TT

		(2000.0)	P	Sato	Q
q	1.8812691				
n	0.14248736	Peri.	297.78436	+0.74250131	-0.64306458
a	3.6303778	Node	102.87420	+0.66209756	+0.66212165
e	0.4817980	Incl.	11.08964	+0.10158065	+0.38478939
P	6.92				

From 632 observations 1999 Oct. 10–2019 Sept. 29, mean residual 0".65.

Nongravitational parameters A1 = +0.19, A2 = -0.0507.

## Comet A/2019 Q1

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 July 19.78664 TT

		(2000.0)	P	Sato	Q
q	4.9968004				
z	-0.0000949	Peri.	55.93138	+0.92263456	-0.26843035
	+/-0.0000467	Node	42.33623	-0.30146093	-0.94979606
e	1.0004740	Incl.	155.72016	+0.24055514	-0.16072523

From 118 observations 2019 Aug. 28–Dec. 28, mean residual 0".49.

## Comet 115P/Maury

Epoch 2020 July 10.0 TT = JDT 2459040.5

T 2020 July 29.75480 TT

		(2000.0)	P	Sato	Q
q	2.0569128				
n	0.11143530	Peri.	121.01522	+0.45575834	+0.88999271
a	4.2768189	Node	176.01932	-0.86998612	+0.44873837
e	0.5190554	Incl.	11.67418	-0.18817141	+0.08091263
P	8.84				

From 694 observations 1985 Sept. 7–2011 Dec. 16, mean residual 0".69.

Nongravitational parameters A1 = +0.65, A2 = -0.0285.

## Comet 304P/Ory

Epoch 2020 Aug. 19.0 TT = JDT 2459080.5

T 2020 Aug. 12.47703 TT

		(2000.0)	P	Sato	Q
q	1.2586865				
n	0.17630166	Peri.	335.22632	+0.82706963	-0.56074786
a	3.1499122	Node	58.93692	+0.52300028	+0.74229189
e	0.6004058	Incl.	2.60666	+0.20597705	+0.36683047
P	5.59				

From 1223 observations 2002 Oct. 4–2015 Jan. 28, mean residual 0".53.

Nongravitational parameters A1 = +0.13, A2 = +0.0780.

## Comet P/2013 W1 (PANSTARRS)

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 10.36777 TT

		(2000.0)	P	Sato	Q
q	1.4213848				
n	0.15108878	Peri.	1.29470	-0.48692718	-0.87043855
a	3.4912524	Node	117.84851	+0.80063036	-0.47792379
e	0.5928725	Incl.	4.69543	+0.34913170	-0.11800674
P	6.52				

From 102 observations 2013 Nov. 9–2014 Mar. 3, mean residual 0".63.

## Comet 257P/Catalina

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 10.74240 TT

		(2000.0)	P	Sato	Q
q	2.1424398				
n	0.13500700	Peri.	117.64906	+0.79759544	+0.58134328
a	3.7632683	Node	207.73794	-0.59861281	+0.79567168
e	0.4306970	Incl.	20.22174	+0.07419033	+0.17013689
P	7.30				

From 1155 observations 2005 Apr. 17–2019 May 11, mean residual 0".59.

Nongravitational parameters A1 = +0.40, A2 = -0.5255.

## Comet 278P/McNaught

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 12.06545 TT

		(2000.0)	P	Sato	Q
q	2.0869998				
n	0.13883594	Peri.	238.08879	-0.28494927	+0.95804100
a	3.6937552	Node	15.44726	-0.83545299	-0.23237024
e	0.4349924	Incl.	6.68494	-0.46991725	-0.16781394
P	7.10				

From 167 observations 2006 May 22–2020 Jan. 7, mean residual 0".59.

## Comet P/2007 R2 (Gibbs)

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 15.61762 TT

		(2000.0)	P	Sato	Q
q	1.6371748				
n	0.14591963	Peri.	352.35024	+0.99775516	-0.06683465
a	3.5732240	Node	11.48450	+0.06250778	+0.90688343
e	0.5418214	Incl.	1.21287	+0.02402932	+0.41604757
P	6.75				

From 161 observations 2007 Sept. 10–Dec. 1, mean residual 0".71.

From CHB 2019.

## Comet 296P/Garradd

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 17.92524 TT

		(2000.0)	P	Sato	Q
q	1.8234250				
n	0.15070810	Peri.	350.12599	-0.26328482	+0.86669241
a	3.4971290	Node	263.64073	-0.85348589	-0.41399813
e	0.4785937	Incl.	25.23472	-0.44971428	+0.27829806
P	6.54				

From 231 observations 2001 June 30–2014 Oct. 2, mean residual 0".66.

## Comet P/2007 VQ11 (Catalina)

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 18.07816 TT

		(2000.0)	P	Sato	Q
q	2.6953448				
n	0.07796326	Peri.	277.67753	+0.14156877	-0.98814025
a	5.4267863	Node	163.81547	+0.97139211	+0.12709510
e	0.5033258	Incl.	12.32007	+0.19067160	+0.08617235
P	12.64				

From 71 observations 2007 Nov. 3–2008 Mar. 27, mean residual 0".71.

From CHB 2019.

## Comet 88P/Howell

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 26.60483 TT

		(2000.0)	P	Sato	Q
q	1.3530922				
n	0.18004635	Peri.	235.90995	+0.38217698	+0.92187903
a	3.1060838	Node	56.68423	-0.82066435	+0.37036567
e	0.5643736	Incl.	4.38368	-0.42479498	+0.11387857
P	5.47				

From 1225 observations 2014 Jan. 29–2020 Jan. 23, mean residual 0".48.

Nongravitational parameters A1 = +0.55, A2 = +0.2045.

## Comet 254P/McNaught

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Sept. 29.66510 TT

		(2000.0)	P	Sato	Q
q	3.1369710				
n	0.09945285	Peri.	219.48151	+0.90293527	+0.10258495
a	4.6137909	Node	129.17461	-0.10226460	+0.99448674
e	0.3200882	Incl.	32.57242	-0.41743245	-0.02173579
P	9.91				

From 109 observations 1980 Oct. 5–2012 Jan. 27, mean residual 0".60.

## Comet 218P/LINEAR

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Oct. 3.76830 TT

		(2000.0)	P	Sato	Q
q	1.1698998				
n	0.18112741	Peri.	59.78416	-0.56259035	+0.82672907
a	3.0937123	Node	175.97596	-0.77392262	-0.52522743
e	0.6218460	Incl.	2.72549	-0.29075053	-0.20163132
P	5.44				

From 694 observations 2003 Apr. 29–2015 Sept. 15, mean residual 0".69.

Nongravitational parameters A1 = +0.23, A2 = -0.0094.

## Comet P/2015 X6 (PANSTARRS)

Epoch 2020 Sept. 28.0 TT = JDT 2459120.5

T 2020 Oct. 17.18675 TT

		(2000.0)	P	Sato	Q
q	2.2781652				
n	0.21575361	Peri.	329.87405	+0.22647344	-0.97103754
a	2.7531550	Node	106.94681	+0.90878073	+0.18253475
e	0.1725256	Incl.	4.56480	+0.35046734	+0.15416598
P	4.57				

From 46 observations 2015 Nov. 12–2016 Mar. 7, mean residual 0".37.

## Comet 378P/McNaught

Epoch 2020 Nov. 7.0 TT = JDT 2459160.5

T 2020 Oct. 20.88621 TT

		(2000.0)	P	Sato	Q
q	3.3808627				
n	0.06112677	Peri.	194.04885	+0.30501188	+0.89475989
a	6.3823669	Node	94.51307	-0.83912841	+0.41445258
e	0.4702807	Incl.	19.09663	-0.45036792	-0.16623417
P	16.12				

From 188 observations 2003 May 30–2019 June 2, mean residual 0".63.

## Comet 184P/Lovas

Epoch 2020 Nov. 7.0 TT = JDT 2459160.5

T 2020 Oct. 26.17848 TT

		(2000.0)	P	Sato	Q
q	1.7032894				
n	0.13342848	Peri.	186.43761	+0.99994358	+0.00500863
a	3.7928909	Node	173.25411	-0.00170524	+0.94610520
e	0.5509258	Incl.	4.57374	-0.01048423	+0.32382074
P	7.39				

From 241 observations 1986 Dec. 2–2014 Jan. 3, mean residual 0".66.

Nongravitational parameters A1 = +0.06, A2 = -0.0074.

## Comet C/2017 Y2 (PANSTARRS)

Epoch 2020 Nov. 7.0 TT = JDT 2459160.5

T 2020 Nov. 4.61312 TT

		(2000.0)	P	Sato Q
q	4.6320756			
z	-0.0002216	Peri.	147.87057	-0.04268825
	+/-0.0000086	Node	65.99122	-0.99886524
e	1.0010267	Incl.	128.41627	+0.02111747

From 239 observations 2017 Dec. 24–2019 Nov. 30, mean residual 0".51.

## Comet 91P/Russell

Epoch 2020 Nov. 7.0 TT = JDT 2459160.5

T 2020 Nov. 9.39432 TT

		(2000.0)	P	Sato Q
q	2.6041812			
n	0.12844529	Peri.	354.80418	-0.45718228
a	3.8903673	Node	247.82769	-0.80696239
e	0.3306079	Incl.	14.09169	-0.37389312

P 7.67

From 251 observations 1996 Nov. 18–2013 Aug. 2, mean residual 0".71.

Nongravitational parameters A1 = -2.29 A2 = +0.1437.

## Comet C/2019 N1 (ATLAS)

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 1.79092 TT

		(2000.0)	P	Sato Q
q	1.7045253			
z	+0.0000321	Peri.	193.44728	-0.93823112
	+/-0.0000037	Node	13.57265	-0.14504543
e	0.9999454	Incl.	82.42742	-0.31414041

From 362 observations 2019 June 10–2020 Jan. 11, mean residual 0".42.

## Comet 162P/Siding Spring

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 7.81967 TT

		(2000.0)	P	Sato Q
q	1.2891346			
n	0.18141179	Peri.	357.13418	+0.87966239
a	3.0904784	Node	30.91117	+0.44503702
e	0.5828689	Incl.	27.55496	+0.16773830

P 5.43

From 2032 observations 1990 Mar. 23–2019 May 30, mean residual 0".43.

## Comet 220P/McNaught

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 10.62918 TT

		(2000.0)	P	Sato Q
q	1.5523499			
n	0.17917735	Peri.	180.53131	+0.87145323
a	3.1161186	Node	150.10207	-0.44948216
e	0.5018322	Incl.	8.12870	-0.19630346

P 5.50

From 388 observations 2004 May 20–2016 Oct. 10, mean residual 0".62.

## Comet 141P/Machholz

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 15.41264 TT

		(2000.0)	P	Sato Q
q	0.8079607			
n	0.18449404	Peri.	153.54417	+0.80361200
a	3.0559612	Node	241.84966	+0.49437503
e	0.7356116	Incl.	13.94565	+0.33136247

P 5.34

From 236 observations 2005 Mar. 16–2015 Oct. 20, mean residual 0".82.

Nongravitational parameters A1 = -0.56, A2 = -0.4561.

## Comet 293P/Spacewatch

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 19.29034 TT

		(2000.0)	P	Sato	Q
q	2.1198405				
n	0.14167629	Peri.	41.06406	-0.48402755	-0.86135953
a	3.6442200	Node	78.41133	+0.75608984	-0.50038770
e	0.4183006	Incl.	9.05642	+0.44050594	-0.08758948
P	6.96				

From 250 observations 2006 Nov. 15–2014 June 1, mean residual 0".54.

## Comet P/2013 TL117 (Lemmon)

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 24.29944 TT

		(2000.0)	P	Sato	Q
q	1.1218996				
n	0.14367931	Peri.	112.24928	-0.43077628	-0.90240976
a	3.6102717	Node	3.31282	+0.75647441	-0.36675467
e	0.6892479	Incl.	9.36448	+0.49211610	-0.22615841
P	6.86				

From 327 observations 2013 Oct. 4–2014 Jan. 29, mean residual 0".42.

From CHB 2019.

## Comet P/2009 Q4 (Boattini)

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 26.96535 TT

		(2000.0)	P	Sato	Q
q	1.3056743				
n	0.17814219	Peri.	320.23609	+0.03078325	-0.98795280
a	3.1281784	Node	127.46360	+0.95878075	-0.01369508
e	0.5826087	Incl.	11.01546	+0.28247454	+0.15414832
P	5.53				

From 765 observations 2009 Aug. 26–2010 May 28, mean residual 0".60.

From CHB 2019.

## Comet 277P/LINEAR

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 30.20961 TT

		(2000.0)	P	Sato	Q
q	1.9044933				
n	0.13036081	Peri.	152.32305	+0.34411896	-0.89401511
a	3.8521632	Node	276.34485	+0.79928074	+0.43927021
e	0.5056042	Incl.	16.77903	+0.49267884	-0.08819674
P	7.56				

From 175 observations 2005 Sept. 15–2013 Oct. 31, mean residual 0".68.

## Comet C/2019 B3 (PANSTARRS)

Epoch 2021 Jan. 26.0 TT = JDT 2459240.5

T 2021 Jan. 20.01177 TT

		(2000.0)	P	Sato	Q
q	6.8233801				
z	-0.0003674	Peri.	263.90747	-0.11694115	+0.99282077
	+/-0.0000147	Node	358.42999	+0.00241637	-0.02502235
e	1.0025072	Incl.	66.53836	-0.99313591	-0.11696493

From 72 observations 2019 Jan. 24–June 23, mean residual 0".44.

## Comet 102P/Shoemaker

Epoch 2021 Jan. 26.0 TT = JDT 2459240.5

T 2021 Jan. 22.73768 TT

		(2000.0)	P	Sato	Q
q	2.0698900				
n	0.13233385	Peri.	20.53409	+0.98759716	-0.03136768
a	3.8137780	Node	339.36615	-0.09272641	+0.67418653
e	0.4572600	Incl.	25.88505	+0.12670308	+0.73789470
P	7.45				

From 365 observations 2006 July 24–2013 Dec. 22, mean residual 0".73.

Nongravitational parameters A1 = +0.80, A2 = +1.2844.

## Comet P/2007 B1 (Christensen)

Epoch 2021 Jan. 26.0 TT = JDT 2459240.5

T 2021 Jan. 25.51826 TT

		(2000.0)	P	Sato	Q
q	2.4388379				
n	0.07020483	Peri.	46.74346	-0.54857963	-0.80945627
a	5.8195766	Node	77.66671	+0.69152753	-0.58002455
e	0.5809252	Incl.	12.37614	+0.46994687	-0.09138964
P	14.04				

From 118 observations 2007 Jan. 17–Mar. 23, mean residual 0".57.

## Comet P/2005 XA54 (LONEOS–Hill)

Epoch 2021 Jan. 26.0 TT = JDT 2459240.5

T 2021 Jan. 29.30600 TT

		(2000.0)	P	Sato	Q
q	1.7540827				
n	0.06620667	Peri.	15.13690	-0.92552013	-0.33615922
a	6.0515720	Node	143.67104	+0.30964198	-0.93685090
e	0.7101443	Incl.	17.11898	+0.21802368	-0.09647468
P	14.89				

From 577 observations 2005 Dec. 4–2006 June 10, mean residual 0".53.

## Comet P/2009 U4 (McNaught)

Epoch 2021 Jan. 26.0 TT = JDT 2459240.5

T 2021 Feb. 1.11188 TT

		(2000.0)	P	Sato	Q
q	1.6465651				
n	0.08598019	Peri.	259.83839	+0.69698191	+0.70248229
a	5.0839794	Node	55.35445	-0.57011348	+0.66464155
e	0.6761267	Incl.	10.08051	-0.43495613	+0.25450000
P	11.46				

From 84 observations 2009 Oct. 11–2010 Jan. 16, mean residual 0".59.

## Comet 265P/LINEAR

Epoch 2021 Jan. 26.0 TT = JDT 2459240.5

T 2021 Feb. 9.04112 TT

		(2000.0)	P	Sato	Q
q	1.4989714				
n	0.11243737	Peri.	33.42317	+0.95450283	-0.28916940
a	4.2513704	Node	342.92709	+0.18881658	+0.77512536
e	0.6474145	Incl.	14.36488	+0.23080866	+0.56174882
P	8.77				

From 502 observations 2003 July 29–2012 June 20, mean residual 0".76.

## Comet P/2013 A2 (Scotti)

Epoch 2021 Mar. 7.0 TT = JDT 2459280.5

T 2021 Feb. 15.55861 TT

		(2000.0)	P	Sato	Q
q	2.1899557				
n	0.12256194	Peri.	134.52915	-0.64741799	-0.76212309
a	4.0138916	Node	355.81132	+0.68156636	-0.57645279
e	0.4544059	Incl.	3.36131	+0.34105314	-0.29473814
P	8.04				

From 85 observations 2013 Jan. 6–June 1, mean residual 0".45.

## Comet P/2013 EW90 (Tenagra)

Epoch 2021 Mar. 7.0 TT = JDT 2459280.5

T 2021 Feb. 15.57693 TT

		(2000.0)	P	Sato	Q
q	3.3140775				
n	0.11801852	Peri.	346.31433	-0.84689662	-0.50121011
a	4.1162581	Node	160.29408	+0.52386576	-0.84373736
e	0.1948810	Incl.	31.79008	+0.09127309	+0.19208253
P	8.35				

From 59 observations 2013 Feb. 16–2014 May 17, mean residual 0".42.

## Comet 17P/Holmes

Epoch 2021 Mar. 7.0 TT = JDT 2459280.5

T 2021 Feb. 19.82706 TT

		(2000.0)	P	Sato	Q
q	2.0806833				
n	0.14215404	Peri.	24.46770	+0.97547110	+0.12754269
a	3.6360505	Node	326.62033	-0.21320379	+0.75022261
e	0.4277628	Incl.	19.03199	+0.05477481	+0.64876721
P	6.93				

From 4918 observations 2007 May 13–2019 May 9, mean residual 0".58.

Nongravitational parameters A1 = +0.74, A2 = -0.3740.

## Comet 246P/NEAT

Epoch 2021 Mar. 7.0 TT = JDT 2459280.5

T 2021 Feb. 22.82519 TT

		(2000.0)	P	Sato	Q
q	2.8639232				
n	0.12245261	Peri.	176.30012	-0.25556913	+0.92828814
a	4.0162802	Node	78.74746	-0.89393286	-0.12049047
e	0.2869215	Incl.	15.98679	-0.36819623	-0.35179992
P	8.05				

From 2996 observations 2003 Feb. 1–2020 Jan. 18, mean residual 0".57.

Nongravitational parameters A1 = -1.00, A2 = +0.7932.

## Comet C/2019 T3 (ATLAS)

Epoch 2021 Mar. 7.0 TT = JDT 2459280.5

T 2021 Mar. 2.70437 TT

		(2000.0)	P	Sato	Q
q	5.9463971				
z	+0.0002706	Peri.	112.27837	+0.60546809	+0.57394758
+/-	-0.0000128	Node	139.52076	-0.19752549	-0.56272682
e	0.9983908	Incl.	121.86222	+0.77096827	-0.59491402

From 149 observations 2019 Jan. 17–2020 Jan. 21, mean residual 0".42.

## Comet P/2013 02 (PANSTARRS)

Epoch 2021 May 26.0 TT = JDT 2459360.5

T 2021 May 22.69647 TT

		(2000.0)	P	Sato	Q
q	2.0960447				
n	0.13363008	Peri.	214.29823	+0.48491808	-0.86821928
a	3.7890753	Node	207.14680	+0.84514312	+0.49612166
e	0.4468189	Incl.	13.31968	+0.22491679	+0.00765355
P	7.38				

From 171 observations 2013 July 16–2014 Feb. 23, mean residual 0".64.

## Comet 7P/Pons–Winnecke

Epoch 2021 May 26.0 TT = JDT 2459360.5

T 2021 May 27.11177 TT

		(2000.0)	P	Sato	Q
q	1.2342374				
n	0.15624848	Peri.	172.59586	-0.06058263	+0.92307311
a	3.4139633	Node	93.37532	-0.93419501	+0.08159604
e	0.6384737	Incl.	22.36363	-0.35158133	-0.37586982
P	6.31				

From 516 observations 1994 Dec. 31–2020 Jan. 17, mean residual 0".71.

Nongravitational parameters A1 = +0.01, A2 = -0.0104.

## Comet P/2014 W12 (Gibbs)

Epoch 2021 July 5.0 TT = JDT 2459400.5

T 2021 June 20.16348 TT

		(2000.0)	P	Sato	Q
q	1.6746839				
n	0.14920169	Peri.	36.86990	+0.90889812	+0.39652712
a	3.5206287	Node	299.28816	-0.40915882	+0.78812271
e	0.5243225	Incl.	8.51322	-0.08058079	+0.47077471
P	6.61				

From 68 observations 2014 Nov. 30–2015 Jan. 7, mean residual 0".57.

Comet C/2019 F1 (ATLAS-Africano)

Epoch 2021 July 5.0 TT = JDT 2459400.5

T 2021 June 22.83473 TT

		(2000.0)	P	Sato Q
q	3.5955414			
z	-0.0010578	Peri. 251.13229	+0.09418897	+0.85665461
	+/-0.0000039	Node 38.72428	-0.27686493	+0.51192542
e	1.0038033	Incl. 54.17485	-0.95628147	-0.06383767

From 626 observations 2019 Feb. 8-2020 Jan. 25, mean residual 0".41.

Comet P/2014 E1 (Larson)

Epoch 2021 July 5.0 TT = JDT 2459400.5

T 2021 July 20.27718 TT

		(2000.0)	P	Sato Q
q	2.1398624			
n	0.13789552	Peri. 186.04325	-0.70882270	+0.68376176
a	3.7105300	Node 39.02517	-0.63510598	-0.51171729
e	0.4233001	Incl. 15.97756	-0.30693773	-0.52020695
P	7.15			

From 374 observations 2014 Jan. 6-Aug. 27, mean residual 0".60.

Comet 173P/Mueller

Epoch 2021 Dec. 12.0 TT = JDT 2459560.5

T 2021 Dec. 16.71480 TT

		(2000.0)	P	Sato Q
q	4.2170645			
n	0.07230306	Peri. 29.18020	-0.61743097	-0.73539758
a	5.7064358	Node 100.40030	+0.65539537	-0.67722979
e	0.2609985	Incl. 16.49276	+0.43501254	-0.02345673
P	13.63			

From 652 observations 1992 Sept. 25-2020 Jan. 23, mean residual 0".70.

Comet C/2019 L3 (ATLAS)

Epoch 2022 Jan. 21.0 TT = JDT 2459600.5

T 2022 Jan. 9.57171 TT

		(2000.0)	P	Sato Q
q	3.5543485			
z	-0.0004773	Peri. 171.61022	-0.26051855	-0.66631042
	+/-0.0000119	Node 290.79036	+0.83675768	+0.20518316
e	1.0016964	Incl. 48.36118	+0.48162918	-0.71688931

From 427 observations 2019 June 10-2020 Jan. 21, mean residual 0".42.

Comet 99P/Kowal

Epoch 2022 Apr. 11.0 TT = JDT 2459680.5

T 2022 Apr. 12.64284 TT

		(2000.0)	P	Sato Q
q	4.7061060			
n	0.06532598	Peri. 174.93261	-0.92015028	+0.38993980
a	6.1058399	Node 28.10187	-0.36186048	-0.81203804
e	0.2292451	Incl. 4.33963	-0.14960099	-0.43421329
P	15.09			

From 522 observations 1977 Apr. 24-2020 Jan. 5, mean residual 0".71.

Comet C/2019 T4 (ATLAS)

Epoch 2022 May 21.0 TT = JDT 2459720.5

T 2022 June 9.34880 TT

		(2000.0)	P	Sato Q
q	4.2431700			
z	+0.0010647	Peri. 351.20017	-0.95991909	+0.05605779
	+/-0.0000156	Node 199.94108	-0.18198449	-0.86982446
e	0.9954822	Incl. 53.62891	-0.21315956	+0.49016623

From 42 observations 2019 Feb. 5-2020 Jan. 23, mean residual 0".32.

Comet C/2017 K2 (PANSTARRS)

Epoch 2022 Dec. 7.0 TT = JDT 2459920.5

T 2022 Dec. 19.66943 TT

		(2000.0)	P	Sato Q
q	1.7969787			
z	-0.0004770	Peri. 236.19630	+0.01818389	+0.04923151
	+/-0.0000012	Node 88.23545	-0.18096313	+0.98245346
e	1.0008571	Incl. 87.56305	-0.98332176	-0.17989293

From 1942 observations 2013 May 12-2020 Jan. 29, mean residual 0".50.

References:

Comet C/2016 X1 (Lemmon)  
 Epoch 2019 Apr. 27.0 TT = JDT 2458600.5  
 T 2019 Apr. 29.73998 TT  

		(2000.0)	P	Sato	Q
q					
z	+0.0005853	Peri. 224.55744	-0.44337741		-0.78477360
	+/-0.0000016	Node 256.42674	+0.89508231		-0.36211528
e	0.9955725	Incl. 26.45595	+0.04737215		-0.50299395

 From 242 observations 2016 Nov. 26–2020 Jan. 19, mean residual 0".53.

Comet P/2019 T6 (PANSTARRS)  
 Epoch 2019 Nov. 13.0 TT = JDT 2458800.5  
 T 2019 Nov. 7.75988 TT  

		(2000.0)	P	Sato	Q
q					
n	0.07785813	Peri. 328.90993	+0.73774717		-0.60292518
a	5.4316705	Node 71.31087	+0.66630788		+0.57807092
e	0.6222284	Incl. 18.69707	+0.10845701		+0.54983202

 P 12.66  
 From 169 observations 2019 Oct. 8–2020 Jan. 20, mean residual 0".48.

Comet P/2019 X2 (PANSTARRS)  
 Epoch 2019 Dec. 23.0 TT = JDT 2458840.5  
 T 2019 Dec. 9.31535 TT  

		(2000.0)	P	Sato	Q
q					
n	0.14176104	Peri. 213.56053	-0.22904617		-0.93845975
a	3.6427674	Node 250.85667	+0.94241541		-0.14729903
e	0.4992455	Incl. 15.88156	+0.24370277		-0.31240405

 P 6.95  
 From 49 observations 2019 Nov. 25–2020 Jan. 9, mean residual 0".52.

Comet A/2019 G2  
 Epoch 2019 Dec. 23.0 TT = JDT 2458840.5  
 T 2019 Dec. 10.06169 TT  

		(2000.0)	P	Sato	Q
q					
z	+0.0013944	Peri. 82.65272	-0.55012765		+0.81812751
	+/-0.0000027	Node 208.14434	+0.55476014		+0.50788572
e	0.9968049	Incl. 159.21163	+0.62418007		+0.26966546

 From 79 observations 2019 Apr. 2–2020 Jan. 18, mean residual 0".44.

Comet A/2019 S4  
 Epoch 2020 Apr. 21.0 TT = JDT 2458960.5  
 T 2020 Apr. 7.94912 TT  

		(2000.0)	P	Sato	Q
q					
z	+0.0041814	Peri. 71.35671	+0.17415397		-0.41761828
	+/-0.0000134	Node 63.16791	-0.12880934		-0.90749572
e	0.9856092	Incl. 92.02386	+0.97625742		-0.04523812

 From 68 observations 2019 Sept. 17–2020 Jan. 1, mean residual 0".40.

Comet P/2019 V2 (Groeller)  
 Epoch 2020 Nov. 7.0 TT = JDT 2459160.5  
 T 2020 Oct. 22.94935 TT  

		(2000.0)	P	Sato	Q
q					
n	0.04785154	Peri. 336.36122	-0.96690639		-0.25304268
a	7.5140158	Node 189.16380	+0.25427896		-0.94535617
e	0.3323905	Incl. 11.80449	+0.02083856		-0.20559941

 P 20.60  
 From 38 observations 2019 Nov. 3–2020 Jan. 19, mean residual 0".55.

Comet P/2009 WX51 (Catalina)

Epoch 2020 Nov. 7.0 TT = JDT 2459160.5

T 2020 Nov. 16.41099 TT

		(2000.0)	P	Sato	Q
q	0.7999980				
n	0.18235015	Peri.	118.06449	-0.85735516	-0.50722412
a	3.0798670	Node	31.68598	+0.39405074	-0.75622487
e	0.7402492	Incl.	9.59526	+0.33115879	-0.41333720
P	5.41				

From 113 observations 2009 Nov. 22–2010 Apr. 17, mean residual 0".45.

From CHB 2019.

Comet P/2007 Q2 (Gilmore)

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Nov. 27.39010 TT

		(2000.0)	P	Sato	Q
q	1.8646519				
n	0.07329010	Peri.	162.77510	+0.90646760	+0.42158355
a	5.6550857	Node	172.16005	-0.40529405	+0.88465268
e	0.6702699	Incl.	10.20270	-0.11854627	+0.19914053
P	13.45				

From 145 observations 2007 Aug. 22–Oct. 15, mean residual 0".51.

From CHB 2019.

Comet P/2010 B2 (WISE)

Epoch 2020 Dec. 17.0 TT = JDT 2459200.5

T 2020 Dec. 4.56169 TT

		(2000.0)	P	Sato	Q
q	1.6175044				
n	0.17971596	Peri.	155.91882	-0.91883279	-0.39464038
a	3.1098895	Node	0.84785	+0.33219122	-0.77654998
e	0.4798836	Incl.	8.93065	+0.21306173	-0.49115078
P	5.48				

From 48 observations 2010 Jan. 22–Apr. 7, mean residual 0".48.

From CHB 2019.

Comet A/2019 T1

Epoch 2021 Jan. 26.0 TT = JDT 2459240.5

T 2021 Jan. 14.26449 TT

		(2000.0)	P	Sato	Q
q	4.2815942				
n	0.00416529	Peri.	91.03126	+0.04424359	-0.99360129
a	38.2565590	Node	6.95381	-0.81058050	-0.09650577
e	0.8880821	Incl.	120.86970	+0.58395355	-0.05867797
P	236.62				

From 48 observations 2017 Sept. 16–2019 Nov. 24, mean residual 0".29.

Comet 206P/Barnard-Boattini

Epoch 2021 Mar. 7.0 TT = JDT 2459280.5

T 2021 Mar. 4.48879 TT

		(2000.0)	P	Sato	Q
q	1.5646685				
n	0.15134408	Peri.	189.46946	+0.86021507	-0.46441624
a	3.4873250	Node	202.34673	+0.49656941	+0.85682492
e	0.5513270	Incl.	33.63317	+0.11596920	-0.22398353
P	6.51				

From 280 observations 1892 Oct. 17–2009 Jan. 4, mean residual 0".67.

Comet A/2019 O3

Epoch 2021 Mar. 7.0 TT = JDT 2459280.5

T 2021 Mar. 8.23800 TT

		(2000.0)	P	Sato	Q
q	8.8184360				
z	-0.0002689	Peri.	60.06704	+0.25479351	-0.43685892
	+/-0.0000093	Node	300.37947	-0.73835262	+0.48820035
e	1.0023716	Incl.	89.81271	+0.62443228	+0.75552280

From 80 observations 2019 May 14–Dec. 1, mean residual 0".40.

## Comet P/2015 J3 (NEOWISE)

Epoch 2021 Apr. 16.0 TT = JDT 2459320.5

T 2021 Apr. 22.14014 TT

		(2000.0)	P	Sato	Q
q	1.4920190				
n	0.16090886	Peri.	129.45752	-0.48049983	+0.86704522
a	3.3477223	Node	111.35107	-0.84180296	-0.41386275
e	0.5543182	Incl.	8.13095	-0.24594244	-0.27739902
P	6.13				

From 112 observations 2015 May 15–Sept. 7, mean residual 0".47.

## Comet A/2019 T2

Epoch 2021 Apr. 16.0 TT = JDT 2459320.5

T 2021 Apr. 22.26785 TT

		(2000.0)	P	Sato	Q
q	2.6456987				
z	+0.0005308	Peri.	239.39222	+0.33382935	-0.86098885
	+/-0.0000138	Node	155.64415	-0.13759427	+0.35822511
e	0.9985956	Incl.	111.48742	-0.93253728	-0.36107196

From 56 observations 2019 Aug. 26–Dec. 29, mean residual 0".29.

## Comet C/2014 F3 (Sheppard–Trujillo)

Epoch 2021 May 26.0 TT = JDT 2459360.5

T 2021 May 21.78281 TT

		(2000.0)	P	Sato	Q
q	5.6932191				
n	0.01623470	Peri.	3.60676	+0.86883512	+0.49107250
a	15.4468452	Node	326.74326	-0.45707464	+0.74664369
e	0.6314316	Incl.	6.60041	-0.19028481	+0.44874380
P	60.71				

From 15 observations 2014 Mar. 26–2015 Apr. 19, mean residual 0".47.

## Comet 332P/Ikeya–Murakami

Epoch 2021 Aug. 14.0 TT = JDT 2459440.5

T 2021 Aug. 18.51325 TT

		(2000.0)	P	Sato	Q
q	1.5771346				
n	0.18150759	Peri.	152.34243	-0.91404192	-0.40547697
a	3.0893908	Node	3.78555	+0.33552464	-0.77072737
e	0.4894998	Incl.	9.38010	+0.22792670	-0.49149542
P	5.43				

From 501 observations 2015 Dec. 31–2016 Apr. 30, mean residual 0".57.

## Comet P/2008 WZ96 (LINEAR)

Epoch 2021 Aug. 14.0 TT = JDT 2459440.5

T 2021 Aug. 26.03338 TT

		(2000.0)	P	Sato	Q
q	1.8503004				
n	0.15137631	Peri.	341.98516	+0.78169609	-0.61506465
a	3.4868300	Node	56.41609	+0.58635287	+0.66844355
e	0.4693460	Incl.	7.11479	+0.21246537	+0.41818501
P	6.51				

From 130 observations 2008 Nov. 30–2009 Apr. 13, mean residual 0".48.

## Comet P/2004 R3 (LINEAR–NEAT)

Epoch 2021 Sept. 23.0 TT = JDT 2459480.5

T 2021 Sept. 15.23414 TT

		(2000.0)	P	Sato	Q
q	3.5304477				
n	0.09446978	Peri.	37.66970	+0.94494794	+0.27358344
a	4.7746418	Node	305.50552	-0.32718206	+0.79839363
e	0.2605837	Incl.	12.73945	+0.00502980	+0.53639511
P	10.43				

From 140 observations 2004 Sept. 10–Nov. 16, mean residual 0".60.

## Comet P/2008 CL94 (Lemmon)

Epoch 2021 Sept. 23.0 TT = JDT 2459480.5

T 2021 Sept. 19.33889 TT

		(2000.0)	P	Sato	Q
q	5.4205364				
n	0.06441096	Peri.	80.37878	-0.39608195	-0.91474777
a	6.1635301	Node	33.31304	+0.77522225	-0.37966750
e	0.1205468	Incl.	8.34637	+0.49208693	-0.13816335
P	15.30				

From 63 observations 2008 Feb. 8–2009 June 13, mean residual 0".52.

Comet P/2005 W3 (Kowalski)

Epoch 2021 Sept. 23.0 TT = JDT 2459480.5

T 2021 Sept. 21.36564 TT

		(2000.0)	P	Sato	Q
q	2.8898633				
n	0.06189652	Peri.	200.73463	+0.63903341	-0.75601694
a	6.3293421	Node	210.08259	+0.73951690	+0.65453755
e	0.5434181	Incl.	16.41931	+0.21154443	-0.00435604
P	15.92				

From 115 observations 2005 Sept. 30–2006 Mar. 24, mean residual 0".71.

Comet P/2010 A5 (LINEAR)

Epoch 2021 Nov. 2.0 TT = JDT 2459520.5

T 2021 Oct. 17.58264 TT

		(2000.0)	P	Sato	Q
q	1.7028935				
n	0.08609227	Peri.	307.10071	-0.70604494	+0.70105507
a	5.0795660	Node	277.65721	-0.61346532	-0.67610774
e	0.6647561	Incl.	5.79747	-0.35378079	-0.22671591
P	11.45				

From 657 observations 2010 Jan. 14–Aug. 7, mean residual 0".52.

Comet P/2012 TK8 (Tenagra)

Epoch 2021 Nov. 2.0 TT = JDT 2459520.5

T 2021 Oct. 26.30005 TT

		(2000.0)	P	Sato	Q
q	2.9953116				
n	0.11753395	Peri.	128.03733	+0.54006259	-0.83511984
a	4.1275641	Node	288.96408	+0.73344370	+0.52786811
e	0.2743150	Incl.	6.34021	+0.41278655	+0.15469361
P	8.39				

From 62 observations 2012 Oct. 6–2014 Apr. 2, mean residual 0".40.

Coomet P/2012 S2 (La Sagra)

Epoch 2021 Nov. 2.0 TT = JDT 2459520.5

T 2021 Oct. 31.74386 TT

		(2000.0)	P	Sato	Q
q	1.3626954				
n	0.10623792	Peri.	312.47365	+0.99137901	-0.05766814
a	4.4151927	Node	51.17863	+0.10761525	+0.87060375
e	0.6913622	Incl.	8.68544	-0.07474366	+0.48859339
P	9.28				

From 367 observations 2012 Sept. 23–Dec. 18, mean residual 0".47.

Comet P/2005 L1 (McNaught)

Epoch 2021 Nov. 2.0 TT = JDT 2459520.5

T 2021 Nov. 2.85473 TT

		(2000.0)	P	Sato	Q
q	3.1425970				
n	0.12426035	Peri.	149.74466	+0.31195442	+0.94585650
a	3.9772327	Node	138.24822	-0.89645894	+0.32429052
e	0.2098534	Incl.	7.73851	-0.31471545	+0.01382514
P	7.93				

From 248 observations 2005 May 16–Sept. 15, mean residual 0".50.

Comet P/2011 A2 (Scotti)

Epoch 2021 Dec. 12.0 TT = JDT 2459560.5

T 2021 Dec. 1.51192 TT

		(2000.0)	P	Sato	Q
q	1.5546587				
n	0.18000275	Peri.	94.50352	-0.85627828	-0.51257745
a	3.1065853	Node	54.67384	+0.43755071	-0.78533082
e	0.4995603	Incl.	4.47475	+0.27447563	-0.34715970
P	5.48				

From 232 observations 2011 Jan. 11–May 12, mean residual 0".61.

Comet P/2007 R4 (Garradd)

Epoch 2021 Dec. 12.0 TT = JDT 2459560.5

T 2021 Dec. 8.69908 TT

	(2000.0)	P	Sato	Q
q	1.9575922			
n	0.06821439	Peri. 282.59008	+0.92544406	-0.15652557
a	5.9322399	Node 87.19361	+0.29271574	+0.87358294
e	0.6700079	Incl. 20.20957	-0.24056348	+0.46081731
P	14.45			

From 87 observations 2007 Aug. 12–Dec. 29, mean residual 0".69.

Comet P/2002 T5 (LINEAR)

Epoch 2021 Dec. 12.0 TT = JDT 2459560.5

T 2021 Dec. 15.36863 TT

	(2000.0)	P	Sato	Q
q	3.9379132			
n	0.05303748	Peri. 326.73362	-0.06197520	-0.90087227
a	7.0158584	Node 123.09144	+0.99049019	-0.10849169
e	0.4387126	Incl. 30.85158	+0.12283428	+0.42030787
P	18.58			

From 1004 observations 2002 Oct. 5–2005 Apr. 5, mean residual 0".63.

Remarks.

Non-gravitational parameters Y1 and Y2 indicate that the Yabushita-style non-gravitational effect based on CO sublimation is taken into account (MN 283, 347).

# 彗星年表 2020

編集委員会

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