4*P Coma Morphology Campaign

Planetary Science Institute

Markku Nissinen Aurinkokuntatapaaminen 2018

Planetary Science Institute
https://www.psi.edu/41P45P46P

- Nalin Samarasinha (Planetary Science Institute), Beatrice Mueller (Planetary Science Institute), Matthew Knight (University of Maryland), Tony Farnham (University of Maryland), Walt Harris (University of Arizona)

41P/Tuttle-Giacobini-Kresak

Tammikuu 2017 - Heinäkuu 2017

45P/Honda-Mrkos-Pajdusakova

Helmikuu 2017 - Maaliskuu 2017

46P/Wirtanen

Joulukuu 2018 alkaen

Tarvitaan CCD kuvia

- Pöly continuum (fotometriset suodattimet)
- Kaasu (CN)
- Kuvat eivät saa olla ylivalottuneita (tai eri valotusajat)
- komeetta lähempänä kuin 1,5 AU Aurinkoa
- Joko seuraten komeettaa tai riittävän lyhyet valotukset
- Normaali kalibrointi riittää, myös flux kalibroidut ok
- Hyvä signaali-kohinasuhde tärkeä kuvissa

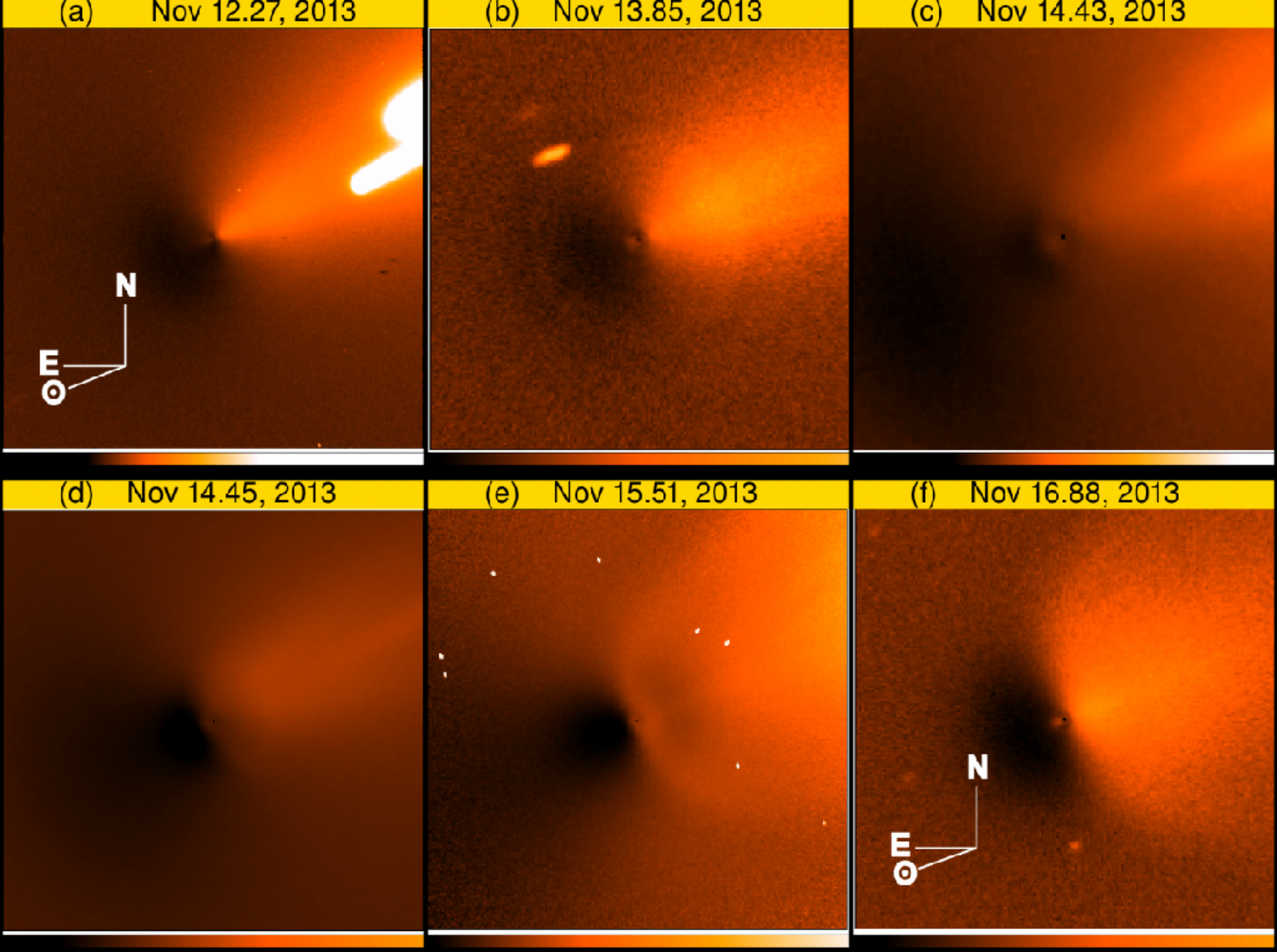
Mitä vastineeksi

- Mahdollisuus päästä mukaan julkaisuun
- Mahdollisesti co-authorship
- Vrt. vastaava julkaisu komeetta ISON:ista
- kriteerinä riittävän laadukas data
- rekisteröinti tarvitaan (ohjeet myöhemmin)
- datat uploadataan ftp:llä
- lisäohjeet mahdollista saada järjestäjiltä

Tieteelliset tulokset

- ytimen pyörimistila
- ytimen aktiivisuustila
- outburstit
- kaasun ja pölyn virtausnopeudet
- kemiallinen koostumus
- pyrstön hetkellinen käyttäytyminen

- Esimerkkinä ISON (C/2012 S1). Pölykuvat
- ytimen tila marraskuun 12 2013 outburstissa
- Nalin Samarasinha et al. 2015, Planetary and Space Science, 118, 127-137


(a) Nov 12.27, 2013
(b) Nov 13.85, 2013
(c) Nov 14.43, 2013
N
E
(d) Nov 14.45, 2013
(e) Nov 15.51, 2013
(f) Nov 16.88, 2013
N
E

Miksi kansainvälinen kampanja

- Komeettaa ei pysty havaitsemaan riittävän kattavasti yhdestä paikasta

- Aikaisempia havaintokampanjoita: International Halley Watch, Deep Impact, EPOXI, Rosetta

- Komeetat 1P/Halley, 9P/Tempel 1, 103P/Hartley 2, 67P/Churyumov-Gerasimenko, ISON, Siding Spring

Ohjeita

- Kuvien olisi hyvä otettu edellä mainittujen aikarajojen sisällä, mutta myös muulloin otetuista kuvista on hyötyä.

- Hyvä signaali-kohinasuhde tärkeä. CCD kuvia. Jos kaukoputki pystyy seuraamaan komeetan ydintä, se olisi ideaalista. Redusoidut kuvat.

- Muutoin täytyy yhdistää useita lyhyen valotuksen kuvia. Komeetta liikkunut enintään seeing disk verran. Sekä yhdistetty kuva että alkuperäiset kuvat. Yhdistäminen ytimen suhteen.

- Kuvien määrää samana yönä otettuna ei ole kovin tarkasti määritelty. Vähintään kaksi kuvaa yhtenä yönä pitäisi ottaa. Saa ottaa kuvia vaikka koko yön ajan.

- Tavoitteena on continuum pölykuvat, joista voidaan mitata kaasujen koostumusta.

- Suodattimet: Fotometrinen R, V, clear tai ei suodatinta. CN suodatin (tai Semrock, jos ei ole HB tai ESA kapeakaistasuodatinta).

- Ideaalinen kuvakoko olisi 10 x 10 kaariminuuttia. Myös pienempi tai suurempi kuvakoko ok, joka eroaa ehkä 2 tai 3x

- Seeing on tietysti tärkeä myös, mutta n. 3 kaarisekunnin seeing on hyväksyttävä, jos signaali-kohinasuhde on riittävän hyvä.

- Pikseliskaalan pitäisi olla ideaalisesti pienempi kuin seeing.

- ns. center pikselien ei pitäisi olla ylivalottuneita. Mutta jos ylivalottuu, niin pitäisi olla mukana kuvat, joissa ei ole ylivalottuneisuutta.

- Kuvat mieluiten FITS muodossa.

- Ideaalisesti kuvien pitäisi olla pohjois itä suunnattuja siten, että ne ovat yhdensuuntaisia joko X tai Y akseliin. esimerkiksi, pohjoinen ylhäällä ja itä vasemmalla.

- Kuvia ei saa missään tapauksessa käsitellä mitenkään. Redusointi bias, flat, dark. Jos on standardi tähtikenttiä, ne voi lähettää flux kalibrointia varten, mutta tämä ei ole mitenkään välttämätöntä.

- Jos kuvat ovat riittävän hyviä, niitä voidaan käyttää julkaisuissa ja kuvaajat noteerataan julkaisussa, esimerkiksi co-author mahdollisesti.

- Kuvat lähetetään FTP:llä
- Salasanat ja muut tarvittavat tiedot toimitetaan

- Rekisteröinti välttämätön

Rekisteröinti

Global Coma Campaign for Comets 41P, 45P, 46P: Observer Information

Thanks for your interest in contributing to this campaign! The information you provide below will help us interpret your observations and properly incorporate them into the worldwide database. You do not need to answer every question, but the more information you provide, the easier it will be for us to use your data. If you are not sure how to answer a question, just enter "unsure."
If you have questions about the form, send an email to 41P45P46P@psi.edu.
-Nalin, Bea, Matthew, Tony, and Walt

* Required

Observer(s) *

Please list all observers who should be credited for this observation

Your answer

Contact email address

Your answer

Telescope name *

Your answer

Location of telescope *

Please provide as much information as possible so that we can understand where your telescope is located. Latitude, longitude, and elevation are preferred. IAU observatory code or city/state/country can also be provided.

Your answer

Size of primary mirror *

Please provide the aperture size and include units (e.g. 42-in, 1.1-m, etc.)

Your answer

Filter(s) used for these observations *

Standard names (Johnson V, Cousins R, HB CN, etc.) or "unfiltered" are preferred. If non-standard, then please provide the approximate wavelength range if known.

Your answer

Tracking type (sidereal or non-sidereal) *

Are you observing sidereally (tracking at the rate of the background stars so the comet is trailed), at the comet's rate (so the stars are trailed), or something else? If something else, please explain

Your answer

Field of view *

Please provide the field of view and units (e.g. 10x10 arcmin)

Your answer

Image size in pixels (e.g. 1024x1024) *

Your answer

Pixel scale (arcsec per pixel) of images *

Your answer

Image orientation and display tool *

When your images are displayed, what directions are north and east, and what program are you using to display? (e.g. north is up and east is to the left when displayed in SAOImage ds9)

Your answer

Type of telescope mount (equatorial, alt-az, etc.) *

Your answer

F-ratio of telescope (if known)

Your answer

Typical seeing in arcsec at your location (if known)

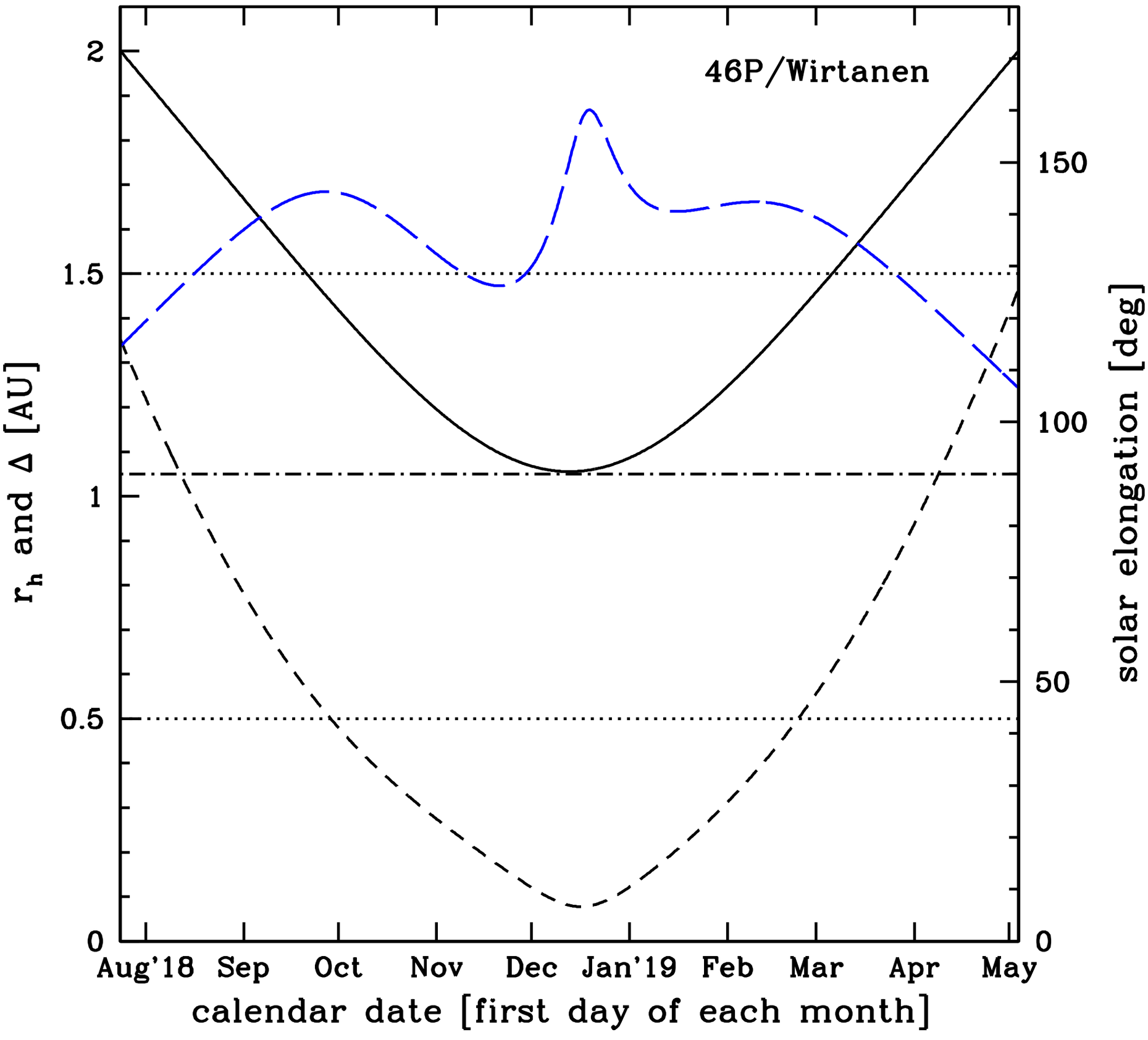
Your answer

Additional information

If there is any additional information you would like to tell us that might help us understand your telescope, please provide it here. If you have a webpage that provides additional information about your telescope (e.g. specifications) feel free to provide the URL here.

Observing plots

Here we provide the plots showing the heliocentric and geocentric distances, r_h and Delta (solid black line and dashed black line, respectively), as well as the solar elongations (blue dashed line) for each comet. The file names are TGK_ephem.pdf, HMP_ephem.pdf, and Wirtanen_ephem.pdf. We also provide plots showing the "up times" of the comets for different latitudes (at 5 deg intervals and "m" in the file name stands for minus latitudes and "p" stands for positive latitudes). The solid black and blue dashed lines are times that the comet is above 30 deg and 15 deg, respectively. The red and orange dot-dash lines are the total and nuclear magnitudes, as calculated from the coefficients given in JPL Horizons (note that other systems will predict different brightnesses and therefore these magnitudes should be considered as ROUGH estimates; in particular, we like to refer to Seiichi Yoshida's website www.aerith.net and his predictions). An observer should choose the closest latitude to the relevant observatory in order estimate the "up time" for a given comet.


46P/Wirtanen
2
1.5
1
0.5
0
150
100
50
0
r_h and Δ [AU]
solar elongation [deg]
Aug'18
Sep
Oct
Nov
Dec
Jan'19
Feb
Mar
Apr
May
calendar date [first day of each month]

Wirtanen (2018)

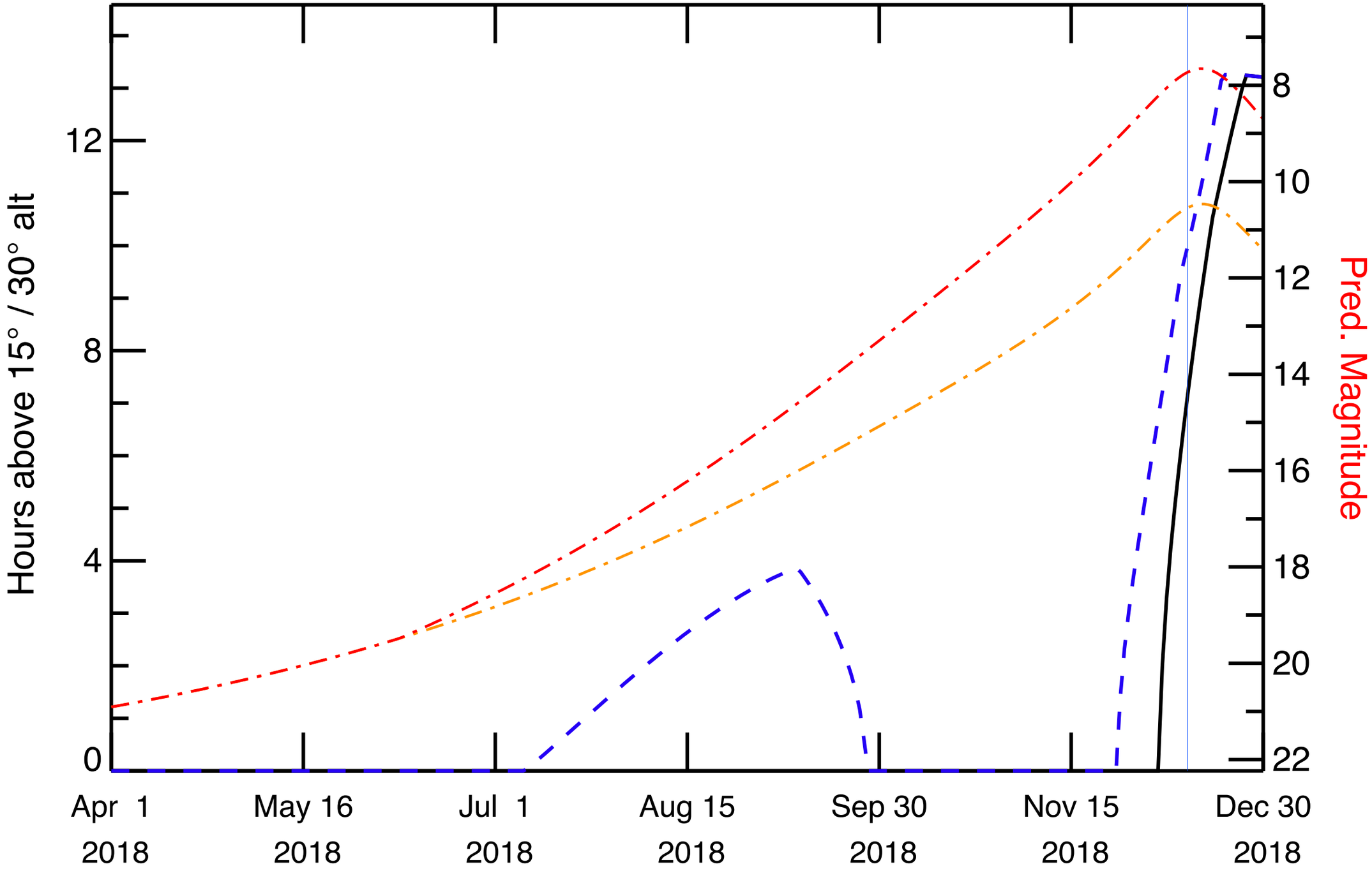
Perihelion Date 2018 Dec 12 23:33:20

Perihelion (JD)	2458465.4814900
Period (years)	5.4388223
Semimajor axis (AU)	3.0926914
Perihelion dist (AU)	1.0553500
Eccentricity	0.6587600

Epoch 2000.0

Inclination (deg)	11.7476000
Long ascending node (deg)	82.1603000
Arg. of perihelion (deg)	356.3890000

Site: L/L Lat = 50.0 Long = 0.0



Wirtanen (2018)

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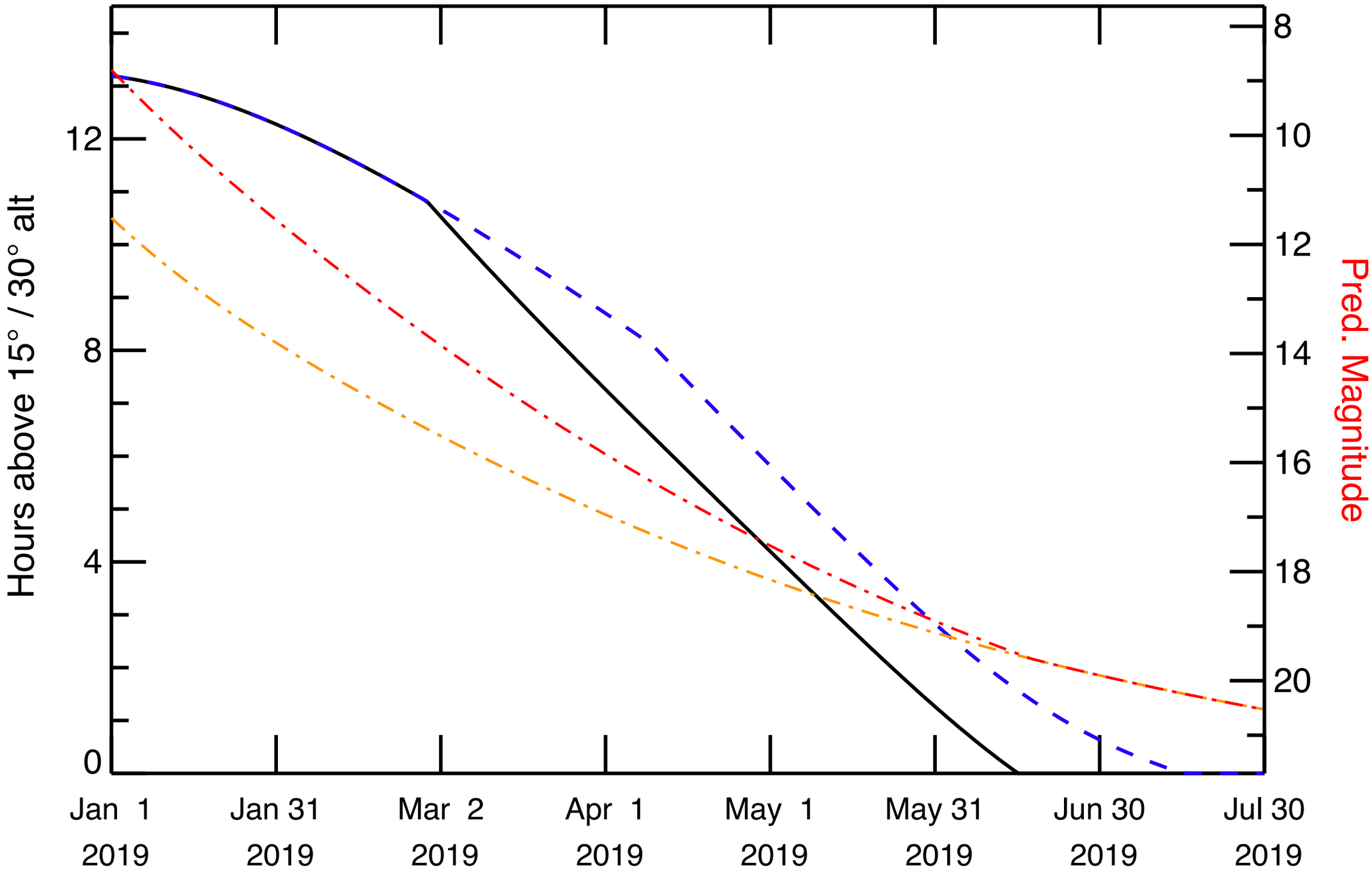

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*******************************************************************************
Ephemeris / WWW_USER Thu Feb  8 16:13:05 2018 Pasadena, USA      / Horizons
*******************************************************************************
Target body name: 46P/Wirtanen                    {source: JPL#K073/17}
Center body name: Earth (399)                     {source: DE431}
Center-site name: Taurus Hill Obs.,Karhilantaipaleenti
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*******************************************************************************************************************
 Date__(UT)__HR:MN     R.A._(ICRF/J2000.0)_DEC Azi_(a-appr)_Elev  T-mag  N-mag           delta      deldot    S-O-T /r    S-T-O
*******************************************************************************************************************
```

```
2018-Dec-08 18:00      03 03 44.33 -04 17 54.5 147.6824  19.5481   8.00  11.90 0.09084769711147  -5.4373409 140.6927 /T  36.1836
2018-Dec-09 00:00      03 05 00.34 -03 36 46.5 241.0501  10.3724   7.98  11.87 0.09009401982851  -5.0219140 141.1858 /T  35.7486
2018-Dec-09 06:00 N    03 06 23.05 -02 54 50.7 325.5381 -26.3403   7.97  11.83 0.08937810230191  -4.9739354 141.7046 /T  35.2879
2018-Dec-09 12:00 *m   03 07 50.40 -02 12 13.7  63.2413 -15.6363   7.95  11.80 0.08864626061620  -5.1413556 142.2436 /T  34.8089
2018-Dec-09 18:00      03 09 14.02 -01 28 52.0 146.5158  22.1735   7.93  11.77 0.08791290156049  -4.9349808 142.7751 /T  34.3365
2018-Dec-10 00:00      03 10 36.00 -00 44 42.4 241.8576  13.1585   7.91  11.74 0.08723279339546  -4.5048424 143.3038 /T  33.8647
2018-Dec-10 06:00 N    03 12 04.89 +00 00 11.8 325.9086 -23.4106   7.90  11.71 0.08659269387601  -4.4410748 143.8577 /T  33.3679
2018-Dec-10 12:00 *m   03 13 38.69 +00 45 50.3  61.5387 -13.1268   7.88  11.67 0.08593879570715  -4.5952027 144.4317 /T  32.8524
2018-Dec-10 18:00      03 15 08.71 +01 32 14.5 145.1340  24.9560   7.86  11.64 0.08528514036857  -4.3771018 144.9960 /T  32.3457
2018-Dec-11 00:00      03 16 37.04 +02 19 20.7 242.6684  16.1679   7.85  11.61 0.08468657988437  -3.9326147 145.5539 /T  31.8431
2018-Dec-11 06:00 N    03 18 12.53 +03 07 06.4 326.2066 -20.2612   7.83  11.58 0.08413031442291  -3.8521660 146.1355 /T  31.3168
2018-Dec-11 12:00 *m   03 19 53.16 +03 55 38.0  59.6895 -10.4712   7.82  11.55 0.08356252547667  -3.9922062 146.7366 /T  30.7724
2018-Dec-11 18:00      03 21 30.00 +04 44 55.2 143.5091  27.8801   7.80  11.52 0.08299673959168  -3.7632022 147.3246 /T  30.2400
2018-Dec-12 00:00      03 23 05.09 +05 34 45.9 243.4821  19.3922   7.79  11.49 0.08248772688238  -3.3054235 147.9014 /T  29.7161
2018-Dec-12 06:00 N    03 24 47.56 +06 25 08.8 326.4311 -16.9036   7.77  11.46 0.08202324370374  -3.2079139 148.4994 /T  29.1710
2018-Dec-12 12:00 *m   03 26 35.44 +07 16 17.6  57.6964  -7.6826   7.76  11.43 0.08154959795379  -3.3335018 149.1151 /T  28.6093
2018-Dec-12 18:00      03 28 19.50 +08 08 10.0 141.6105  30.9206   7.75  11.40 0.08107963798754  -3.0950921 149.7131 /T  28.0641
2018-Dec-13 00:00      03 30 01.73 +09 00 25.1 244.2982  22.8149   7.74  11.38 0.08066785138852  -2.6259063 150.2937 /T  27.5332
2018-Dec-13 06:00 N    03 31 51.56 +09 53 02.5 326.5817 -13.3576   7.73  11.35 0.08030266730624  -2.5116153 150.8918 /T  26.9846
2018-Dec-13 12:00 *m   03 33 47.08 +10 46 24.0  55.5653  -4.7824   7.72  11.32 0.07993068272661  -2.6229492 151.5046 /T  26.4224
2018-Dec-13 18:00  m   03 35 38.76 +11 40 25.3 139.4057  34.0416   7.71  11.30 0.07956389576658  -2.3773921 152.0931 /T  25.8826
2018-Dec-14 00:00      03 37 28.49 +12 34 36.0 245.1160  26.4095   7.70  11.27 0.07925628114959  -1.8995814 152.6570 /T  25.3642
2018-Dec-14 06:00 N    03 39 26.03 +13 28 56.5 326.6585  -9.6531   7.69  11.25 0.07899705867097  -1.7695478 153.2332 /T  24.8329
2018-Dec-14 12:00 *m   03 41 29.53 +14 23 57.3  53.3057  -1.8002   7.69  11.23 0.07873329981179  -1.8674758 153.8192 /T  24.2927
2018-Dec-14 18:00  m   03 43 29.17 +15 19 32.5 136.8616  37.1961   7.68  11.20 0.07847597912224  -1.6177963 154.3730 /T  23.7823
2018-Dec-15 00:00      03 45 26.74 +16 15 01.6 245.9346  30.1403   7.67  11.19 0.07827830846769  -1.1350106 154.8934 /T  23.3017
2018-Dec-15 06:00 N    03 47 32.26 +17 10 25.8 326.6623  -5.8290   7.67  11.17 0.07813041574349  -0.9910489 155.4198 /T  22.8142
2018-Dec-15 12:00 *m   03 49 44.06 +18 06 24.8  50.9306   1.2267   7.67  11.15 0.07798005031561  -1.0770782 155.9492 /T  22.3240
2018-Dec-15 18:00  m   03 51 51.95 +19 02 51.0 133.9467  40.3271   7.66  11.13 0.07783699825023  -0.8269641 156.4369 /T  21.8726
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2018-Dec-16	00:00		03	53	57.61	+19	58	54.4	246.7530	33.9628	7.66	11.12	0.07775345320292	-0.3435631	156.8821 /T	21.4596
2018-Dec-16	06:00	N	03	56	11.35	+20	54	36.7	326.5945	-1.9323	7.66	11.10	0.07772056624335	-0.1881719	157.3261 /T	21.0466
2018-Dec-16	12:00	*m	03	58	31.64	+21	50	46.6	48.4570	4.2546	7.66	11.09	0.07768697856352	-0.2643782	157.7650 /T	20.6386
2018-Dec-16	18:00	m	04	00	48.01	+22	47	15.8	130.6357	43.3701	7.66	11.08	0.07766114183134	-0.0179586	158.1522 /T	20.2786
2018-Dec-17	00:00		04	03	01.92	+23	43	04.9	247.5699	37.8266	7.66	11.07	0.07769398758495	0.4612729	158.4886 /T	19.9649
2018-Dec-17	06:00	N	04	05	24.00	+24	38	16.1	326.4573	1.9844	7.67	11.06	0.07777779997899	0.6251119	158.8172 /T	19.6575
2018-Dec-17	12:00	*m	04	07	52.90	+25	33	46.8	45.9053	7.2368	7.67	11.06	0.07786232650782	0.5562698	159.1323 /T	19.3627
2018-Dec-17	18:00	m	04	10	17.84	+26	29	28.5	126.9142	46.2573	7.67	11.05	0.07795456713689	0.7947399	159.3875 /T	19.1237
2018-Dec-18	00:00	m	04	12	40.05	+27	24	13.6	248.3835	41.6777	7.68	11.05	0.07810397535269	1.2649653	159.5868 /T	18.9358
2018-Dec-18	06:00	N	04	15	10.46	+28	18	04.2	326.2534	5.8665	7.69	11.05	0.07830406922002	1.4340680	159.7741 /T	18.7581
2018-Dec-18	12:00	*m	04	17	47.94	+29	12	05.9	43.2993	10.1269	7.69	11.06	0.07850590567525	1.3699966	159.9416 /T	18.5988
2018-Dec-18	18:00	m	04	20	21.40	+30	06	11.1	122.7859	48.9226	7.70	11.06	0.07871495101306	1.5964916	160.0452 /T	18.4991
2018-Dec-19	00:00	m	04	22	51.81	+30	59	04.8	249.1919	45.4635	7.71	11.06	0.07897900607764	2.0532199	160.0935 /T	18.4497
2018-Dec-19	06:00	N	04	25	30.38	+31	50	48.7	325.9862	9.6615	7.72	11.07	0.07929290965845	2.2245027	160.1299 /T	18.4105
2018-Dec-19	12:00	*m	04	28	16.22	+32	42	35.8	40.6646	12.8824	7.73	11.08	0.07960920763562	2.1627337	160.1443 /T	18.3918
2018-Dec-19	18:00	m	04	30	57.98	+33	34	19.9	118.2799	51.3076	7.74	11.09	0.07993178863374	2.3737825	160.0965 /T	18.4309
2018-Dec-20	00:00	m	04	33	36.31	+34	24	40.2	249.9924	49.1352	7.75	11.11	0.08030667575835	2.8132126	160.0005 /T	18.5136
2018-Dec-20	06:00	N	04	36	22.66	+35	13	37.5	325.6597	13.3217	7.76	11.12	0.08073009614527	2.9839592	159.8972 /T	18.6022
2018-Dec-20	12:00	*m	04	39	16.47	+36	02	31.2	38.0284	15.4675	7.78	11.14	0.08115622962123	2.9223650	159.7737 /T	18.7095
2018-Dec-20	18:00	m	04	42	06.10	+36	51	17.1	113.4558	53.3676	7.79	11.15	0.08158737954914	3.1152866	159.5949 /T	18.8679
2018-Dec-21	00:00	m	04	44	51.85	+37	38	30.0	250.7819	52.6517	7.81	11.17	0.08206771799578	3.5345405	159.3795 /T	19.0593
2018-Dec-21	06:00	N	04	47	45.41	+38	24	09.3	325.2785	16.8078	7.82	11.19	0.08259490456847	3.7025828	159.1640 /T	19.2496
2018-Dec-21	12:00	*	04	50	46.53	+39	09	39.4	35.4177	17.8559	7.84	11.21	0.08312485588023	3.6395125	158.9326 /T	19.4545
2018-Dec-21	18:00	m	04	53	43.37	+39	54	59.0	108.4052	55.0751	7.85	11.23	0.08365831401635	3.8125279	158.6555 /T	19.7016
2018-Dec-22	00:00	m	04	56	35.83	+40	38	39.5	251.5568	55.9808	7.87	11.26	0.08423757571378	4.2097456	158.3545 /T	19.9697
2018-Dec-22	06:00	Nm	04	59	35.76	+41	20	38.7	324.8478	20.0897	7.89	11.28	0.08486175129505	4.3735419	158.0609 /T	20.2297
2018-Dec-22	12:00	*	05	02	43.32	+42	02	24.6	32.8585	20.0306	7.91	11.31	0.08548855143165	4.3078648	157.7563 /T	20.4998
2018-Dec-22	18:00	m	05	05	46.46	+42	43	59.0	103.2459	56.4229	7.92	11.33	0.08611720584850	4.4600875	157.4155 /T	20.8031
2018-Dec-23	00:00	m	05	08	44.67	+43	23	51.7	252.3124	59.1000	7.94	11.36	0.08678815439347	4.8343936	157.0621 /T	21.1167
2018-Dec-23	06:00	Nm	05	11	49.94	+44	01	58.0	324.3731	23.1470	7.96	11.39	0.08750195051678	4.9930123	156.7226 /T	21.4164
2018-Dec-23	12:00	*	05	15	02.81	+44	39	48.3	30.3743	21.9842	7.98	11.42	0.08821811159082	4.9240840	156.3759 /T	21.7223
2018-Dec-23	18:00	m	05	18	11.12	+45	17	28.0	98.1100	57.4234	8.00	11.44	0.08893442180850	5.0554163	156.0012 /T	22.0539
2018-Dec-24	00:00	m	05	21	13.90	+45	53	26.0	253.0432	61.9959	8.02	11.47	0.08968951729896	5.4067922	155.6231 /T	22.3873
2018-Dec-24	06:00	Nm	05	24	23.22	+46	27	35.1	323.8604	25.9686	8.05	11.50	0.09048536356669	5.5598286	155.2634 /T	22.7025
2018-Dec-24	12:00	*	05	27	40.06	+47	01	26.9	27.9858	23.7175	8.07	11.53	0.09128325719491	5.4874062	154.8993 /T	23.0214
2018-Dec-24	18:00	m	05	30	52.19	+47	35	10.1	93.1268	58.1055	8.09	11.56	0.09207961521422	5.5983805	154.5134 /T	23.3601
2018-Dec-25	00:00	m	05	33	58.16	+48	07	14.0	253.7423	64.6632	8.11	11.59	0.09291134965823	5.9274862	154.1309 /T	23.6944
2018-Dec-25	06:00	Nm	05	37	10.08	+48	37	28.9	323.3159	28.5511	8.13	11.62	0.09378178752938	6.0749454	153.7696 /T	24.0078
2018-Dec-25	12:00	*	05	40	29.38	+49	07	25.9	25.7100	25.2376	8.16	11.66	0.09465394379222	5.9990808	153.4058 /T	24.3233
2018-Dec-25	18:00	m	05	43	43.80	+49	37	17.5	88.4073	58.5096	8.18	11.69	0.09552295303709	6.0906854	153.0247 /T	24.6543
2018-Dec-26	00:00	m	05	46	51.44	+50	05	34.2	254.4014	67.1031	8.20	11.72	0.09642410166232	6.3986696	152.6518 /T	24.9766
2018-Dec-26	06:00	Nm	05	50	04.37	+50	32	03.2	322.7459	30.8972	8.23	11.75	0.09736201294681	6.5408444	152.3017 /T	25.2766
2018-Dec-26	12:00	*	05	53	24.49	+50	58	14.7	23.5600	26.5566	8.25	11.78	0.09830133382606	6.4617812	151.9499 /T	25.5778
2018-Dec-26	18:00		05	56	39.58	+51	24	24.8	84.0337	58.6820	8.27	11.81	0.09923600362332	6.5352971	151.5841 /T	25.8916

2019-Jan-08	06:00	N	08	08	55.91	+59	33	36.0	315.5411	45.1465	9.53	13.16	0.16023812578408	9.7978960	141.5591	/L	33.3085
2019-Jan-08	12:00	*m	08	10	47.55	+59	33	56.8	7.7805	32.2327	9.55	13.18	0.16164745837124	9.7021353	141.4876	/L	33.3316
2019-Jan-08	18:00		08	12	35.60	+59	34	49.5	58.7088	54.6383	9.58	13.20	0.16304231353154	9.6552277	141.4089	/L	33.3614
2019-Jan-09	00:00		08	14	15.25	+59	35	21.9	251.2850	83.2554	9.60	13.22	0.16444666214555	9.8204182	141.3417	/L	33.3808
2019-Jan-09	06:00	N	08	15	54.45	+59	35	03.0	315.1438	45.4096	9.63	13.24	0.16587556247909	9.9373293	141.2882	/L	33.3873
2019-Jan-09	12:00	*m	08	17	38.02	+59	34	44.4	7.3493	32.1990	9.65	13.26	0.16730501570347	9.8409459	141.2298	/L	33.3981
2019-Jan-09	18:00		08	19	18.24	+59	34	57.8	58.3334	54.3651	9.67	13.28	0.16871969087941	9.7907308	141.1644	/L	33.4156
2019-Jan-10	00:00		08	20	50.35	+59	34	53.2	249.7435	83.5381	9.70	13.30	0.17014339229979	9.9534782	141.1099	/L	33.4231
2019-Jan-10	06:00	N	08	22	21.99	+59	34	00.0	314.7802	45.6003	9.72	13.33	0.17159149563248	10.0705080	141.0684	/L	33.4185
2019-Jan-10	12:00	*m	08	23	57.91	+59	33	07.6	6.9994	32.1355	9.75	13.35	0.17304015993788	9.9734675	141.0220	/L	33.4183
2019-Jan-10	18:00	m	08	25	30.69	+59	32	47.2	58.0775	54.1184	9.77	13.37	0.17447377633258	9.9204322	140.9685	/L	33.4248
2019-Jan-11	00:00		08	26	55.67	+59	32	10.8	248.1058	83.7447	9.79	13.39	0.17591603913928	10.0813164	140.9255	/L	33.4218
2019-Jan-11	06:00	N	08	28	20.17	+59	30	48.0	314.4506	45.7247	9.82	13.41	0.17738260200211	10.1985242	140.8949	/L	33.4072
2019-Jan-11	12:00	*m	08	29	48.88	+59	29	26.7	6.7252	32.0460	9.84	13.43	0.17884972508488	10.1007830	140.8592	/L	33.3972
2019-Jan-11	18:00	m	08	31	14.65	+59	28	37.2	57.9290	53.8981	9.86	13.45	0.18030155747319	10.0453696	140.8165	/L	33.3937
2019-Jan-12	00:00		08	32	32.91	+59	27	33.3	246.4290	83.8806	9.89	13.46	0.18176173566807	10.2049130	140.7838	/L	33.3814
2019-Jan-12	06:00	N	08	33	50.73	+59	25	45.4	314.1554	45.7887	9.91	13.48	0.18324615410184	10.3223373	140.7629	/L	33.3580
2019-Jan-12	12:00	*m	08	35	12.67	+59	23	59.2	6.5215	31.9343	9.94	13.50	0.18473112185457	10.2238448	140.7369	/L	33.3392
2019-Jan-12	18:00	m	08	36	31.85	+59	22	44.6	57.8770	53.7037	9.96	13.52	0.18620058005445	10.1664552	140.7040	/L	33.3270
2019-Jan-13	00:00		08	37	43.83	+59	21	17.0	244.7722	83.9510	9.98	13.54	0.18767815537221	10.3251282	140.6805	/L	33.3063
2019-Jan-13	06:00	N	08	38	55.41	+59	19	07.3	313.8945	45.7975	10.01	13.56	0.18917994784329	10.4427891	140.6683	/L	33.2751
2019-Jan-13	12:00	*m	08	40	11.02	+59	16	59.8	6.3835	31.8034	10.03	13.58	0.19068226753664	10.3434899	140.6510	/L	33.2485
2019-Jan-13	18:00	m	08	41	24.05	+59	15	23.6	57.9124	53.5343	10.05	13.60	0.19216888004916	10.2844905	140.6267	/L	33.2285
2019-Jan-14	00:00		08	42	30.17	+59	13	35.4	243.1913	83.9611	10.07	13.62	0.19366344635786	10.4427168	140.6115	/L	33.2004
2019-Jan-14	06:00	N	08	43	35.93	+59	11	07.0	313.6677	45.7559	10.10	13.63	0.19518223871612	10.5606184	140.6071	/L	33.1624
2019-Jan-14	12:00	*m	08	44	45.65	+59	08	41.1	6.3066	31.6560	10.12	13.65	0.19670152420500	10.4604538	140.5975	/L	33.1290
2019-Jan-14	18:00	m	08	45	52.94	+59	06	46.0	58.0268	53.3893	10.14	13.67	0.19820492385034	10.4001796	140.5810	/L	33.1021
2019-Jan-15	00:00		08	46	53.61	+59	04	40.0	241.7335	83.9163	10.17	13.69	0.19971617351066	10.5583411	140.5731	/L	33.0676
2019-Jan-15	06:00	N	08	47	53.98	+59	01	55.4	313.4746	45.6680	10.19	13.71	0.20125168590101	10.6764745	140.5755	/L	33.0236
2019-Jan-15	12:00	*m	08	48	58.22	+58	59	13.7	6.2867	31.4945	10.21	13.72	0.20278764481298	10.5753843	140.5728	/L	32.9842
2019-Jan-15	18:00	m	08	50	00.17	+58	57	02.3	58.2133	53.2675	10.23	13.74	0.20430755637061	10.5141439	140.5632	/L	32.9513
2019-Jan-16	00:00	m	08	50	55.79	+58	54	40.6	240.4342	83.8212	10.26	13.76	0.20583526861344	10.6725856	140.5618	/L	32.9112
2019-Jan-16	06:00	N	08	51	51.16	+58	51	42.0	313.3144	45.5379	10.28	13.78	0.20738730445175	10.7909314	140.5703	/L	32.8620
2019-Jan-16	12:00	*m	08	52	50.32	+58	48	46.6	6.3199	31.3209	10.30	13.79	0.20893972751929	10.6888569	140.5735	/L	32.8174
2019-Jan-16	18:00	m	08	53	47.33	+58	46	20.8	58.4655	53.1682	10.32	13.81	0.21047595758726	10.6269368	140.5700	/L	32.7792
2019-Jan-17	00:00	m	08	54	38.26	+58	43	45.5	239.3160	83.6806	10.35	13.83	0.21201998917676	10.7859730	140.5744	/L	32.7342
2019-Jan-17	06:00	N	08	55	29.01	+58	40	34.8	313.1866	45.3690	10.37	13.84	0.21358842650355	10.9045051	140.5881	/L	32.6806
2019-Jan-17	12:00	*m	08	56	23.48	+58	37	27.4	6.4026	31.1371	10.39	13.86	0.21515717939476	10.8013921	140.5966	/L	32.6315
2019-Jan-17	18:00	m	08	57	15.90	+58	34	49.1	58.7780	53.0902	10.41	13.88	0.21670960885796	10.7390627	140.5985	/L	32.5888
2019-Jan-18	00:00	m	08	58	02.50	+58	32	01.7	238.3891	83.4987	10.44	13.89	0.21826988745655	10.8989829	140.6078	/L	32.5396

Youtube video

- Swift Mission Catches a Comet Slowdown (41P)

- https://youtu.be/oe-d9RxLLaM