

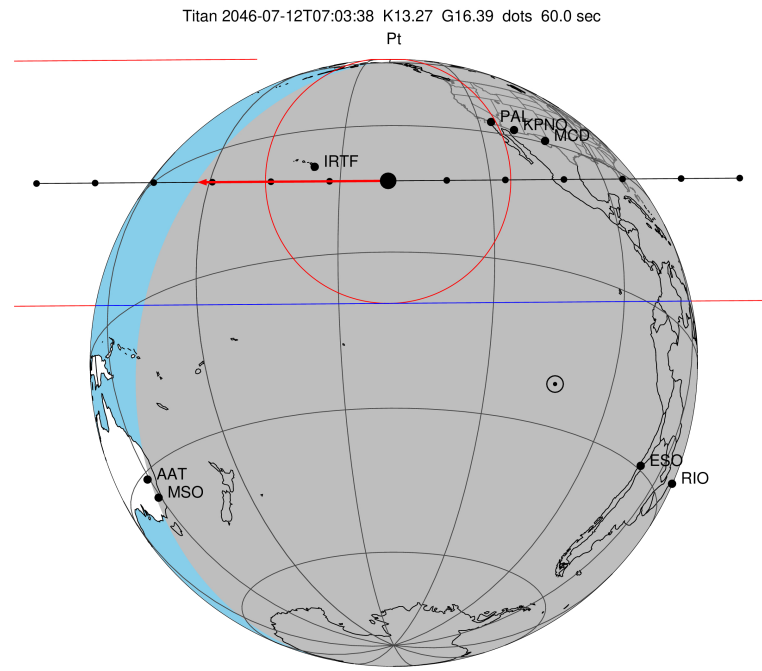
target : Titan  
 target radius (km) : 2575.15  
 C/A epoch : 2046-07-12T07:03:38.410  
 Event type : Pt  
 : Titan occs: topocentric, not geocentric  
 : Not a ringed target  
 Gaia source ID : 4127605996892599040  
 2Mass ID (if available) : 17044628-2120576

ICRS Star Coord at Epoch: 17h 04m 46.27190s -21:20:57.95624s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.267  
 G magnitude : 16.391  
 RP magnitude : 15.481  
 BP magnitude : 17.130  
 DUPflag : 0  
 Distance (au) : 9.156  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -20.50  
 Sun-Target sep (deg) : 147.63  
 Sun-Moon sep (deg) : 39.04  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.39  
 Pole direction: RA (deg): 39.48270  
 Dec (deg): 83.42790  
 C/A sky separation (") : 0.575  
 C/A sky separation (km) : 3815.6  
 NAIF SPICE kernels : RAJobs\_U111+rgf16.spk

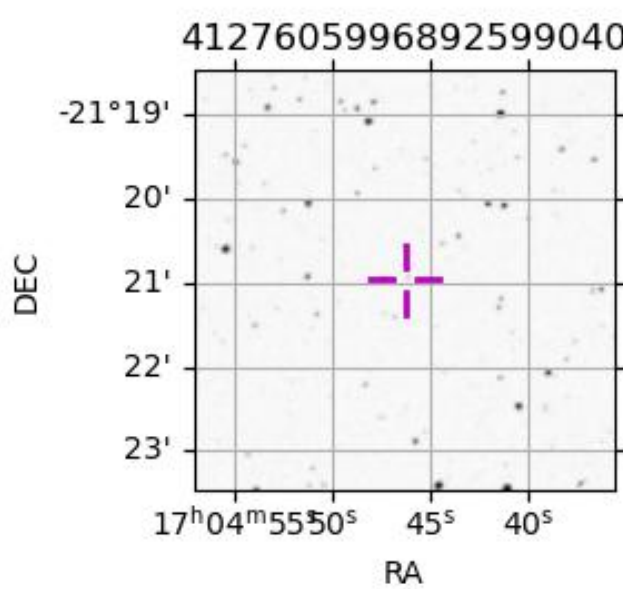
URKALLv1.spk  
 naif0012.tls  
 nep097.bsp  
 nep101.bsp  
 sat4401.bsp

Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+ +	JUL 12 07:00 - JUL 12 07:03	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUL 12 06:59 - JUL 12 07:03	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUL 12 06:59 - JUL 12 07:03	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUL 12 07:02 - JUL 12 07:06	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8			Pnn
ESO	European Southern Obs. (3.6m)	-29.3	289.3			Pnn
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



2046-07-12T07:03:38.4100 cc: 17 04 46.2719 s: -21 20 57.956 C/A 0.576" PA 359.57 deg v\_sky -20.51 km/s D 09.16 AU  
 Credit: Styled after SORA/Lucky Star



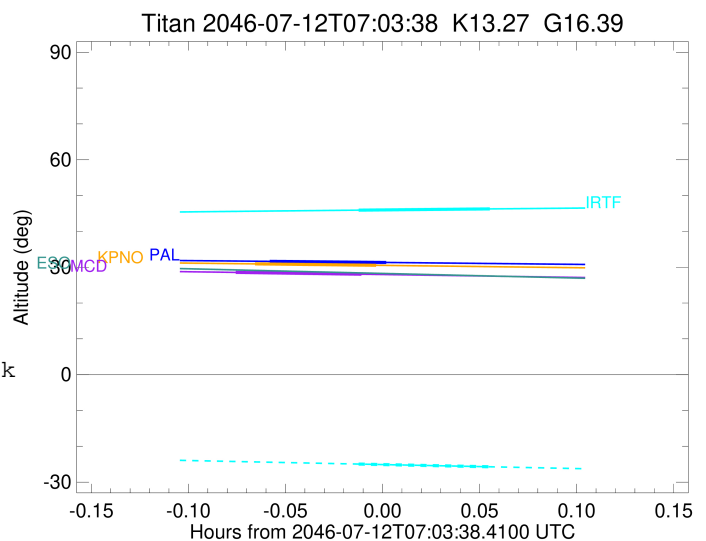
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2046-07-12T07:01:57.590
Event type           : Pt
: Titan occs: topocentric, not geocentric
: Not a ringed target
Observer code        : PAL
Location             : Palomar Mt (200")
Latitude (deg)       : 33.35622
E. Longitude (deg)   : 243.13601
Altitude (km)        : 1.706
Gaia source ID       : 4127605996892599040
2Mass ID (if available) : 17044628-2120576
ICRS Star Coord at Epoch: 17h 04m 46.27190s -21:20:57.95624s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 13.267
G magnitude           : 16.391
RP magnitude         : 15.481
BP magnitude         : 17.130
DUPflag              : 0
Distance (au)        : 9.156
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -20.50
Sun-Target sep (deg) : 147.63
Sun-Moon sep (deg)   : 39.66
B (ring opening deg) : 26.56
PA of pole (deg)     : 4.39
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.182
C/A sky separation (km): 1210.3
NAIF SPICE kernels   : RAJobs_U111+rgf16.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk

```

x: target alt < 5.0 deg or sun > -5.0 deg

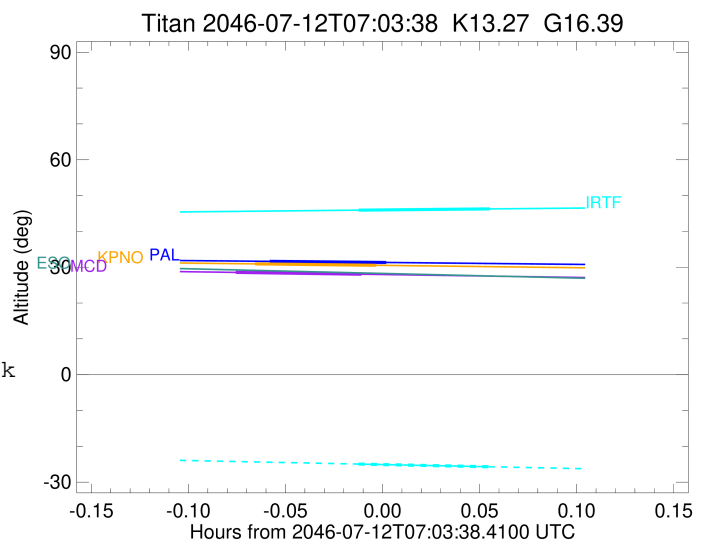
Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Titan	I	2046-07-12T07:00:08.648	31.63	-33.47	2575.1	20.77	20.78
Titan	E	2046-07-12T07:03:46.525	31.31	-33.66	2575.1	28.90	28.91



target : Titan  
 target radius (km) : 2575.15  
 C/A epoch : 2046-07-12T07:01:34.520  
 Event type : Pt  
 : Titan occs: topocentric, not geocentric  
 : Not a ringed target  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 4127605996892599040  
 2Mass ID (if available) : 17044628-2120576  
 ICRS Star Coord at Epoch: 17h 04m 46.27190s -21:20:57.95624s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.267  
 G magnitude : 16.391  
 RP magnitude : 15.481  
 BP magnitude : 17.130  
 DUPflag : 0  
 Distance (au) : 9.156  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -20.50  
 Sun-Target sep (deg) : 147.63  
 Sun-Moon sep (deg) : 39.71  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.39  
 Pole direction: RA (deg): 39.48270  
 Dec (deg): 83.42790  
 C/A sky separation (") : 0.156  
 C/A sky separation (km) : 1037.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf16.spk  
 URKALLv1.spk  
 naif0012.tls  
 nep097.bsp  
 nep101.bsp  
 sat4401.bsp  
 de440.bsp  
 earth\_720101\_070426.bpc  
 jup365.bsp  
 urall6.bsp  
 IAU\_SATURN\_for\_RINGFIT.tpc  
 pck00010.tpc  
 earth\_200101\_990628\_predict.bpc  
 IAU\_NEPTUNE\_for\_RINGFIT.tpc.BECAREFUL  
 uranus\_ringframes\_rfrench20220627\_v1.tf  
 neptune\_ringframes\_rfrench20220702a\_v1.tf  
 earth\_flat\_IAU.spk

x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Titan	I	2046-07-12T06:59:41.501	30.93	-35.73	2575.1	17.03	17.04
Titan	E	2046-07-12T07:03:27.533	30.53	-35.85	2575.1	25.17	25.18



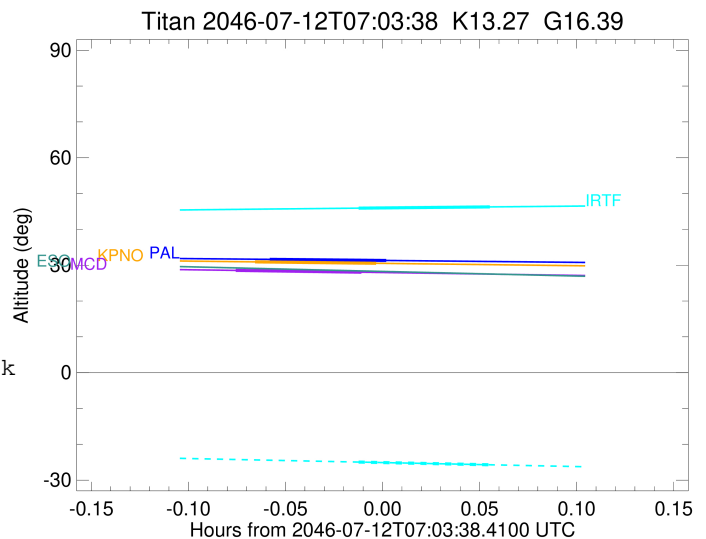
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2046-07-12T07:01:03.160
Event type           : Pt
: Titan occs: topocentric, not geocentric
: Not a ringed target
Observer code        : MCD
Location             : McDonald Obs. 2.7m
Latitude (deg)       : 30.67158
E. Longitude (deg)  : 255.97844
Altitude (km)        : 2.075
Gaia source ID       : 4127605996892599040
2Mass ID (if available) : 17044628-2120576
ICRS Star Coord at Epoch: 17h 04m 46.27190s -21:20:57.95624s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 13.267
G magnitude          : 16.391
RP magnitude         : 15.481
BP magnitude         : 17.130
DUPflag             : 0
Distance (au)        : 9.156
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -20.50
Sun-Target sep (deg) : 147.63
Sun-Moon sep (deg)   : 39.76
B (ring opening deg) : 26.56
PA of pole (deg)     : 4.39
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.121
C/A sky separation (km): 805.3
NAIF SPICE kernels  : RAJobs_U111+rgf16.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk

```

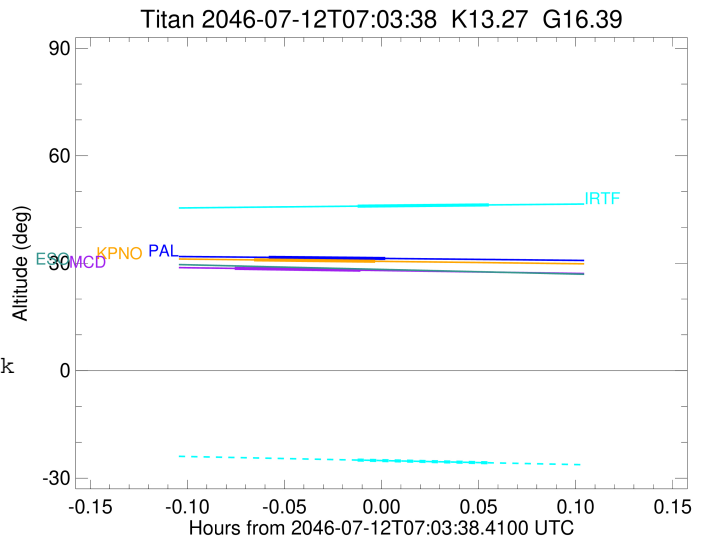
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Titan	I	2046-07-12T06:59:05.756	28.54	-37.57	2575.1	12.16	12.17
Titan	E	2046-07-12T07:03:00.576	28.03	-37.57	2575.1	20.29	20.30



```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2046-07-12T07:04:55.390
Event type           : Pt
: Titan occs: topocentric, not geocentric
: Not a ringed target
Observer code        : IRTF
Location             : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 4127605996892599040
2Mass ID (if available) : 17044628-2120576
ICRS Star Coord at Epoch: 17h 04m 46.27190s -21:20:57.95624s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 13.267
G magnitude          : 16.391
RP magnitude         : 15.481
BP magnitude         : 17.130
DUPflag             : 0
Distance (au)        : 9.156
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -20.50
Sun-Target sep (deg) : 147.63
Sun-Moon sep (deg)   : 39.34
B (ring opening deg) : 26.56
PA of pole (deg)     : 4.39
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.048
C/A sky separation (km) : 317.4
NAIF SPICE kernels   : RAJobs_U111+rgf16.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```



x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Titan	I	2046-07-12T07:02:53.279	45.92	-24.95	2575.2	1.92	1.92
Titan	E	2046-07-12T07:06:57.485	46.27	-25.71	2575.1	10.72	10.73