

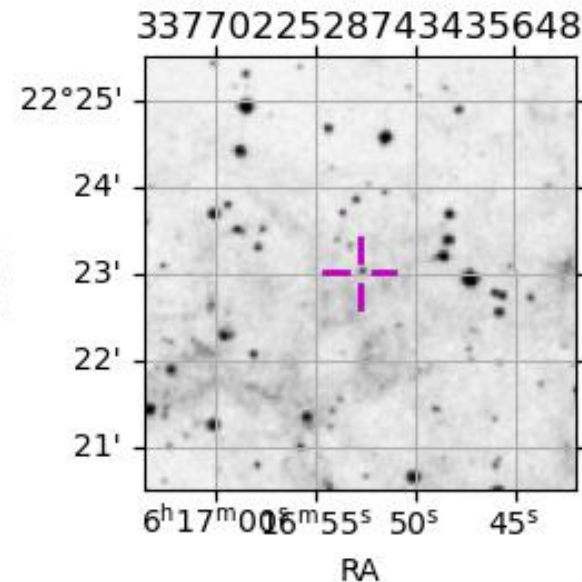
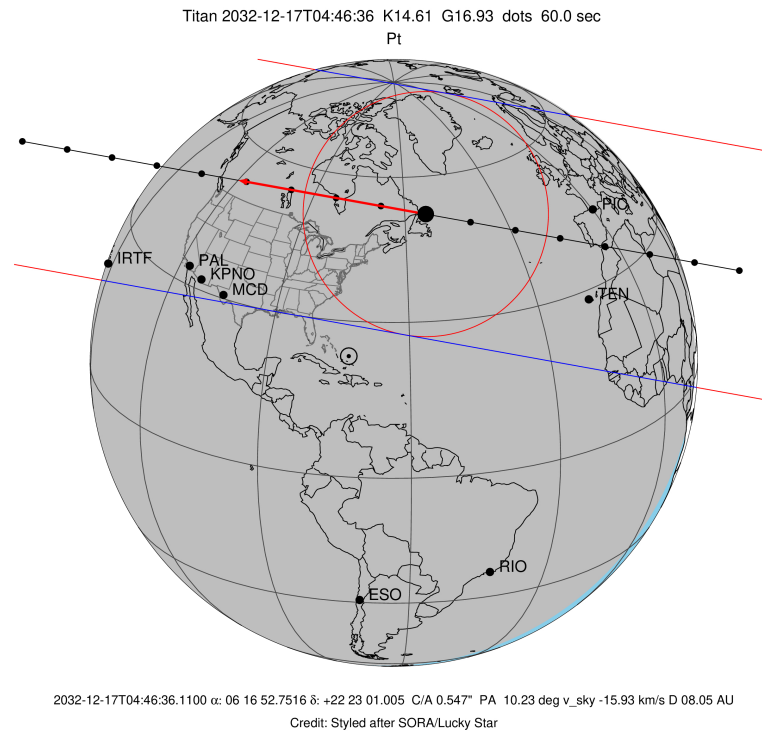
target : Titan  
 target radius (km) : 2575.15  
 C/A epoch : 2032-12-17T04:46:36.110  
 Event type : Pt  
 : Titan occs: topocentric, not geocentric  
 : Not a ringed target  
 Gaia source ID : 3377022528743435648  
 2Mass ID (if available) : 06165275+2223012

ICRS Star Coord at Epoch: 06h 16m 52.75158s +22:23:01.00460s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.605  
 G magnitude : 16.928  
 RP magnitude : 16.150  
 BP magnitude : 17.557  
 DUPflag : 0  
 Distance (au) : 8.047  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -15.94  
 Sun-Target sep (deg) : 171.38  
 Sun-Moon sep (deg) : 5.71  
 B (ring opening deg) : -26.07  
 PA of pole (deg) : -5.97  
 Pole direction: RA (deg): 39.48270  
 Dec (deg): 83.42790  
 C/A sky separation (") : 0.543  
 C/A sky separation (km) : 3171.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf16.spk

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

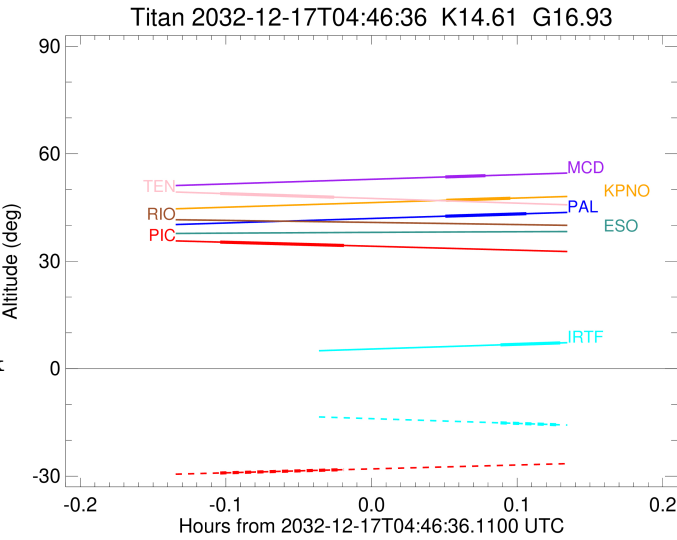
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+ +	DEC 17 04:40 - DEC 17 04:45	Pie
PAL	Palomar Mt (200")	33.4	243.1	+ +	DEC 17 04:49 - DEC 17 04:53	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	DEC 17 04:49 - DEC 17 04:52	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	DEC 17 04:49 - DEC 17 04:51	Pie
TEN	Teide Obs./Tenerife	28.3	343.5	+ +	DEC 17 04:40 - DEC 17 04:45	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	DEC 17 04:51 - DEC 17 04:54	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



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target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2032-12-17T04:42:55.530
Event type            : Pt
: Titan occs: topocentric, not geocentric
: 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        : 3377022528743435648
2Mass ID (if available) : 06165275+2223012
ICRS Star Coord at Epoch: 06h 16m 52.75158s +22:23:01.00460s
RUWE (>1.4 is poor)  : 0.99
K magnitude           : 14.605
G magnitude           : 16.928
RP magnitude          : 16.150
BP magnitude          : 17.557
DUPflag              : 0
Distance (au)         : 8.047
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.94
Sun-Target sep (deg)  : 171.38
Sun-Moon sep (deg)    : 6.54
B (ring opening deg) : -26.07
PA of pole (deg)      : -5.97
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.121
C/A sky separation (km) : 705.1
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
    
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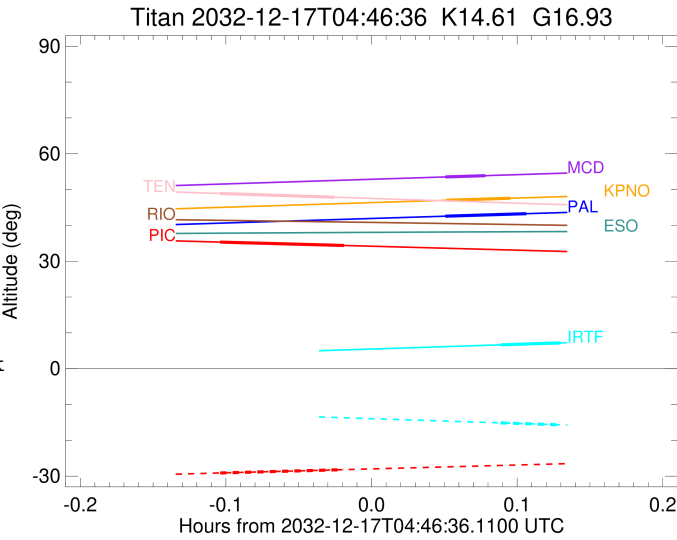
x: target alt < 5.0 deg or sun > -5.0 deg

```

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Titan	I	2032-12-17T04:40:21.349	35.33	-29.12	2575.1	28.06	28.07
Titan	E	2032-12-17T04:45:29.714	34.38	-28.18	2575.2	0.18	0.18

```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2032-12-17T04:51:18.830
Event type           : Pt
: Titan occs: topocentric, not geocentric
: 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       : 3377022528743435648
2Mass ID (if available) : 06165275+2223012
ICRS Star Coord at Epoch: 06h 16m 52.75158s +22:23:01.00460s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 14.605
G magnitude          : 16.928
RP magnitude         : 16.150
BP magnitude         : 17.557
DUPflag             : 0
Distance (au)        : 8.047
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.94
Sun-Target sep (deg) : 171.38
Sun-Moon sep (deg)   : 5.46
B (ring opening deg) : -26.07
PA of pole (deg)     : -5.97
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.340
C/A sky separation (km): 1982.6
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
    
```



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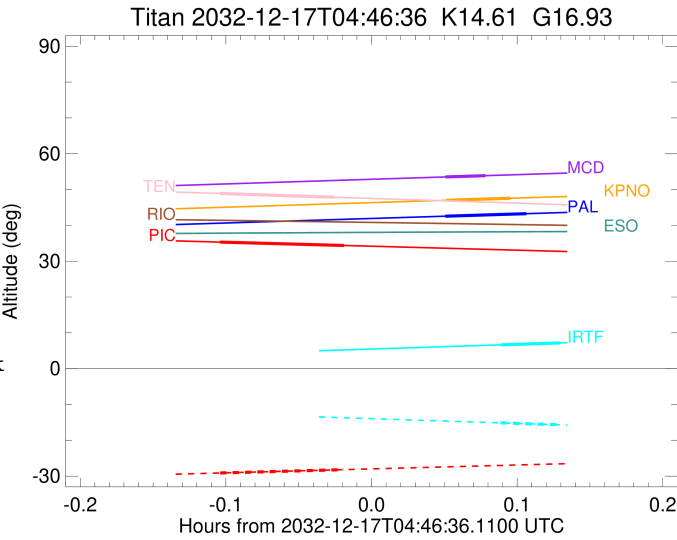
x: target alt < 5.0 deg or sun > -5.0 deg

```

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Titan	I	2032-12-17T04:49:37.329	42.55	-50.75	2575.1	-30.05	-30.07
Titan	E	2032-12-17T04:53:00.305	43.26	-51.45	2575.1	-55.65	-55.67

```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2032-12-17T04:51:00.230
Event type           : Pt
: Titan occs: topocentric, not geocentric
: 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       : 3377022528743435648
2Mass ID (if available) : 06165275+2223012
ICRS Star Coord at Epoch: 06h 16m 52.75158s +22:23:01.00460s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 14.605
G magnitude          : 16.928
RP magnitude         : 16.150
BP magnitude         : 17.557
DUPflag             : 0
Distance (au)        : 8.047
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.94
Sun-Target sep (deg) : 171.38
Sun-Moon sep (deg)  : 5.46
B (ring opening deg) : -26.07
PA of pole (deg)    : -5.97
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation ("): 0.379
C/A sky separation (km): 2214.6
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	2032-12-17T04:49:39.213	46.99	-55.27	2575.1	-37.70	-37.71
Titan	E	2032-12-17T04:52:21.226	47.57	-55.85	2575.1	-60.52	-60.54

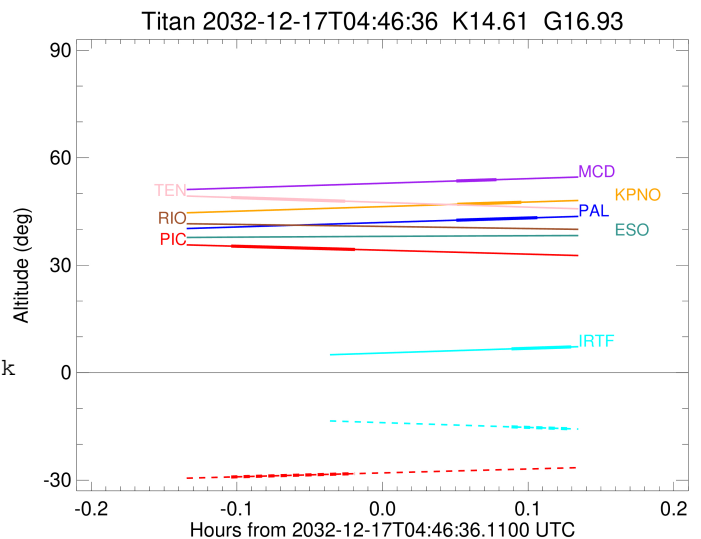
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch            : 2032-12-17T04:50:28.170
Event type           : Pt
: Titan occs: topocentric, not geocentric
: 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       : 3377022528743435648
2Mass ID (if available) : 06165275+2223012
ICRS Star Coord at Epoch: 06h 16m 52.75158s +22:23:01.00460s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 14.605
G magnitude          : 16.928
RP magnitude         : 16.150
BP magnitude         : 17.557
DUPflag             : 0
Distance (au)        : 8.047
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.94
Sun-Target sep (deg) : 171.38
Sun-Moon sep (deg)   : 5.49
B (ring opening deg) : -26.07
PA of pole (deg)     : -5.97
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.419
C/A sky separation (km) : 2444.7
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	2032-12-17T04:49:38.398	53.51	-61.85	2575.1	-47.64	-47.65
Titan	E	2032-12-17T04:51:17.938	53.87	-62.21	2575.0	-63.86	-63.88



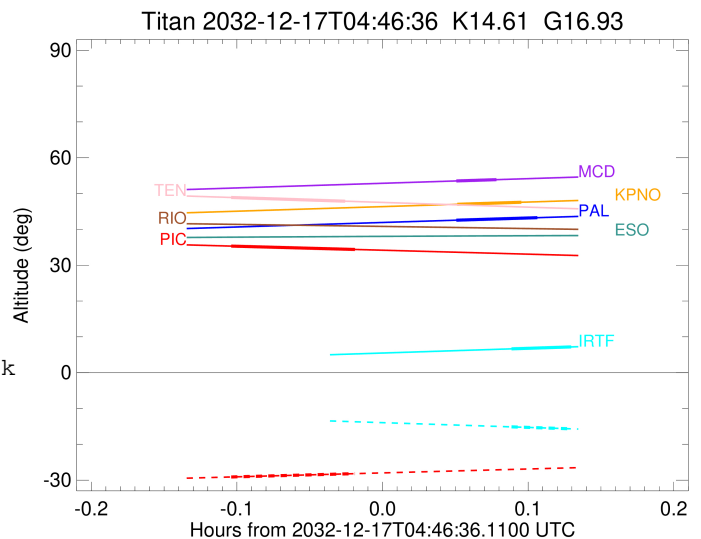
```

target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2032-12-17T04:42:42.490
Event type            : Pt
: Titan occs: topocentric, not geocentric
: 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        : 3377022528743435648
2Mass ID (if available) : 06165275+2223012
ICRS Star Coord at Epoch: 06h 16m 52.75158s +22:23:01.00460s
RUWE (>1.4 is poor)  : 0.99
K magnitude           : 14.605
G magnitude           : 16.928
RP magnitude          : 16.150
BP magnitude          : 17.557
DUPflag              : 0
Distance (au)         : 8.047
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -15.94
Sun-Target sep (deg)  : 171.38
Sun-Moon sep (deg)    : 6.39
B (ring opening deg)  : -26.07
PA of pole (deg)      : -5.97
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.201
C/A sky separation (km) : 1173.6
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	2032-12-17T04:40:20.916	48.90	-41.04	2575.2	-10.31	-10.31
Titan	E	2032-12-17T04:45:04.064	47.86	-40.01	2575.1	-37.56	-37.57



```

target                : Titan
target radius (km)   : 2575.15
C/A epoch             : 2032-12-17T04:53:08.090
Event type            : Pt
: Titan occs: topocentric, not geocentric
: 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        : 3377022528743435648
2Mass ID (if available) : 06165275+2223012
ICRS Star Coord at Epoch: 06h 16m 52.75158s +22:23:01.00460s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.605
G magnitude           : 16.928
RP magnitude          : 16.150
BP magnitude          : 17.557
DUPflag              : 0
Distance (au)         : 8.047
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.94
Sun-Target sep (deg)  : 171.38
Sun-Moon sep (deg)    : 5.23
B (ring opening deg) : -26.07
PA of pole (deg)      : -5.97
Pole direction: RA (deg): 39.48270
Dec (deg): 83.42790
C/A sky separation (") : 0.391
C/A sky separation (km) : 2281.6
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	2032-12-17T04:51:53.312	6.64	-15.12	2575.1	-39.92	-39.93
Titan	E	2032-12-17T04:54:22.843	7.19	-15.67	2575.1	-61.92	-61.93

