

target : Titan  
 target radius (km) : 2575.15  
 C/A epoch : 2028-11-12T03:09:36.290  
 Event type : Pgt  
 : Titan occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 72641950108630784  
 2Mass ID (if available) : 02200652+1108065

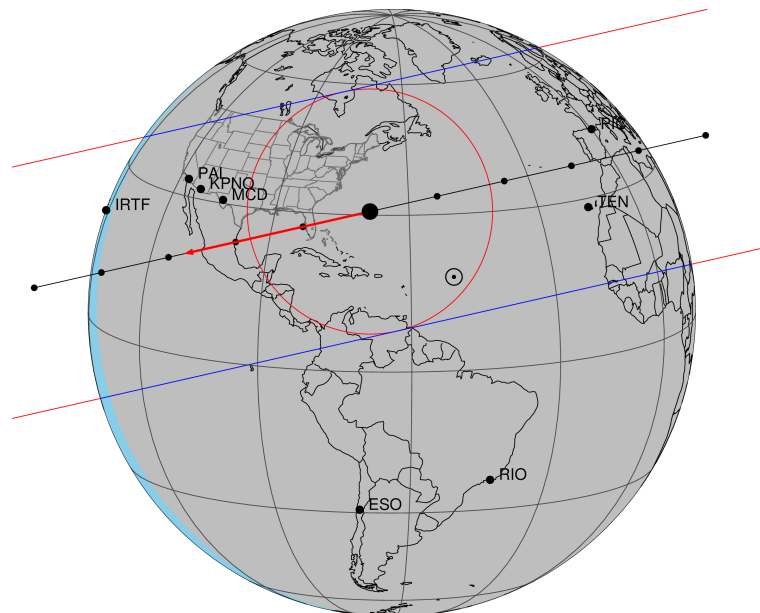
ICRS Star Coord at Epoch: 02h 20m 06.54380s +11:08:06.15069s  
 RUWE (>1.4 is poor) : 1.09  
 K magnitude : 14.330  
 G magnitude : 18.198  
 RP magnitude : 17.014  
 BP magnitude : 19.609  
 DUPflag : 0  
 Distance (au) : 8.244  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -24.09  
 Sun-Target sep (deg) : 166.33  
 Sun-Moon sep (deg) : 132.40  
 B (ring opening deg) : -17.69  
 PA of pole (deg) : 0.53  
 Pole direction: RA (deg): 39.48270  
 Dec (deg): 83.42790  
 C/A sky separation (") : 0.363  
 C/A sky separation (km) : 2169.8  
 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

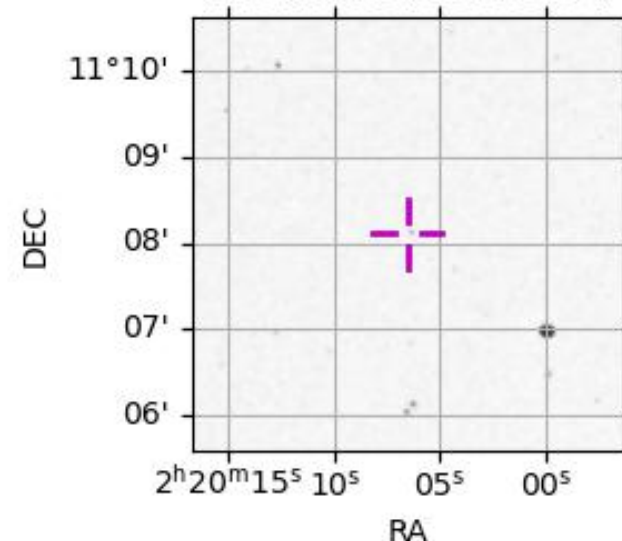
| Obs  | Location                          | lat   | Elon  | Target | Observed Events Interval    | OEcode |
|------|-----------------------------------|-------|-------|--------|-----------------------------|--------|
| PIC  | Pic du Midi                       | 42.9  | 0.1   | + +    | NOV 12 03:04 - NOV 12 03:07 | Pie    |
| PAL  | Palomar Mt (200")                 | 33.4  | 243.1 | + +    | NOV 12 03:10 - NOV 12 03:13 | Pie    |
| PMO  | Purple Mtn Obs. Nanking           | 32.1  | 118.8 |        |                             | Pnn    |
| KPNO | Kitt Peak Natl Obs                | 32.0  | 248.4 | + +    | NOV 12 03:10 - NOV 12 03:13 | Pie    |
| MCD  | McDonald Obs. 2.7m                | 30.7  | 256.0 | + +    | NOV 12 03:09 - NOV 12 03:13 | Pie    |
| TEN  | Teide Obs./Tenerife               | 28.3  | 343.5 | + +    | NOV 12 03:04 - NOV 12 03:08 | Pie    |
| IRTF | Mauna Kea/IRTF                    | 19.8  | 204.5 |        |                             | Pnn    |
| 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    |

Titan 2028-11-12T03:09:36 K14.33 G18.20 dots 60.0 sec  
 Pgt



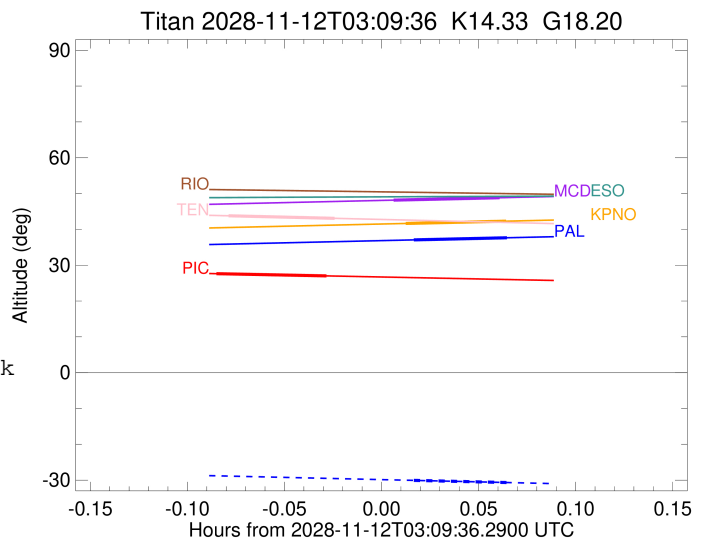
2028-11-12T03:09:36.2900 α: 02 20 06.5438 δ: +11 08 06.151 C/A 0.364" PA 347.19 deg v\_sky -24.10 km/s D 08.24 AU  
 Credit: Styled after SORA/Lucky Star

72641950108630784



```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2028-11-12T03:06:12.470
Event type           : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Observer code        : PIC
Location             : Pic du Midi
Latitude (deg)       : 42.93656
E. Longitude (deg)  : 0.14231
Altitude (km)       : 2.890
Gaia source ID       : 72641950108630784
2Mass ID (if available) : 02200652+1108065
ICRS Star Coord at Epoch: 02h 20m 06.54380s +11:08:06.15069s
RUWE (>1.4 is poor) : 1.09
K magnitude          : 14.330
G magnitude          : 18.198
RP magnitude         : 17.014
BP magnitude         : 19.609
DUPflag             : 0
Distance (au)        : 8.244
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -24.09
Sun-Target sep (deg) : 166.33
Sun-Moon sep (deg)  : 133.24
B (ring opening deg) : -17.69
PA of pole (deg)    : 0.53
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.108
C/A sky separation (km) : 646.0
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
    
```

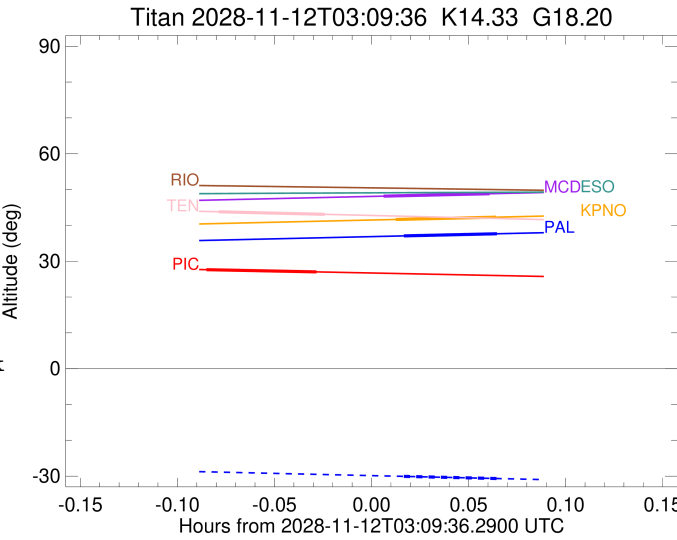


```

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 2028-11-12T03:04:29.712 27.63 -40.92 2575.2 1.09 1.09
Titan E 2028-11-12T03:07:55.231 27.01 -40.31 2575.1 26.49 26.50
    
```

```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2028-11-12T03:12:02.430
Event type           : Pgt
: Titan occs: geocentric, topocentric
: 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       : 72641950108630784
2Mass ID (if available) : 02200652+1108065
ICRS Star Coord at Epoch: 02h 20m 06.54380s +11:08:06.15069s
RUWE (>1.4 is poor) : 1.09
K magnitude           : 14.330
G magnitude           : 18.198
RP magnitude          : 17.014
BP magnitude          : 19.609
DUPflag              : 0
Distance (au)         : 8.244
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -24.09
Sun-Target sep (deg) : 166.33
Sun-Moon sep (deg)   : 132.45
B (ring opening deg) : -17.69
PA of pole (deg)     : 0.53
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.247
C/A sky separation (km): 1478.7
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
    
```



```

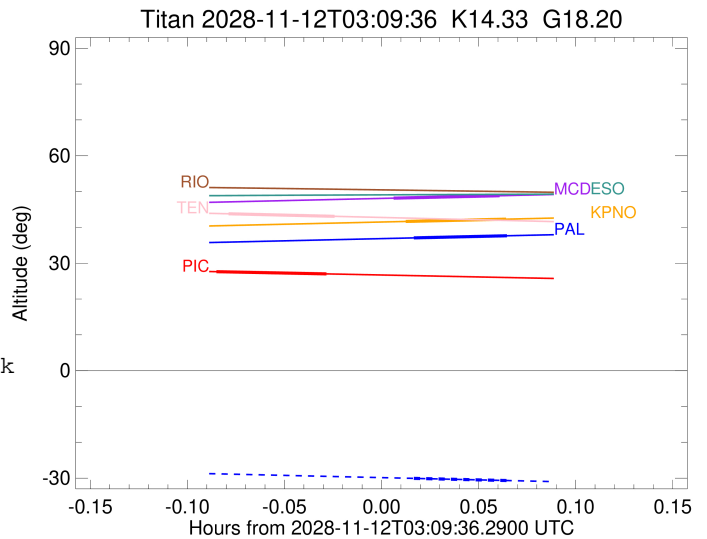
x: target alt < 5.0 deg or sun > -5.0 deg

```

| Target | I/E | UTC                     | alt   | alt-sun | radius | lat-geo | lat-geodetic |
|--------|-----|-------------------------|-------|---------|--------|---------|--------------|
| Titan  | I   | 2028-11-12T03:10:35.722 | 37.06 | -30.06  | 2575.2 | 20.88   | 20.89        |
| Titan  | E   | 2028-11-12T03:13:29.137 | 37.65 | -30.67  | 2575.1 | 45.18   | 45.19        |

```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2028-11-12T03:11:54.110
Event type           : Pgt
: Titan occs: geocentric, topocentric
: 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       : 72641950108630784
2Mass ID (if available) : 02200652+1108065
ICRS Star Coord at Epoch: 02h 20m 06.54380s +11:08:06.15069s
RUWE (>1.4 is poor) : 1.09
K magnitude          : 14.330
G magnitude          : 18.198
RP magnitude         : 17.014
BP magnitude         : 19.609
DUPflag             : 0
Distance (au)        : 8.244
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -24.09
Sun-Target sep (deg) : 166.33
Sun-Moon sep (deg)  : 132.52
B (ring opening deg) : -17.69
PA of pole (deg)    : 0.53
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.204
C/A sky separation (km) : 1217.1
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   | 2028-11-12T03:10:20.896 | 41.65 | -34.41  | 2575.2 | 14.41   | 14.42        |
| Titan  | E   | 2028-11-12T03:13:27.316 | 42.29 | -35.07  | 2575.1 | 38.94   | 38.95        |

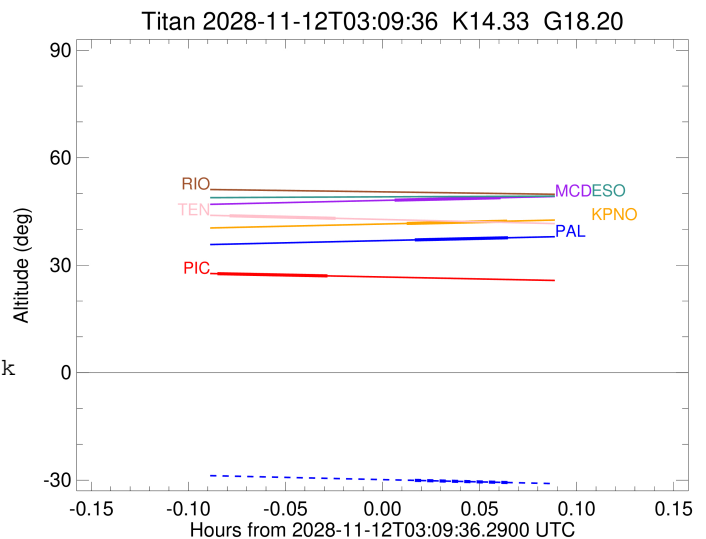
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2028-11-12T03:11:37.220
Event type            : Pgt
: Titan occs: geocentric, topocentric
: 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        : 72641950108630784
2Mass ID (if available) : 02200652+1108065
ICRS Star Coord at Epoch: 02h 20m 06.54380s +11:08:06.15069s
RUWE (>1.4 is poor) : 1.09
K magnitude           : 14.330
G magnitude           : 18.198
RP magnitude          : 17.014
BP magnitude          : 19.609
DUPflag              : 0
Distance (au)         : 8.244
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -24.09
Sun-Target sep (deg)  : 166.33
Sun-Moon sep (deg)   : 132.62
B (ring opening deg) : -17.69
PA of pole (deg)     : 0.53
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.149
C/A sky separation (km) : 893.4
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

```

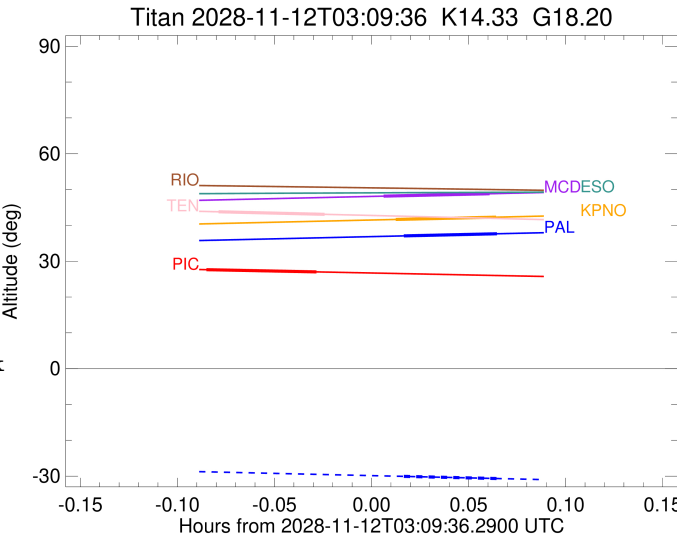
x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC                     | alt   | alt-sun | radius | lat-geo | lat-geodetic |
|--------|-----|-------------------------|-------|---------|--------|---------|--------------|
| Titan  | I   | 2028-11-12T03:09:58.171 | 48.15 | -40.83  | 2575.2 | 6.89    | 6.90         |
| Titan  | E   | 2028-11-12T03:13:16.249 | 48.83 | -41.54  | 2575.1 | 31.59   | 31.61        |



```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2028-11-12T03:06:31.160
Event type           : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Observer code        : TEN
Location             : Teide Obs./Tenerife
Latitude (deg)       : 28.30050
E. Longitude (deg)  : 343.48909
Altitude (km)        : 2.395
Gaia source ID       : 72641950108630784
2Mass ID (if available) : 02200652+1108065
ICRS Star Coord at Epoch: 02h 20m 06.54380s +11:08:06.15069s
RUWE (>1.4 is poor) : 1.09
K magnitude          : 14.330
G magnitude          : 18.198
RP magnitude         : 17.014
BP magnitude         : 19.609
DUPflag             : 0
Distance (au)        : 8.244
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -24.09
Sun-Target sep (deg) : 166.33
Sun-Moon sep (deg)  : 133.37
B (ring opening deg) : -17.69
PA of pole (deg)    : 0.53
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.155
C/A sky separation (km) : 928.6
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   | 2028-11-12T03:04:52.656 | 43.79 | -57.45  | 2575.1 | -32.61  | -32.63       |
| Titan  | E   | 2028-11-12T03:08:09.678 | 43.08 | -56.74  | 2575.2 | -7.44   | -7.44        |