

target : Titan  
 target radius (km) : 2575.15  
 C/A epoch : 2030-11-13T09:45:35.560  
 Event type : Pgt  
 : Titan occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 47843019396310784  
 2Mass ID (if available) : 04185343+1915470

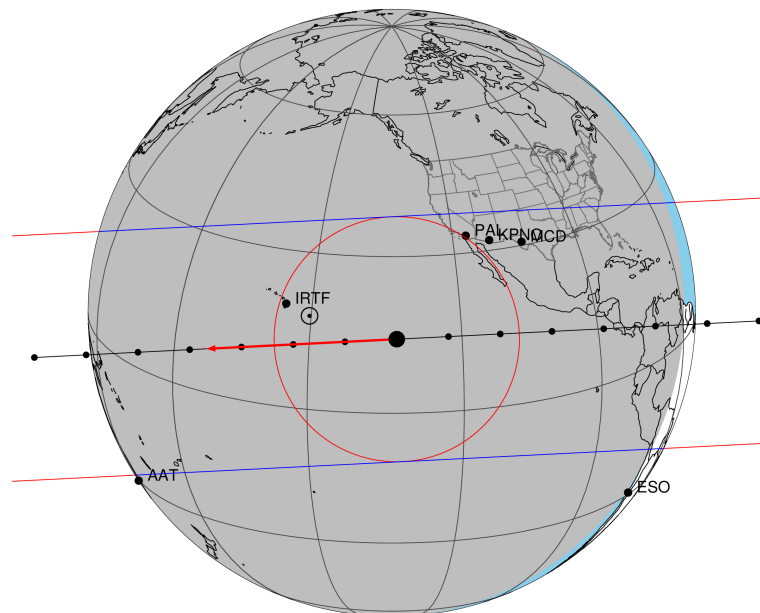
ICRS Star Coord at Epoch: 04h 18m 53.43440s +19:15:46.95395s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.523  
 G magnitude : 17.067  
 RP magnitude : 16.248  
 BP magnitude : 17.739  
 DUPflag : 0  
 Distance (au) : 8.114  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -18.13  
 Sun-Target sep (deg) : 164.27  
 Sun-Moon sep (deg) : 19.81  
 B (ring opening deg) : -25.18  
 PA of pole (deg) : -3.09  
 Pole direction: RA (deg): 39.48270  
 Dec (deg): 83.42790  
 C/A sky separation (") : 0.097  
 C/A sky separation (km) : 573.6  
 NAIF SPICE kernels : RAJobs\_U111+rgf16.spk

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

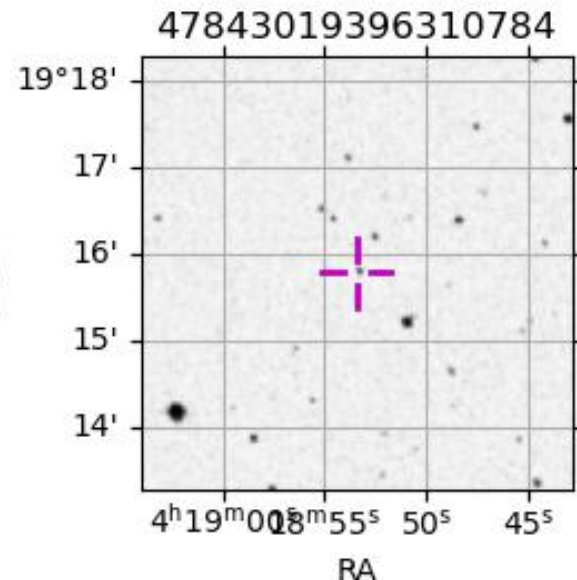
Observable events with sun below -5 deg and altitude above 5 deg

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	+ +	NOV 13 09:42 - NOV 13 09:45	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	NOV 13 09:42 - NOV 13 09:45	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	NOV 13 09:41 - NOV 13 09:44	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	NOV 13 09:45 - NOV 13 09:49	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

Titan 2030-11-13T09:45:35 K14.52 G17.07 dots 60.0 sec  
 Pgt



2030-11-13T09:45:35.5600 α: 04 18 53.4344 δ: +19 15 46.954 C/A 0.095" PA 177.15 deg v\_sky -18.13 km/s D 08.11 AU  
 Credit: Styled after SORA/Lucky Star



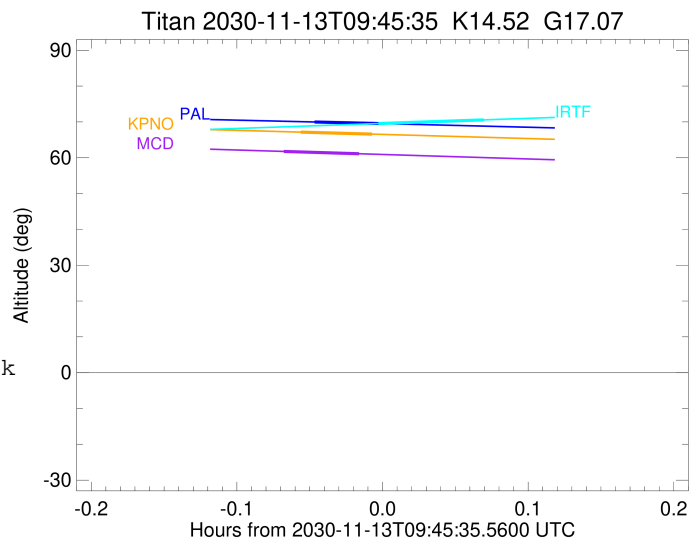
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2030-11-13T09:44:07.530
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        : 47843019396310784
2Mass ID (if available) : 04185343+1915470
ICRS Star Coord at Epoch: 04h 18m 53.43440s +19:15:46.95395s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.523
G magnitude           : 17.067
RP magnitude          : 16.248
BP magnitude          : 17.739
DUPflag              : 0
Distance (au)         : 8.114
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -18.13
Sun-Target sep (deg)  : 164.27
Sun-Moon sep (deg)   : 19.85
B (ring opening deg) : -25.18
PA of pole (deg)     : -3.09
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.356
C/A sky separation (km) : 2097.8
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	2030-11-13T09:42:46.822	69.97	-56.99	2575.1	47.61	47.62
Titan	E	2030-11-13T09:45:28.227	69.53	-56.45	2575.1	47.39	47.40



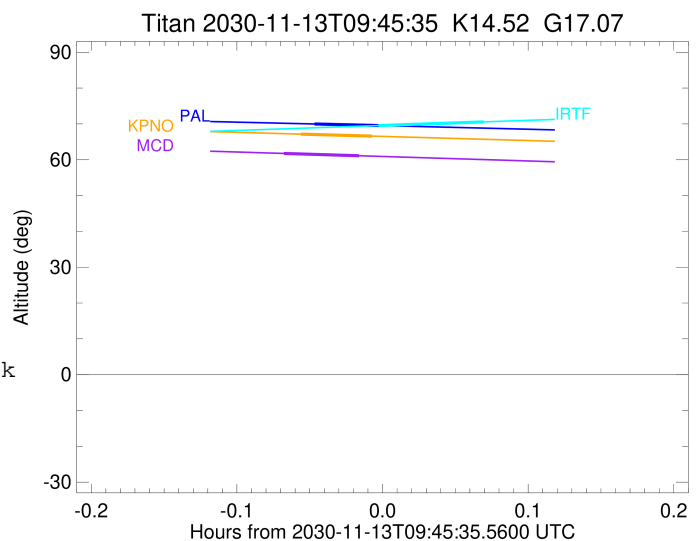
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2030-11-13T09:43:41.040
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       : 47843019396310784
2Mass ID (if available) : 04185343+1915470
ICRS Star Coord at Epoch: 04h 18m 53.43440s +19:15:46.95395s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.523
G magnitude           : 17.067
RP magnitude          : 16.248
BP magnitude          : 17.739
DUPflag              : 0
Distance (au)        : 8.114
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -18.13
Sun-Target sep (deg) : 164.27
Sun-Moon sep (deg)   : 19.78
B (ring opening deg) : -25.18
PA of pole (deg)     : -3.09
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.336
C/A sky separation (km): 1978.7
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	2030-11-13T09:42:11.954	67.15	-53.21	2575.1	44.14	44.16
Titan	E	2030-11-13T09:45:10.127	66.58	-52.60	2575.1	43.97	43.99



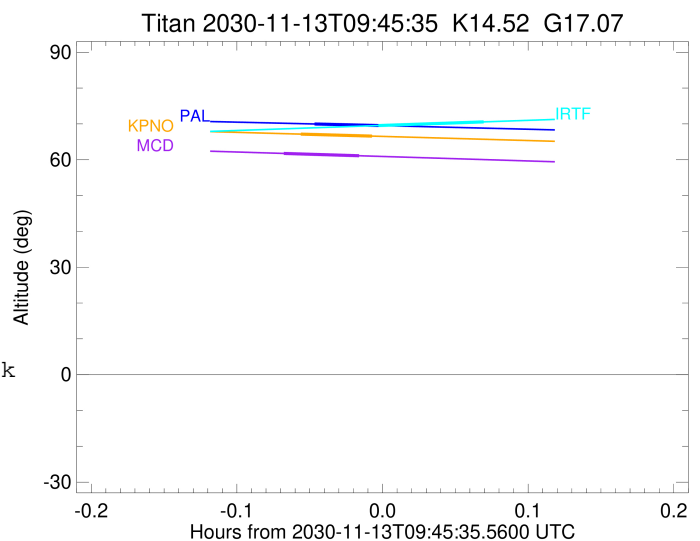
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target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2030-11-13T09:43:04.140
Event type           : Pgt
: Titan occs: geocentric, topocentric
: Not a ringed target
Observer code        : MCD
Location             : McDonald Obs. 2.7m
Latitude (deg)       : 30.67158
E. Longitude (deg)   : 255.97844
Altitude (km)        : 2.075
Gaia source ID       : 47843019396310784
2Mass ID (if available) : 04185343+1915470
ICRS Star Coord at Epoch: 04h 18m 53.43440s +19:15:46.95395s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.523
G magnitude           : 17.067
RP magnitude          : 16.248
BP magnitude          : 17.739
DUPflag              : 0
Distance (au)        : 8.114
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -18.13
Sun-Target sep (deg) : 164.27
Sun-Moon sep (deg)   : 19.68
B (ring opening deg) : -25.18
PA of pole (deg)     : -3.09
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.324
C/A sky separation (km) : 1909.6
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	2030-11-13T09:41:30.663	61.75	-47.17	2575.1	42.19	42.21
Titan	E	2030-11-13T09:44:37.617	61.10	-46.51	2575.1	42.11	42.12



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target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2030-11-13T09:47:34.860
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       : 47843019396310784
2Mass ID (if available) : 04185343+1915470
ICRS Star Coord at Epoch: 04h 18m 53.43440s +19:15:46.95395s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.523
G magnitude           : 17.067
RP magnitude          : 16.248
BP magnitude          : 17.739
DUPflag              : 0
Distance (au)         : 8.114
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -18.13
Sun-Target sep (deg) : 164.27
Sun-Moon sep (deg)   : 20.38
B (ring opening deg) : -25.18
PA of pole (deg)     : -3.09
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.145
C/A sky separation (km) : 852.0
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	2030-11-13T09:45:23.775	69.53	-84.81	2575.1	17.80	17.81
Titan	E	2030-11-13T09:49:45.903	70.56	-85.78	2575.1	17.04	17.05

