

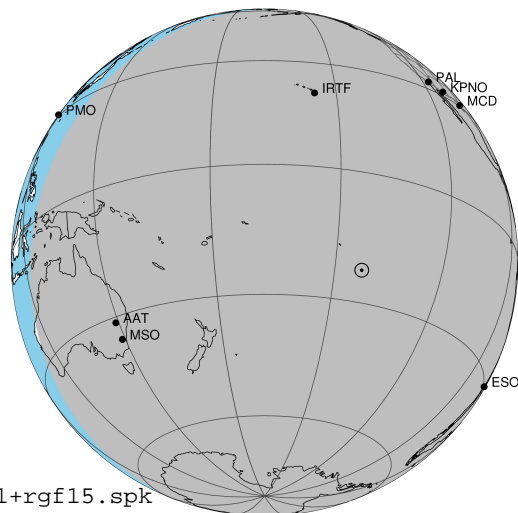
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-07-06T09:36:46.740  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4114655777181745792  
 2Mass ID (if available) : 17212504-2243426

Jupiter 2031-07-06T09:36:46 K8.18 G13.25 Pgt

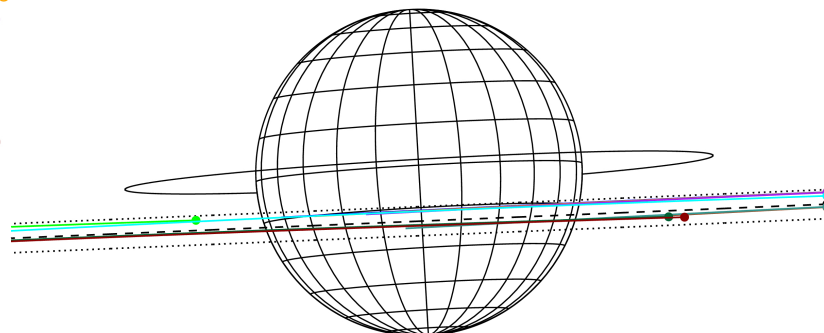
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s

RUWE (>1.4 is poor) : 1.13  
 K magnitude : 8.183  
 G magnitude : 13.254  
 RP magnitude : 11.823  
 BP magnitude : 15.977  
 DUPflag : 0  
 Distance (au) : 4.320  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -14.24  
 Sun-Target sep (deg) : 157.39  
 Sun-Moon sep (deg) : 45.73  
 B (ring opening deg) : -2.57  
 PA of pole (deg) : 3.31  
 Pole direction: RA (deg): 268.05690  
 Dec (deg): 64.49651  
 C/A sky separation (") : 6.805  
 C/A sky separation (km) : 21321.0  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-07-06T09:36:46 K8.18 G13.25  
 Pgt



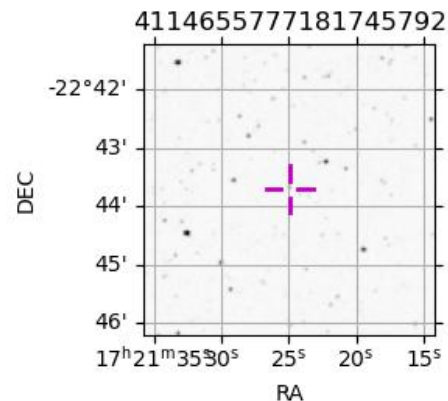
Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 RIO  
 ESO  
 AAT  
 MSO



2031-07-06T09:36:46.7400 a: 17 21 25.02687 s: -22 43 42.718 C/A 6.816" PA 2.39 deg v\_sky -14.24 km/s D 04.32 AU  
 Credit: Styled after SORA/Lucky Star

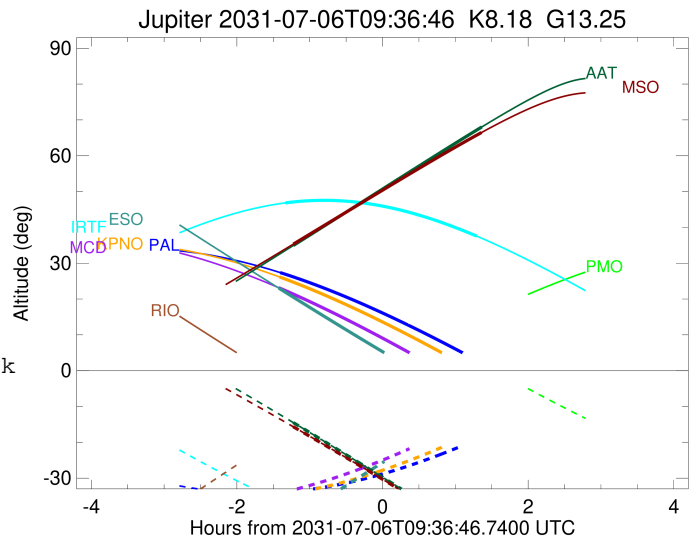
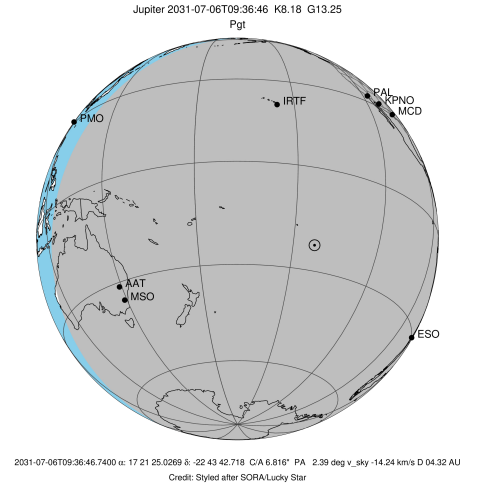
Observable events with sun below -5 deg and altitude above 5 deg

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 06 08:12 - JUL 06 08:12	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUL 06 08:11 - JUL 06 08:11	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUL 06 08:11 - JUL 06 08:11	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUL 06 08:16 - JUL 06 10:54	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	+	JUL 06 08:11 - JUL 06 08:11	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	JUL 06 08:23 - JUL 06 10:58	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUL 06 08:23 - JUL 06 10:58	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-06T09:32:05.940
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      : 4114655777181745792
2Mass ID (if available) : 17212504-2243426
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s
RUWE (>1.4 is poor) : 1.13
K magnitude          : 8.183
G magnitude          : 13.254
RP magnitude         : 11.823
BP magnitude         : 15.977
DUPflag             : 0
Distance (au)       : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.24
Sun-Target sep (deg) : 157.39
Sun-Moon sep (deg)  : 45.45
B (ring opening deg) : -2.57
PA of pole (deg)    : 3.31
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (" ) : 5.302
C/A sky separation (km) : 16612.6
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
    
```

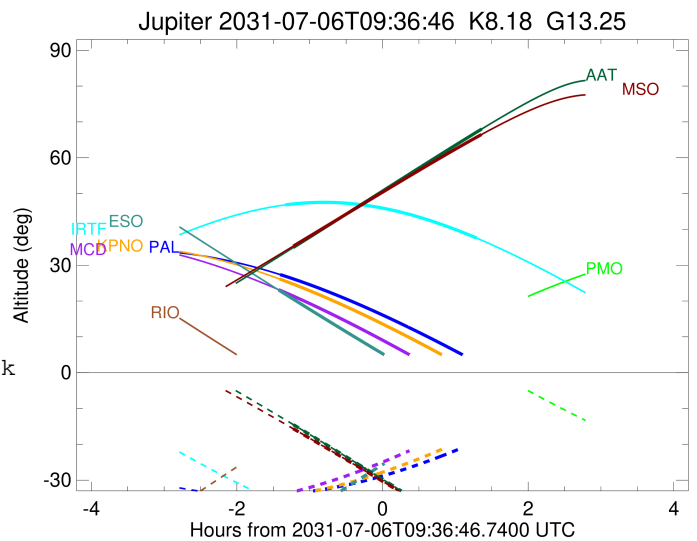
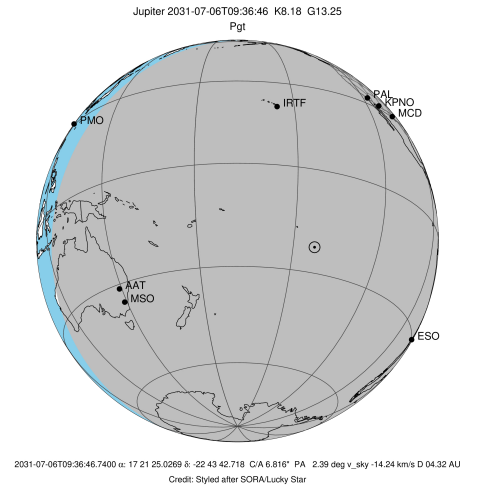


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-06T08:12:27.790	27.38	-33.93	71491.5	-14.01	-15.92
Jupiter	E	2031-07-06T10:52:21.153	3.26x	-19.56	71491.5	-12.99	-14.77

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-06T09:31:38.770
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       : 4114655777181745792
2Mass ID (if available) : 17212504-2243426
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s
RUWE (>1.4 is poor) : 1.13
K magnitude           : 8.183
G magnitude           : 13.254
RP magnitude         : 11.823
BP magnitude         : 15.977
DUPflag              : 0
Distance (au)        : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.24
Sun-Target sep (deg) : 157.39
Sun-Moon sep (deg)   : 45.38
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.31
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 5.376
C/A sky separation (km) : 16845.9
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
    
```

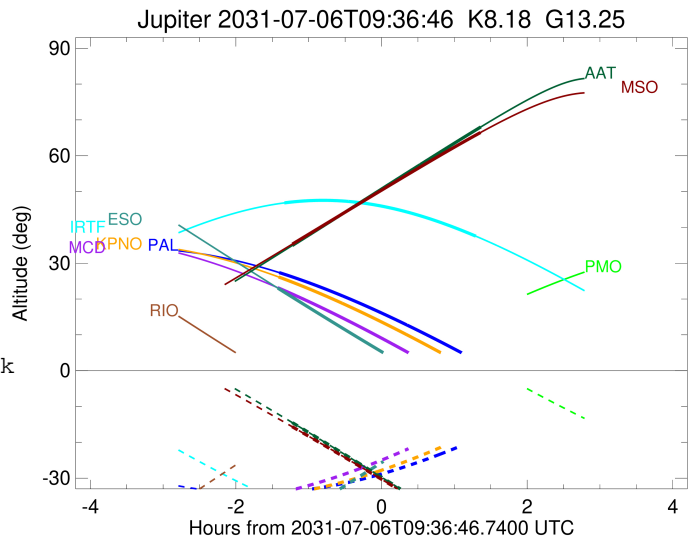
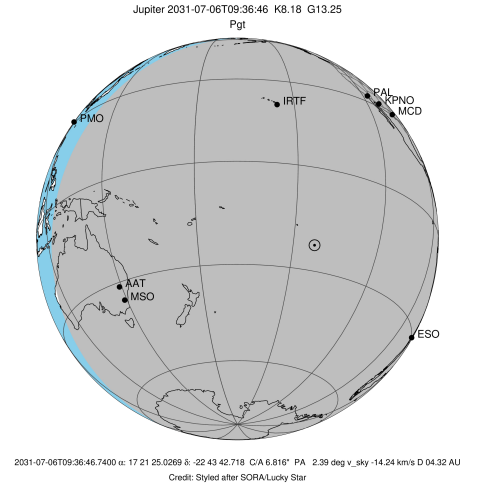


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-06T08:11:58.374	26.15	-34.66	71491.5	-14.16	-16.08
Jupiter	E	2031-07-06T10:51:59.458	0.09x	-17.39	71491.5	-13.22	-15.03

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-06T09:31:06.030
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      : 4114655777181745792
2Mass ID (if available) : 17212504-2243426
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s
RUWE (>1.4 is poor) : 1.13
K magnitude         : 8.183
G magnitude         : 13.254
RP magnitude        : 11.823
BP magnitude        : 15.977
DUPflag            : 0
Distance (au)       : 4.320
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.24
Sun-Target sep (deg) : 157.39
Sun-Moon sep (deg)  : 45.28
B (ring opening deg) : -2.57
PA of pole (deg)    : 3.31
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (" ) : 5.477
C/A sky separation (km) : 17160.2
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
    
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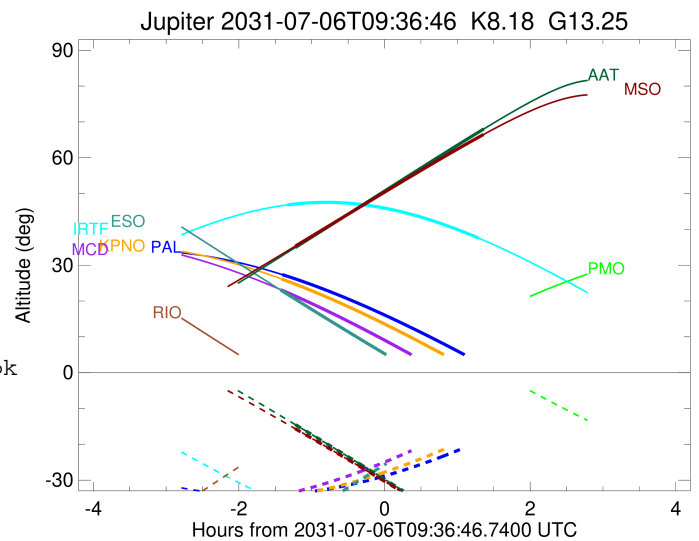
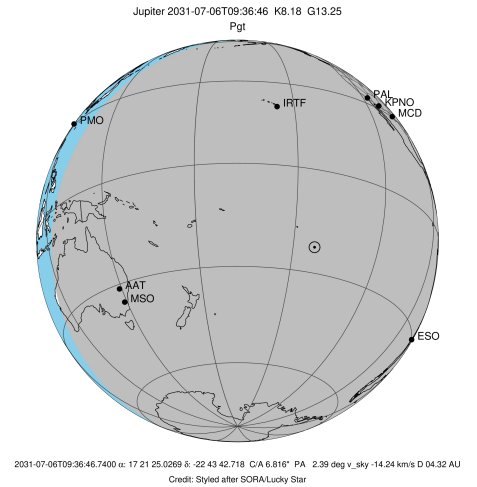


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-06T08:11:19.599	23.16	-34.19	71491.4	-14.35	-16.30
Jupiter	E	2031-07-06T10:51:36.790	-5.15x	-13.26	71491.5	-13.52	-15.37

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-06T09:35:30.890
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       : 4114655777181745792
2Mass ID (if available) : 17212504-2243426
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s
RUWE (>1.4 is poor) : 1.13
K magnitude          : 8.183
G magnitude          : 13.254
RP magnitude         : 11.823
BP magnitude         : 15.977
DUPflag             : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.24
Sun-Target sep (deg) : 157.39
Sun-Moon sep (deg)   : 46.10
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.31
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 5.432
C/A sky separation (km) : 17019.0
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
    
```

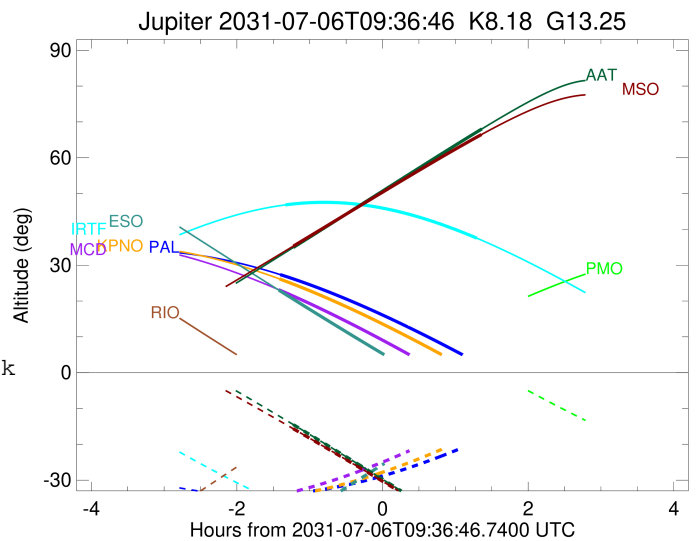
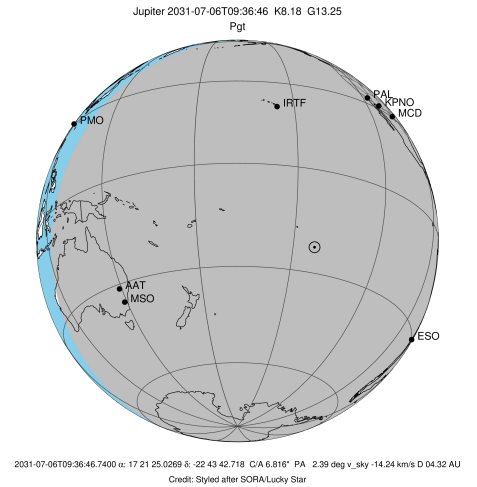


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-06T08:16:43.314	46.83	-37.07	71491.4	-14.72	-16.71
Jupiter	E	2031-07-06T10:54:30.881	37.54	-47.08	71491.5	-13.02	-14.81

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-06T09:29:50.290
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       : 4114655777181745792
2Mass ID (if available) : 17212504-2243426
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s
RUWE (>1.4 is poor) : 1.13
K magnitude          : 8.183
G magnitude           : 13.254
RP magnitude         : 11.823
BP magnitude         : 15.977
DUPflag             : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.24
Sun-Target sep (deg) : 157.39
Sun-Moon sep (deg)   : 45.20
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.31
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 7.710
C/A sky separation (km) : 24156.6
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
    
```

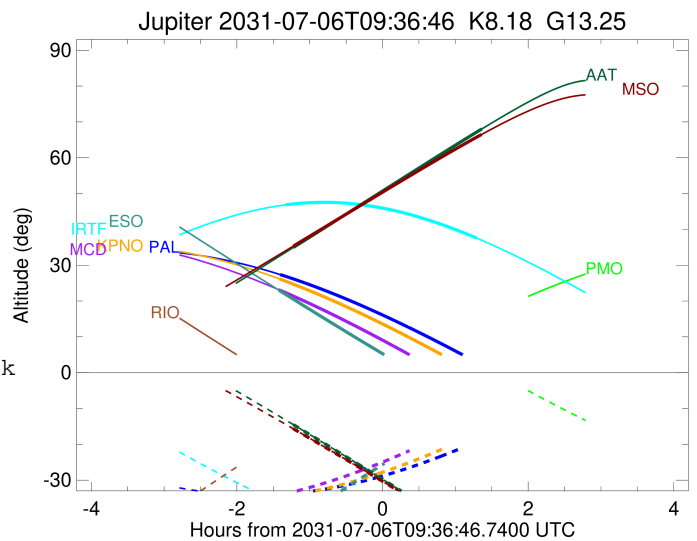
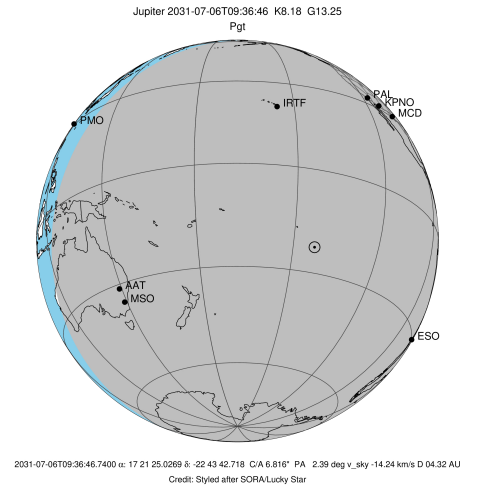


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-06T08:11:20.827	23.04	-44.09	71490.9	-20.03	-22.61
Jupiter	E	2031-07-06T10:49:09.941	-8.75x	-10.51	71491.0	-19.44	-21.95

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-06T09:41:13.110
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : AAT
Location              : Siding Spring (AAT)
Latitude (deg)        : -31.27703
E. Longitude (deg)    : 149.06608
Altitude (km)         : 1.164
Gaia source ID        : 4114655777181745792
2Mass ID (if available) : 17212504-2243426
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s
RUWE (>1.4 is poor) : 1.13
K magnitude           : 8.183
G magnitude           : 13.254
RP magnitude          : 11.823
BP magnitude          : 15.977
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.24
Sun-Target sep (deg)  : 157.39
Sun-Moon sep (deg)   : 46.72
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.31
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 7.320
C/A sky separation (km) : 22936.3
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
    
```

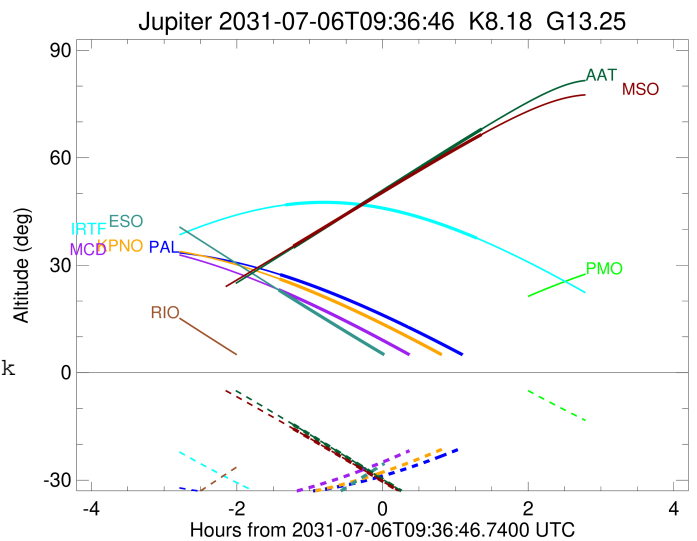
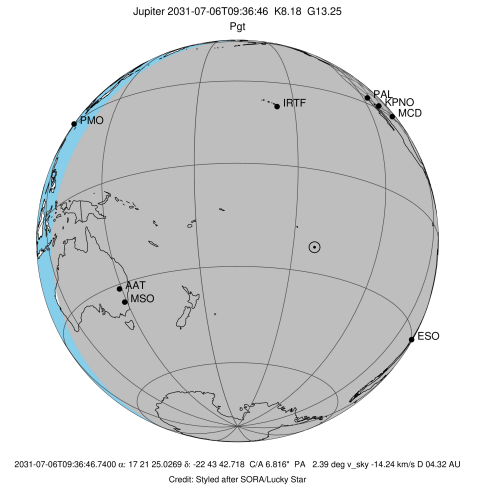


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-06T08:23:19.696	34.95	-14.50	71490.9	-20.13	-22.71
Jupiter	E	2031-07-06T10:58:39.976	68.04	-47.17	71491.2	-17.40	-19.70

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-06T09:41:00.540
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : MSO
Location              : Mt. Stromlo Observatory
Latitude (deg)        : -35.32000
E. Longitude (deg)   : 149.00833
Altitude (km)         : 0.770
Gaia source ID        : 4114655777181745792
2Mass ID (if available) : 17212504-2243426
ICRS Star Coord at Epoch: 17h 21m 25.02687s -22:43:42.71839s
RUWE (>1.4 is poor) : 1.13
K magnitude           : 8.183
G magnitude           : 13.254
RP magnitude          : 11.823
BP magnitude          : 15.977
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.24
Sun-Target sep (deg) : 157.39
Sun-Moon sep (deg)   : 46.70
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.31
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 7.452
C/A sky separation (km) : 23348.4
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	2031-07-06T08:23:13.160	35.30	-15.65	71490.9	-20.45	-23.07
Jupiter	E	2031-07-06T10:58:22.680	66.47	-46.95	71491.2	-17.77	-20.11