

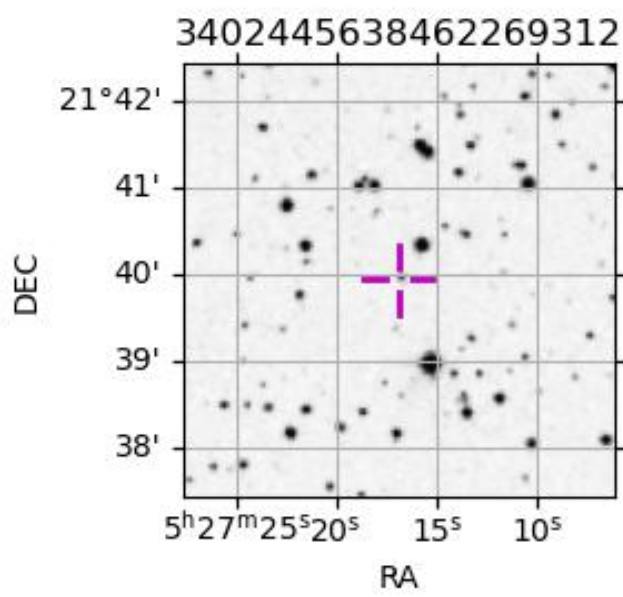
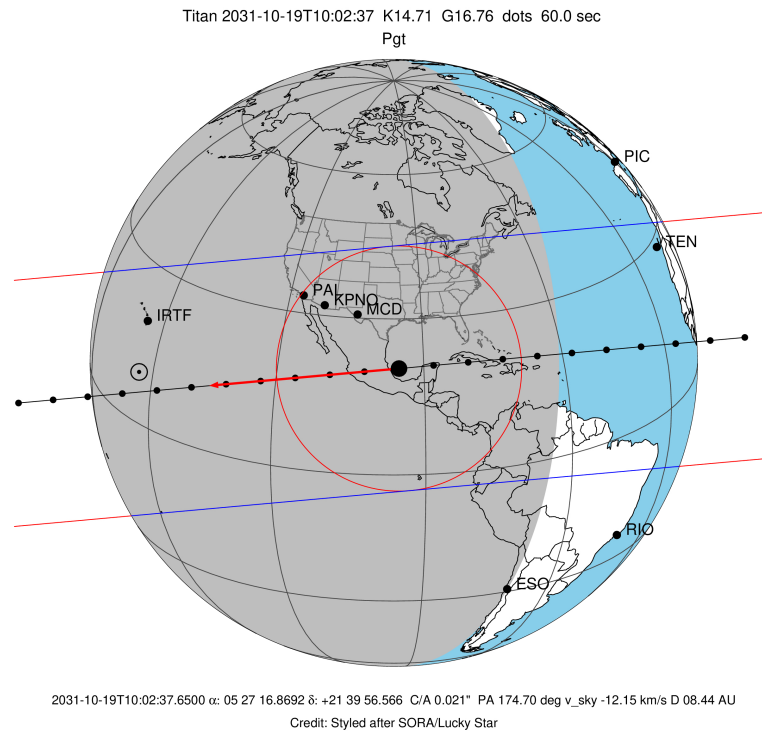
target : Titan  
 target radius (km) : 2575.15  
 C/A epoch : 2031-10-19T10:02:37.650  
 Event type : Pgt  
 : Titan occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 3402445638462269312  
 2Mass ID (if available) : 05271687+2139564

ICRS Star Coord at Epoch: 05h 27m 16.86915s +21:39:56.56560s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.707  
 G magnitude : 16.763  
 RP magnitude : 16.079  
 BP magnitude : 17.293  
 DUPflag : 0  
 Distance (au) : 8.443  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -12.15  
 Sun-Target sep (deg) : 122.97  
 Sun-Moon sep (deg) : 161.86  
 B (ring opening deg) : -26.45  
 PA of pole (deg) : -4.94  
 Pole direction: RA (deg): 39.48270  
 Dec (deg): 83.42790  
 C/A sky separation (") : 0.022  
 C/A sky separation (km) : 133.0  
 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    | OEncode |
|------|-----------------------------------|-------|-------|--------|-----------------------------|---------|
| PIC  | Pic du Midi                       | 42.9  | 0.1   |        |                             | Pnn     |
| PAL  | Palomar Mt (200")                 | 33.4  | 243.1 | + +    | OCT 19 10:02 - OCT 19 10:07 | Pie     |
| PMO  | Purple Mtn Obs. Nanking           | 32.1  | 118.8 |        |                             | Pnn     |
| KPNO | Kitt Peak Natl Obs                | 32.0  | 248.4 | + +    | OCT 19 10:01 - OCT 19 10:07 | Pie     |
| MCD  | McDonald Obs. 2.7m                | 30.7  | 256.0 | + +    | OCT 19 10:00 - OCT 19 10:06 | Pie     |
| TEN  | Teide Obs./Tenerife               | 28.3  | 343.5 |        |                             | Pnn     |
| IRTF | Mauna Kea/IRTF                    | 19.8  | 204.5 | + +    | OCT 19 10:06 - OCT 19 10:12 | 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     |



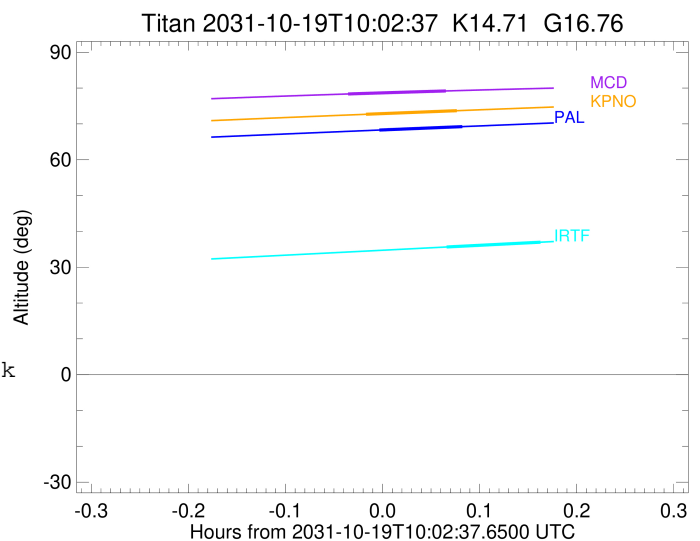
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2031-10-19T10:04:59.740
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       : 3402445638462269312
2Mass ID (if available) : 05271687+2139564
ICRS Star Coord at Epoch: 05h 27m 16.86915s +21:39:56.56560s
RUWE (>1.4 is poor) : 0.98
K magnitude          : 14.707
G magnitude          : 16.763
RP magnitude         : 16.079
BP magnitude         : 17.293
DUPflag             : 0
Distance (au)        : 8.443
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.15
Sun-Target sep (deg) : 122.97
Sun-Moon sep (deg)  : 161.88
B (ring opening deg) : -26.45
PA of pole (deg)    : -4.94
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.274
C/A sky separation (km): 1678.8
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   | 2031-10-19T10:02:23.679 | 68.27 | -48.50  | 2575.1 | 35.83   | 35.85        |
| Titan  | E   | 2031-10-19T10:07:35.764 | 69.24 | -47.51  | 2575.1 | 35.60   | 35.61        |



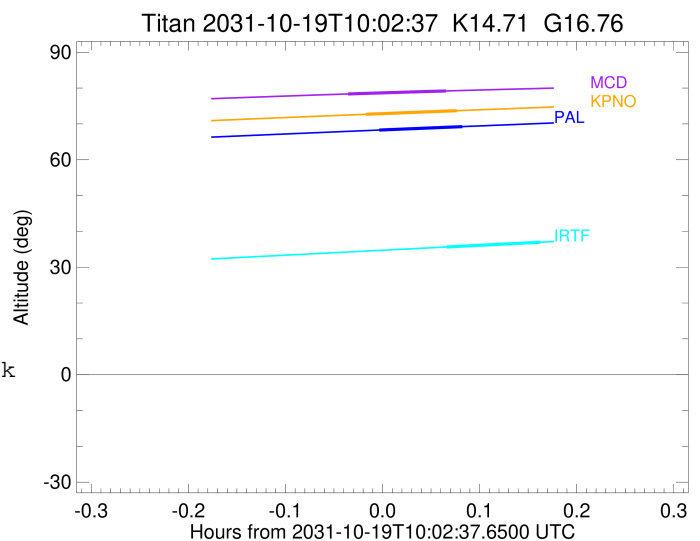
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2031-10-19T10:04:25.530
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     : 3402445638462269312
2Mass ID (if available) : 05271687+2139564
ICRS Star Coord at Epoch: 05h 27m 16.86915s +21:39:56.56560s
RUWE (>1.4 is poor) : 0.98
K magnitude        : 14.707
G magnitude        : 16.763
RP magnitude       : 16.079
BP magnitude       : 17.293
DUPflag           : 0
Distance (au)     : 8.443
f0 (km)           : 0.00
g0 (km)           : 0.00
skyplane vel. (km/s) : -12.15
Sun-Target sep (deg) : 122.97
Sun-Moon sep (deg) : 161.95
B (ring opening deg) : -26.45
PA of pole (deg)   : -4.94
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.235
C/A sky separation (km) : 1438.1
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

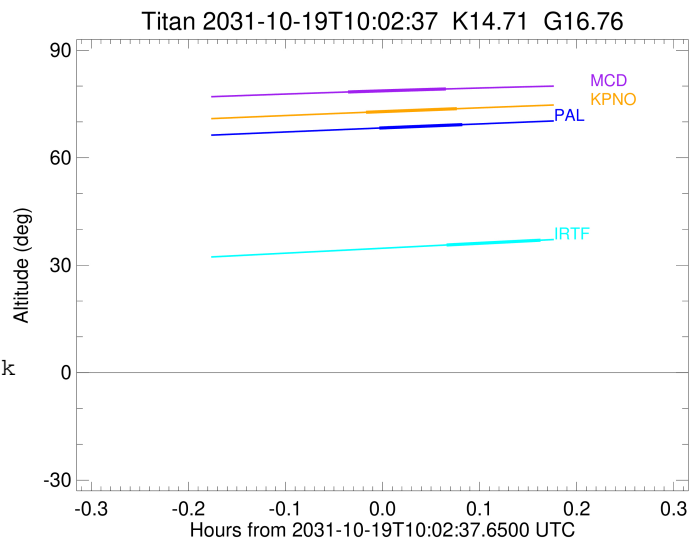
| Target | I/E | UTC                     | alt   | alt-sun | radius | lat-geo | lat-geodetic |
|--------|-----|-------------------------|-------|---------|--------|---------|--------------|
| Titan  | I   | 2031-10-19T10:01:35.036 | 72.67 | -45.08  | 2575.1 | 30.09   | 30.10        |
| Titan  | E   | 2031-10-19T10:07:15.989 | 73.69 | -43.93  | 2575.1 | 29.92   | 29.94        |



```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2031-10-19T10:03:31.640
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       : 3402445638462269312
2Mass ID (if available) : 05271687+2139564
ICRS Star Coord at Epoch: 05h 27m 16.86915s +21:39:56.56560s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 14.707
G magnitude           : 16.763
RP magnitude          : 16.079
BP magnitude          : 17.293
DUPflag              : 0
Distance (au)         : 8.443
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.15
Sun-Target sep (deg) : 122.97
Sun-Moon sep (deg)   : 162.05
B (ring opening deg) : -26.45
PA of pole (deg)     : -4.94
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.194
C/A sky separation (km) : 1188.8
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   | 2031-10-19T10:00:29.563 | 78.35 | -39.43  | 2575.1 | 24.44   | 24.45        |
| Titan  | E   | 2031-10-19T10:06:33.692 | 79.19 | -38.15  | 2575.1 | 24.40   | 24.41        |

```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2031-10-19T10:09:29.430
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       : 3402445638462269312
2Mass ID (if available) : 05271687+2139564
ICRS Star Coord at Epoch: 05h 27m 16.86915s +21:39:56.56560s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 14.707
G magnitude           : 16.763
RP magnitude         : 16.079
BP magnitude         : 17.293
DUPflag              : 0
Distance (au)        : 8.443
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.15
Sun-Target sep (deg) : 122.97
Sun-Moon sep (deg)   : 161.29
B (ring opening deg) : -26.45
PA of pole (deg)     : -4.94
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.226
C/A sky separation (km) : 1383.5
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   | 2031-10-19T10:06:33.914 | 35.63 | -80.28  | 2575.1 | 29.17   | 29.18        |
| Titan  | E   | 2031-10-19T10:12:24.859 | 36.98 | -80.19  | 2575.1 | 28.34   | 28.36        |

