

```
target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2048-06-21T14:42:42.370
Event type            : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Gaia source ID       : 4075748458673224448
2Mass ID (if available) : 18553865-2213460
```

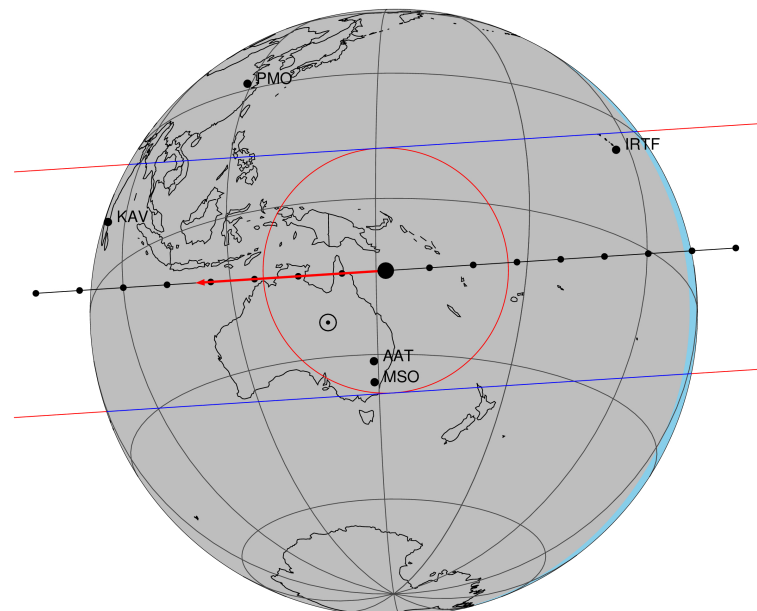
```
ICRS Star Coord at Epoch: 18h 55m 38.63367s -22:13:46.24943s
RUWE (>1.4 is poor)  : 1.92
K magnitude            : 13.185
G magnitude            : 15.957
RP magnitude           : 14.588
BP magnitude           : 15.802
DUPflag                : 0
Distance (au)          : 9.048
f0 (km)                : 0.00
g0 (km)                : 0.00
skyplane vel. (km/s)  : -15.34
Sun-Target sep (deg)   : 167.36
Sun-Moon sep (deg)    : 74.98
B (ring opening deg)  : 24.93
PA of pole (deg)      : 6.54
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.137
C/A sky separation (km) : 899.0
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

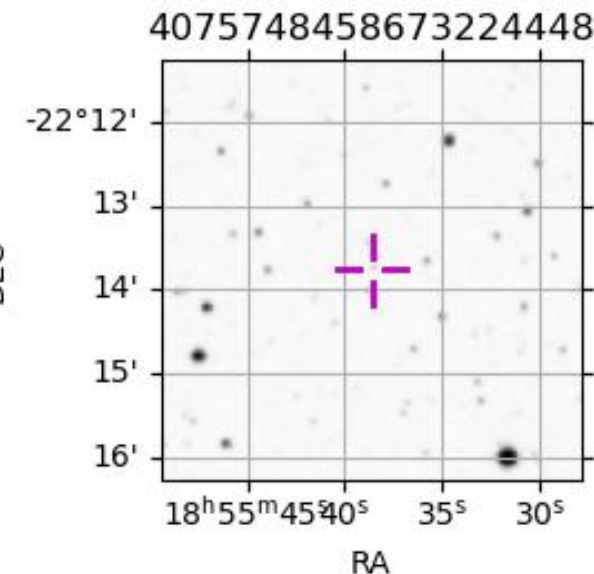
Obs	Location	lat	Elon	Target	Observed Events	Interval	OEcode
PIC	Pic du Midi	42.9	0.1				Pnn
PAL	Palomar Mt (200")	33.4	243.1				Pnn
PMO	Purple Mtn Obs. Nanking	32.1	118.8				Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4				Pnn
MCD	McDonald Obs. 2.7m	30.7	256.0				Pnn
TEN	Teide Obs./Tenerife	28.3	343.5				Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUN 21 14:36 - JUN 21 14:38		Pie
KAV	Kavalur Observatory	12.6	78.8	+ +	JUN 21 14:46 - JUN 21 14:51		Pie
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	+ +	JUN 21 14:41 - JUN 21 14:45		Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8				Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUN 21 14:42 - JUN 21 14:44		Pie

Titan 2048-06-21T14:42:42 K13.19 G15.96 dots 60.0 sec  
Pgt

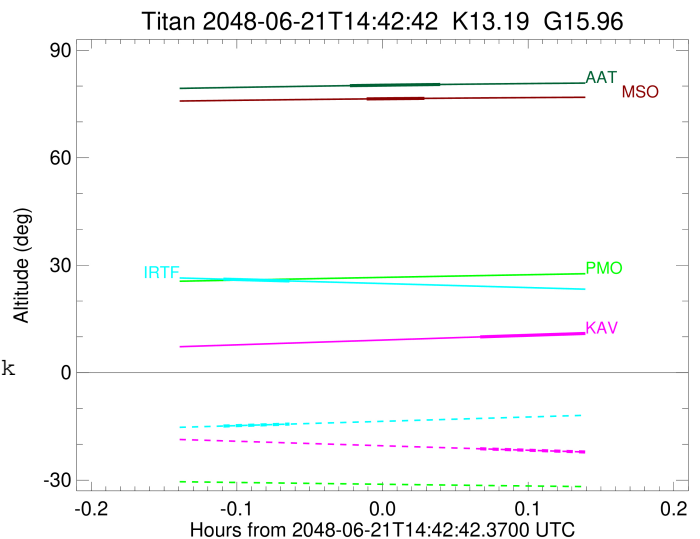


2048-06-21T14:42:42.3700 ra: 18 55 38.6337 d: -22 13 46.249 C/A 0.137" PA 356.32 deg v\_sky -15.34 km/s D 09.05 AU

Credit: Styled after SORA/Lucky Star



target : Titan  
 target radius (km) : 2575.15  
 C/A epoch : 2048-06-21T14:37:29.940  
 Event type : Pgt  
 : Titan occs: geocentric, topocentric  
 : 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 : 4075748458673224448  
 2Mass ID (if available) : 18553865-2213460  
 ICRS Star Coord at Epoch: 18h 55m 38.63367s -22:13:46.24943s  
 RUWE (>1.4 is poor) : 1.92  
 K magnitude : 13.185  
 G magnitude : 15.957  
 RP magnitude : 14.588  
 BP magnitude : 15.802  
 DUPflag : 0  
 Distance (au) : 9.048  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -15.34  
 Sun-Target sep (deg) : 167.36  
 Sun-Moon sep (deg) : 75.59  
 B (ring opening deg) : 24.93  
 PA of pole (deg) : 6.54  
 Pole direction: RA (deg): 39.48270  
 Dec (deg): 83.42790  
 C/A sky separation (") : 0.340  
 C/A sky separation (km) : 2229.5  
 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	2048-06-21T14:36:07.443	26.10	-14.90	2575.1	44.22	44.23
Titan	E	2048-06-21T14:38:52.441	25.59	-14.35	2575.1	58.25	58.26

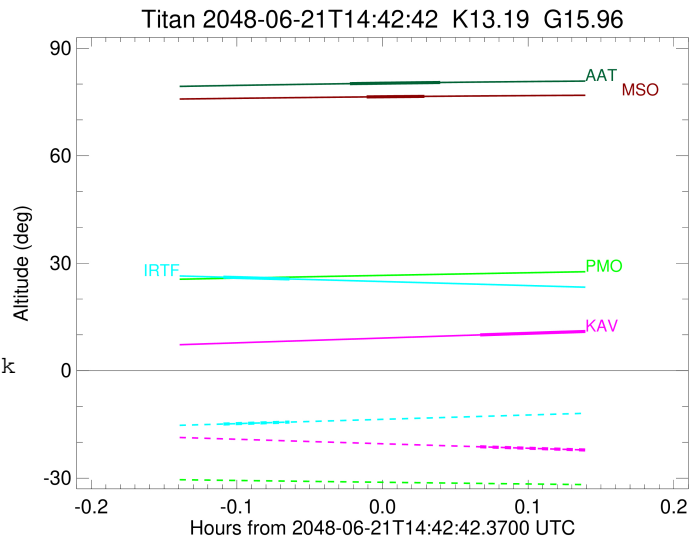
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2048-06-21T14:48:59.890
Event type            : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Observer code         : KAV
Location              : Kavalur Observatory
Latitude (deg)       : 12.57556
E. Longitude (deg)   : 78.83167
Altitude (km)        : 0.722
Gaia source ID       : 4075748458673224448
2Mass ID (if available) : 18553865-2213460
ICRS Star Coord at Epoch: 18h 55m 38.63367s -22:13:46.24943s
RUWE (>1.4 is poor) : 1.92
K magnitude           : 13.185
G magnitude           : 15.957
RP magnitude          : 14.588
BP magnitude          : 15.802
DUPflag              : 0
Distance (au)        : 9.048
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.34
Sun-Target sep (deg) : 167.36
Sun-Moon sep (deg)   : 74.91
B (ring opening deg) : 24.93
PA of pole (deg)     : 6.54
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.225
C/A sky separation (km): 1474.6
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

```

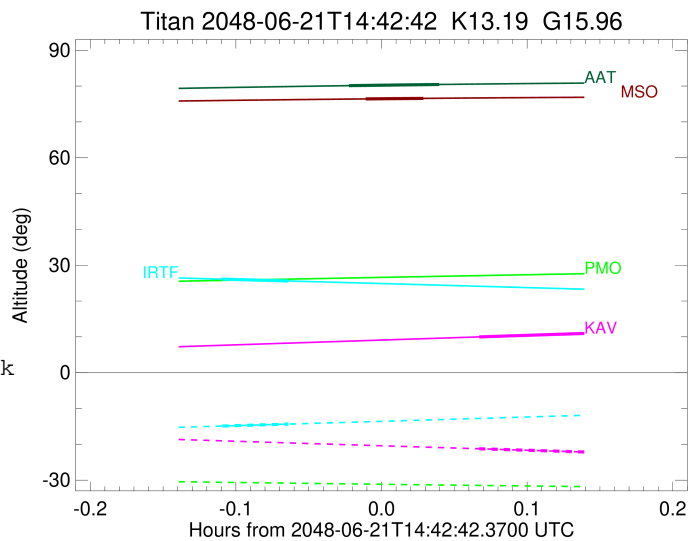
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Titan	I	2048-06-21T14:46:43.492	9.99	-21.24	2575.1	21.74	21.75
Titan	E	2048-06-21T14:51:16.267	10.99	-22.19	2575.1	40.52	40.54



```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2048-06-21T14:43:13.160
Event type           : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Observer code        : AAT
Location             : Siding Spring (AAT)
Latitude (deg)       : -31.27703
E. Longitude (deg)   : 149.06608
Altitude (km)        : 1.164
Gaia source ID       : 4075748458673224448
2Mass ID (if available) : 18553865-2213460
ICRS Star Coord at Epoch: 18h 55m 38.63367s -22:13:46.24943s
RUWE (>1.4 is poor) : 1.92
K magnitude           : 13.185
G magnitude           : 15.957
RP magnitude          : 14.588
BP magnitude          : 15.802
DUPflag              : 0
Distance (au)         : 9.048
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.34
Sun-Target sep (deg) : 167.36
Sun-Moon sep (deg)   : 75.91
B (ring opening deg) : 24.93
PA of pole (deg)     : 6.54
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (" ) : 0.284
C/A sky separation (km) : 1865.0
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	2048-06-21T14:41:20.330	80.11	-78.98	2575.1	-49.20	-49.21
Titan	E	2048-06-21T14:45:06.011	80.44	-78.36	2575.1	-32.40	-32.41

```

target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2048-06-21T14:43:14.260
Event type            : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Observer code         : MSO
Location              : Mt. Stromlo Observatory
Latitude (deg)       : -35.32000
E. Longitude (deg)   : 149.00833
Altitude (km)        : 0.770
Gaia source ID       : 4075748458673224448
2Mass ID (if available) : 18553865-2213460
ICRS Star Coord at Epoch: 18h 55m 38.63367s -22:13:46.24943s
RUWE (>1.4 is poor) : 1.92
K magnitude           : 13.185
G magnitude           : 15.957
RP magnitude          : 14.588
BP magnitude          : 15.802
DUPflag              : 0
Distance (au)        : 9.048
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.34
Sun-Target sep (deg) : 167.36
Sun-Moon sep (deg)   : 75.89
B (ring opening deg) : 24.93
PA of pole (deg)     : 6.54
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.351
C/A sky separation (km) : 2304.6
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	2048-06-21T14:42:01.174	76.41	-75.91	2575.1	-60.50	-60.51
Titan	E	2048-06-21T14:44:27.358	76.56	-75.60	2575.1	-46.65	-46.66

