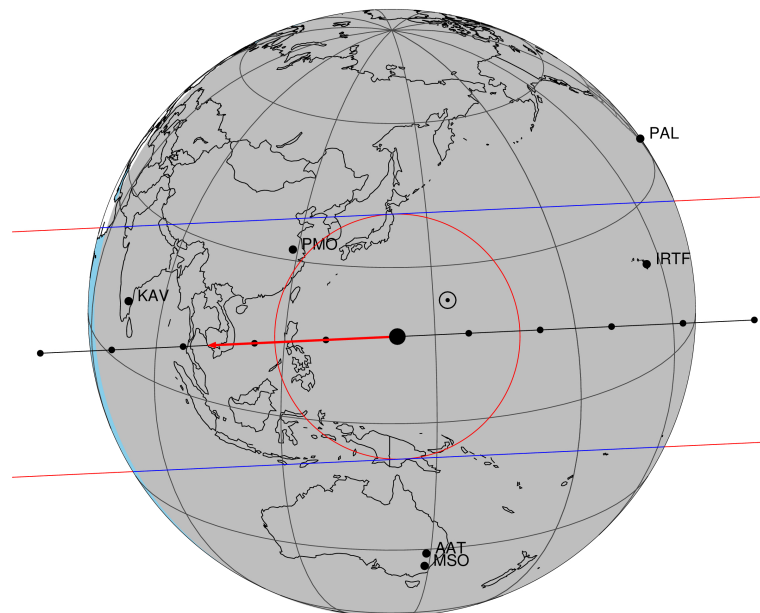


target : Titan
 target radius (km) : 2575.15
 C/A epoch : 2031-12-21T13:46:03.760
 Event type : Pgt
 : Titan occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 3414912936385380352
 2Mass ID (if available) : 05093792+2123200

ICRS Star Coord at Epoch: 05h 09m 37.93568s +21:23:19.95647s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 13.979
 G magnitude : 16.378
 RP magnitude : 15.638
 BP magnitude : 16.965
 DUPflag : 0
 Distance (au) : 8.052
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -25.01
 Sun-Target sep (deg) : 169.14
 Sun-Moon sep (deg) : 72.19
 B (ring opening deg) : -26.51
 PA of pole (deg) : -4.51
 Pole direction: RA (deg): 39.48270
 Dec (deg): 83.42790
 C/A sky separation (") : 0.088
 C/A sky separation (km) : 514.3
 NAIF SPICE kernels : RAJobs_U111+rgf16.spk

Titan 2031-12-21T13:46:03 K13.98 G16.38 dots 60.0 sec
 Pgt

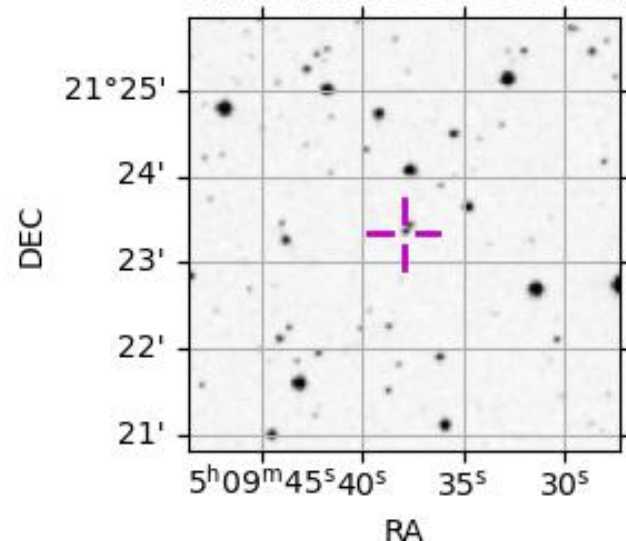


2031-12-21T13:46:03.7600 α: 05 09 37.9357 δ: +21 23 19.956 C/A 0.086" PA 177.36 deg v_sky -25.02 km/s D 08.05 AU
 Credit: Styled after SORA/Lucky Star

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

| Obs | Location | lat | Elon | Target | Observed Events Interval | OCode |
|------|-----------------------------------|-------|-------|--------|-----------------------------|-------|
| 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 | + + | DEC 21 13:46 - DEC 21 13:48 | Pie |
| 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 | + + | DEC 21 13:41 - DEC 21 13:43 | Pie |
| KAV | Kavalur Observatory | 12.6 | 78.8 | + + | DEC 21 13:48 - DEC 21 13:51 | 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 | | | Pnn |
| SAAO | So. Afr. Astro. Obs. (Sutherland) | -32.4 | 20.8 | | | Pnn |
| MSO | Mt. Stromlo Observatory | -35.3 | 149.0 | | | Pnn |

3414912936385380352



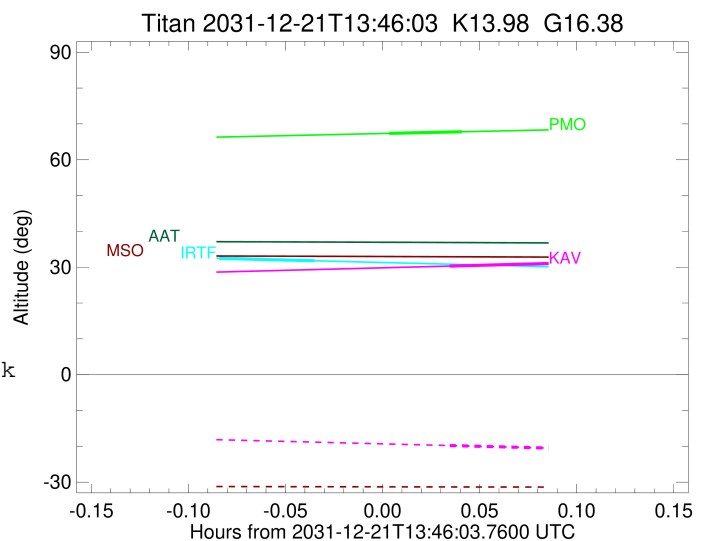
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2031-12-21T13:47:23.600
Event type           : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Observer code        : PMO
Location             : Purple Mtn Obs. Nanking
Latitude (deg)       : 32.06667
E. Longitude (deg)   : 118.82089
Altitude (km)        : 0.364
Gaia source ID       : 3414912936385380352
2Mass ID (if available) : 05093792+2123200
ICRS Star Coord at Epoch: 05h 09m 37.93568s +21:23:19.95647s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 13.979
G magnitude          : 16.378
RP magnitude         : 15.638
BP magnitude         : 16.965
DUPflag             : 0
Distance (au)        : 8.052
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -25.01
Sun-Target sep (deg) : 169.14
Sun-Moon sep (deg)   : 72.95
B (ring opening deg) : -26.51
PA of pole (deg)     : -4.51
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.327
C/A sky separation (km) : 1907.3
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 | 2031-12-21T13:46:15.435 | 67.35 | -58.77 | 2575.1 | 43.10 | 43.12 |
| Titan | E | 2031-12-21T13:48:31.772 | 67.80 | -59.25 | 2575.1 | 39.90 | 39.92 |



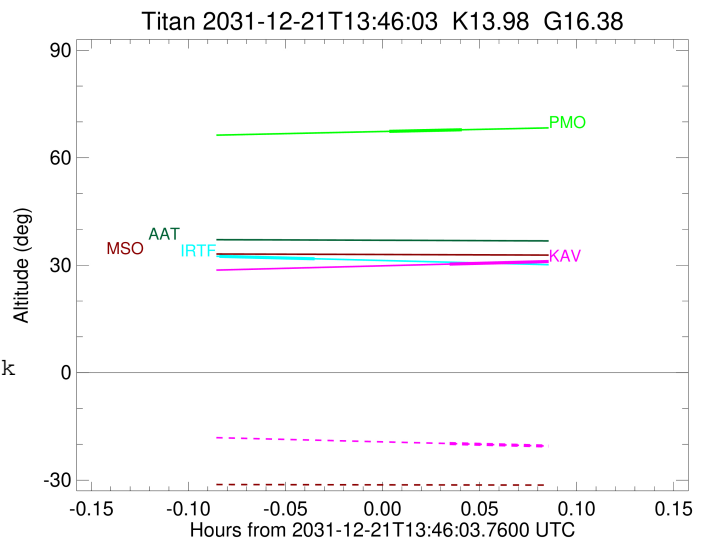
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2031-12-21T13:42:29.610
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       : 3414912936385380352
2Mass ID (if available) : 05093792+2123200
ICRS Star Coord at Epoch: 05h 09m 37.93568s +21:23:19.95647s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 13.979
G magnitude           : 16.378
RP magnitude          : 15.638
BP magnitude          : 16.965
DUPflag              : 0
Distance (au)         : 8.052
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -25.01
Sun-Target sep (deg) : 169.14
Sun-Moon sep (deg)   : 72.91
B (ring opening deg) : -26.51
PA of pole (deg)     : -4.51
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.216
C/A sky separation (km) : 1262.5
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 | 2031-12-21T13:41:00.640 | 32.47 | -43.32 | 2575.1 | 27.36 | 27.37 |
| Titan | E | 2031-12-21T13:43:58.579 | 31.79 | -42.64 | 2575.1 | 24.69 | 24.70 |



target : Titan
 target radius (km) : 2575.15
 C/A epoch : 2031-12-21T13:49:42.550
 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 : 3414912936385380352
 2Mass ID (if available) : 05093792+2123200
 ICRS Star Coord at Epoch: 05h 09m 37.93568s +21:23:19.95647s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 13.979
 G magnitude : 16.378
 RP magnitude : 15.638
 BP magnitude : 16.965
 DUPflag : 0
 Distance (au) : 8.052
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -25.01
 Sun-Target sep (deg) : 169.14
 Sun-Moon sep (deg) : 72.40
 B (ring opening deg) : -26.51
 PA of pole (deg) : -4.51
 Pole direction: RA (deg): 39.48270
 Dec (deg): 83.42790
 C/A sky separation (") : 0.164
 C/A sky separation (km) : 957.5
 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 | 2031-12-21T13:48:07.783 | 30.31 | -19.79 | 2575.1 | 21.35 | 21.36 |
| Titan | E | 2031-12-21T13:51:17.305 | 31.04 | -20.51 | 2575.1 | 17.51 | 17.52 |

