

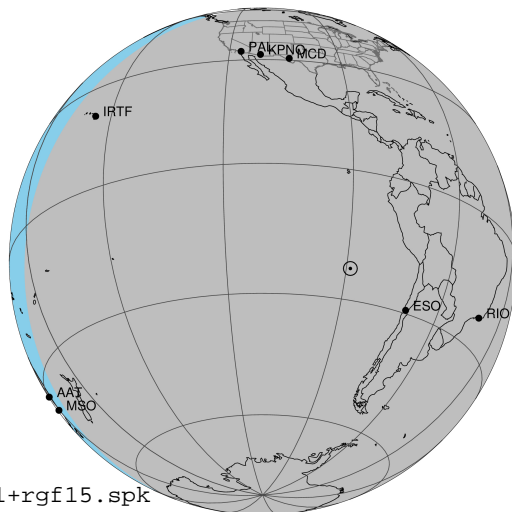
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-07-04T06:00:11.210
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4114649622431036416
 2Mass ID (if available) : 17222706-2244013

Jupiter 2031-07-04T06:00:11 K9.04 G14.22 Pgt

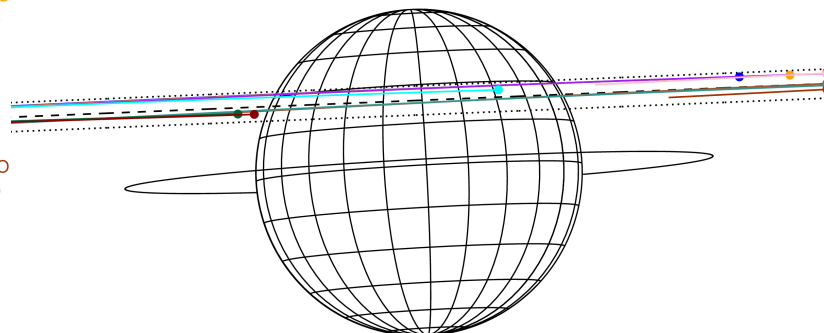
ICRS Star Coord at Epoch: 17h 22m 27.05939s -22:44:01.39801s

RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.038
 G magnitude : 14.219
 RP magnitude : 12.850
 BP magnitude : 16.442
 DUPflag : 0
 Distance (au) : 4.309
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -14.66
 Sun-Target sep (deg) : 159.67
 Sun-Moon sep (deg) : 12.83
 B (ring opening deg) : -2.58
 PA of pole (deg) : 3.20
 Pole direction: RA (deg): 268.05690
 Dec (deg): 64.49651
 C/A sky separation (") : 10.099
 C/A sky separation (km) : 31561.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-07-04T06:00:11 K9.04 G14.22
 Pgt



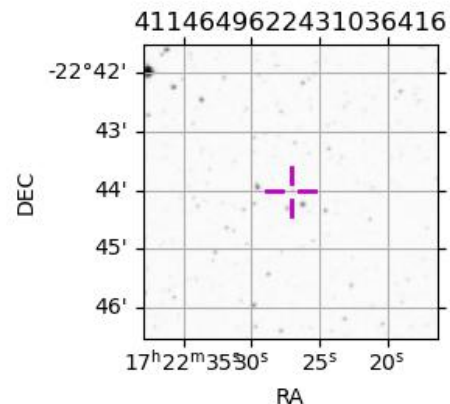
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO



2031-07-04T06:00:11.2100 a: 17 22 27.0594 ð -22 44 01.398 C/A ***** PA 182.36 deg v_sky -14.66 km/s D 04.31 AU
 Credit: Styled after SORA/Lucky Star

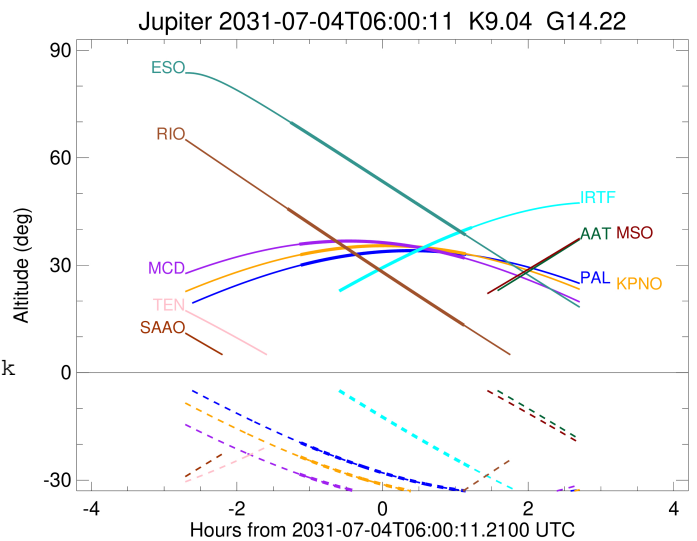
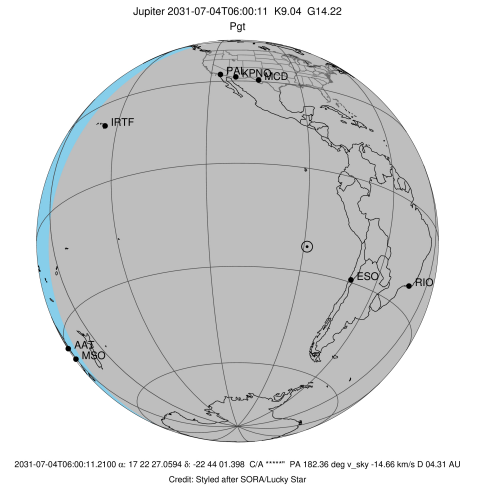
Observable events with sun below -5 deg and altitude above 5 deg

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	+ +	JUL 04 04:52 - JUL 04 07:08	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUL 04 04:52 - JUL 04 07:08	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUL 04 04:51 - JUL 04 07:07	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5		JUL 04 07:13 - JUL 04 07:13	Pne
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUL 04 04:41 - JUL 04 07:07	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUL 04 04:44 - JUL 04 07:08	Pie
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                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-04T06:00:55.730
Event type            : Pgt
: Jupiter 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       : 4114649622431036416
2Mass ID (if available) : 17222706-2244013
ICRS Star Coord at Epoch: 17h 22m 27.05939s -22:44:01.39801s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 9.038
G magnitude           : 14.219
RP magnitude          : 12.850
BP magnitude          : 16.442
DUPflag              : 0
Distance (au)        : 4.309
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.66
Sun-Target sep (deg) : 159.67
Sun-Moon sep (deg)   : 12.94
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.20
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 11.778
C/A sky separation (km): 36807.7
NAIF SPICE kernels   : RAJobs_U111+rgf15.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
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

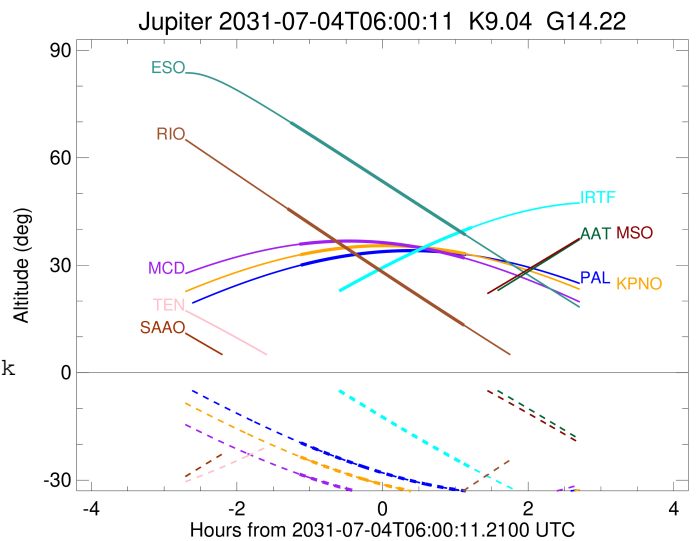
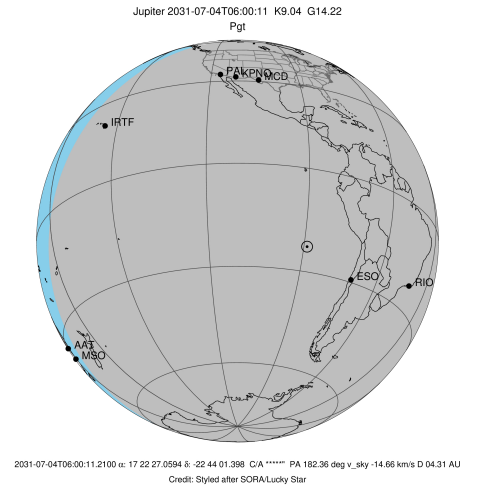


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-04T04:52:57.526	30.01	-19.58	71489.7	29.92	33.28
Jupiter	E	2031-07-04T07:08:52.739	33.01	-33.02	71489.5	31.82	35.29

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-04T06:00:25.250
Event type            : Pgt
: Jupiter 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        : 4114649622431036416
2Mass ID (if available) : 17222706-2244013
ICRS Star Coord at Epoch: 17h 22m 27.05939s -22:44:01.39801s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 9.038
G magnitude           : 14.219
RP magnitude          : 12.850
BP magnitude          : 16.442
DUPflag              : 0
Distance (au)         : 4.309
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.66
Sun-Target sep (deg) : 159.67
Sun-Moon sep (deg)   : 12.87
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.20
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 11.759
C/A sky separation (km): 36748.3
NAIF SPICE kernels   : RAJobs_U111+rgf15.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
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

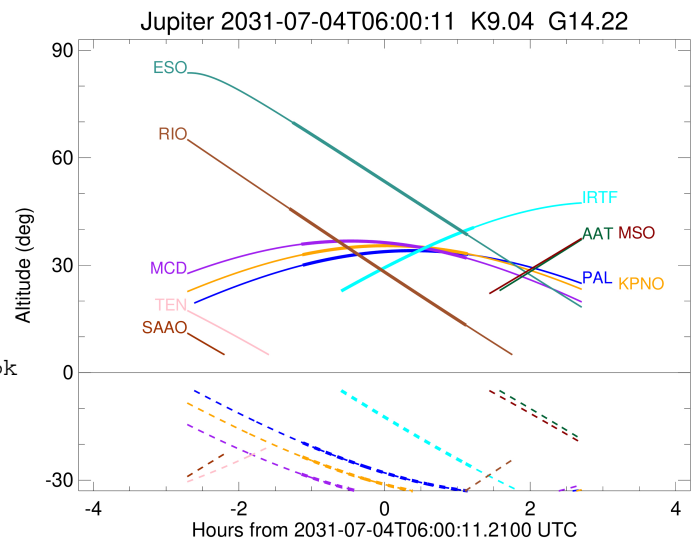
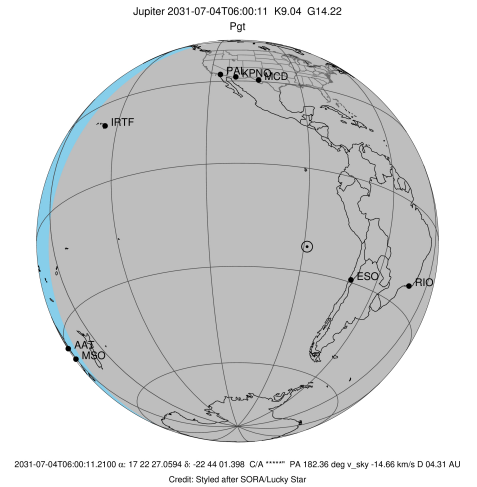


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-04T04:52:28.208	32.92	-23.50	71489.7	29.91	33.27
Jupiter	E	2031-07-04T07:08:23.795	33.20	-35.07	71489.5	31.72	35.18

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-04T05:59:40.160
Event type            : Pgt
: Jupiter 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        : 4114649622431036416
2Mass ID (if available) : 17222706-2244013
ICRS Star Coord at Epoch: 17h 22m 27.05939s -22:44:01.39801s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 9.038
G magnitude           : 14.219
RP magnitude          : 12.850
BP magnitude          : 16.442
DUPflag              : 0
Distance (au)         : 4.309
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.66
Sun-Target sep (deg) : 159.67
Sun-Moon sep (deg)   : 12.76
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.20
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 11.736
C/A sky separation (km) : 36675.8
NAIF SPICE kernels   : RAJobs_U111+rgf15.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
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

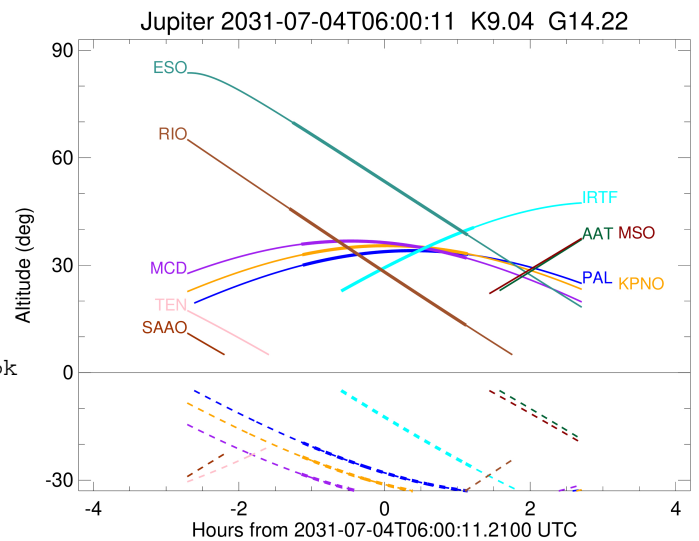
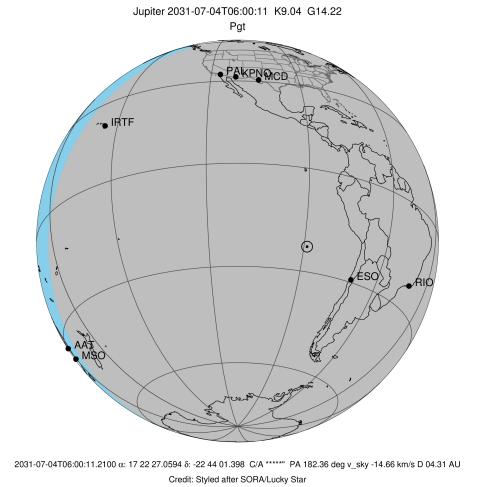


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-04T04:51:43.089	35.85	-28.32	71489.7	29.91	33.28
Jupiter	E	2031-07-04T07:07:42.764	31.99	-36.59	71489.5	31.57	35.03

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-04T06:04:41.070
Event type           : Pgt
: Jupiter 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       : 4114649622431036416
2Mass ID (if available) : 17222706-2244013
ICRS Star Coord at Epoch: 17h 22m 27.05939s -22:44:01.39801s
RUWE (>1.4 is poor) : 1.12
K magnitude          : 9.038
G magnitude          : 14.219
RP magnitude         : 12.850
BP magnitude         : 16.442
DUPflag             : 0
Distance (au)        : 4.309
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.66
Sun-Target sep (deg) : 159.67
Sun-Moon sep (deg)   : 13.52
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.20
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 11.225
C/A sky separation (km): 35078.1
NAIF SPICE kernels   : RAJobs_U111+rgf15.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
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

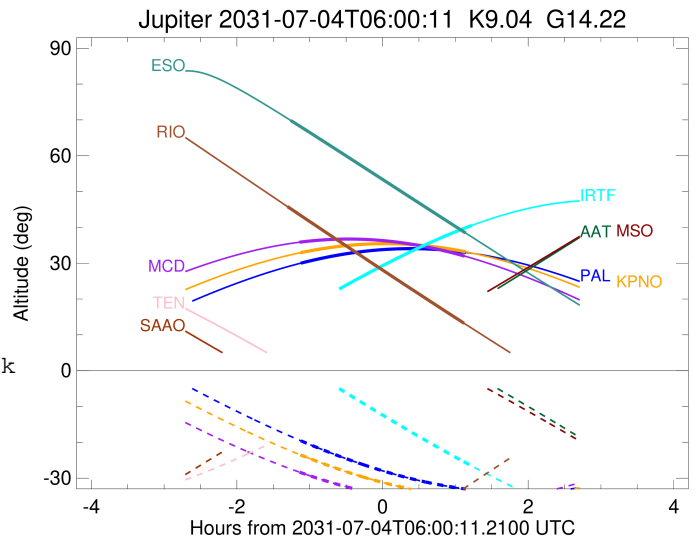
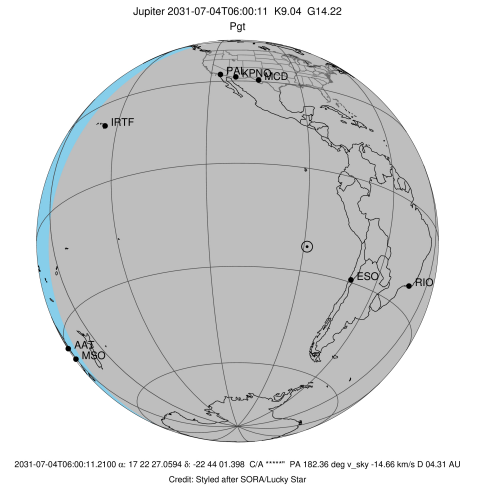


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-04T04:55:06.319	17.06	1.28x	71490.0	27.96	31.20
Jupiter	E	2031-07-04T07:13:53.172	40.54	-26.63	71489.6	30.61	34.02

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-04T05:54:21.070
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : RIO
Location              : Rio de Janeiro
Latitude (deg)        : -22.89506
E. Longitude (deg)    : 316.77708
Altitude (km)         : 0.033
Gaia source ID        : 4114649622431036416
2Mass ID (if available) : 17222706-2244013
ICRS Star Coord at Epoch: 17h 22m 27.05939s -22:44:01.39801s
RUWE (>1.4 is poor)  : 1.12
K magnitude           : 9.038
G magnitude           : 14.219
RP magnitude          : 12.850
BP magnitude          : 16.442
DUPflag              : 0
Distance (au)         : 4.309
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.66
Sun-Target sep (deg)  : 159.67
Sun-Moon sep (deg)    : 12.12
B (ring opening deg)  : -2.58
PA of pole (deg)      : 3.20
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 9.730
C/A sky separation (km) : 30406.1
NAIF SPICE kernels    : RAJobs_U111+rgf15.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
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

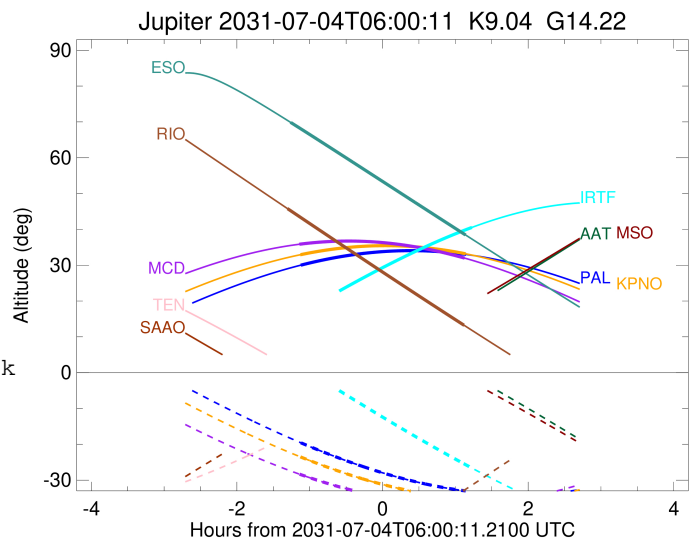
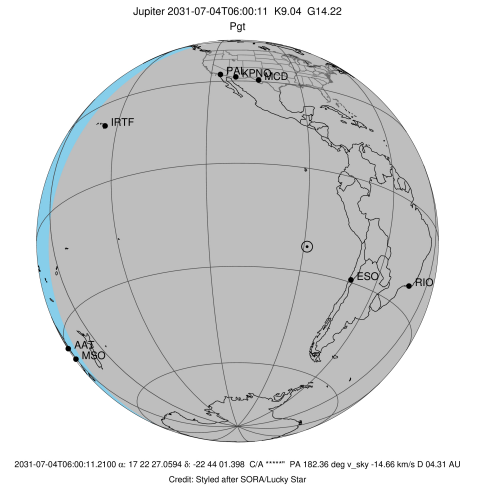


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-04T04:41:57.656	45.78	-65.91	71490.4	24.80	27.81
Jupiter	E	2031-07-04T07:07:22.475	13.24	-32.85	71490.3	25.38	28.44

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-04T05:56:19.740
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : ESO
Location             : European Southern Obs. (3.6m)
Latitude (deg)       : -29.26097
E. Longitude (deg)   : 289.26831
Altitude (km)        : 2.400
Gaia source ID       : 4114649622431036416
2Mass ID (if available) : 17222706-2244013
ICRS Star Coord at Epoch: 17h 22m 27.05939s -22:44:01.39801s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 9.038
G magnitude           : 14.219
RP magnitude         : 12.850
BP magnitude         : 16.442
DUPflag              : 0
Distance (au)        : 4.309
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.66
Sun-Target sep (deg) : 159.67
Sun-Moon sep (deg)   : 12.48
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.20
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 9.761
C/A sky separation (km): 30504.4
NAIF SPICE kernels   : RAJobs_U111+rgf15.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
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
Jupiter	I	2031-07-04T04:44:31.913	69.85	-83.76	71490.4	24.64	27.63
Jupiter	E	2031-07-04T07:08:32.398	38.45	-57.79	71490.3	25.66	28.74