

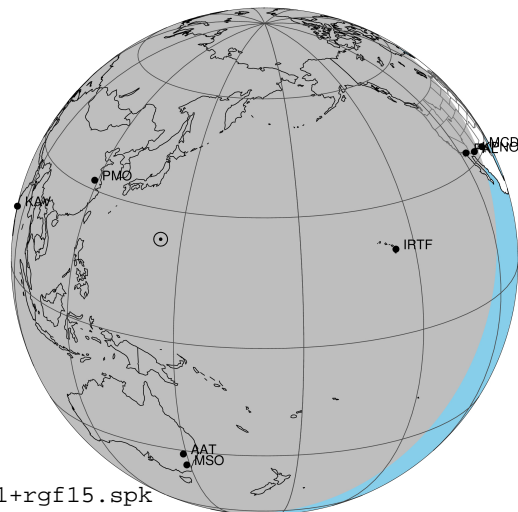
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2049-12-28T14:23:13.570  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 675650891700777728  
 2Mass ID (if available) : 08145186+2017060

Jupiter 2049-12-28T14:23:13 K7.75 G10.03 Pgt

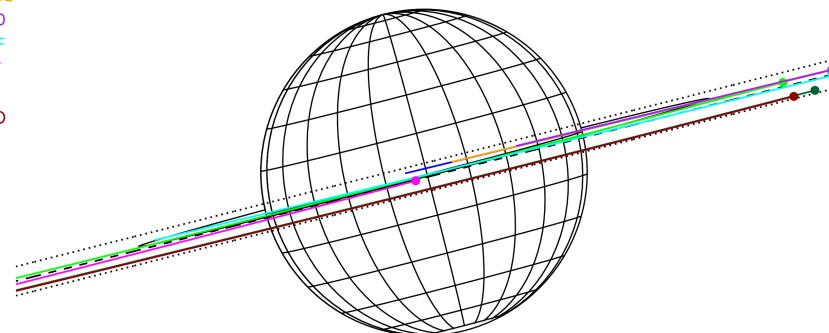
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67807s

RUWE (>1.4 is poor) : 1.20  
 K magnitude : 7.748  
 G magnitude : 10.035  
 RP magnitude : 9.294  
 BP magnitude : 10.369  
 DUPflag : 0  
 Distance (au) : 4.331  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -14.67  
 Sun-Target sep (deg) : 155.21  
 Sun-Moon sep (deg) : 150.81  
 B (ring opening deg) : 0.87  
 PA of pole (deg) : 14.54  
 Pole direction: RA (deg): 268.05755  
 Dec (deg): 64.49714  
 C/A sky separation (") : 0.724  
 C/A sky separation (km) : 2274.5  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2049-12-28T14:23:13 K7.75 G10.03  
 Pgt



Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 KAV  
 AAT  
 MSO

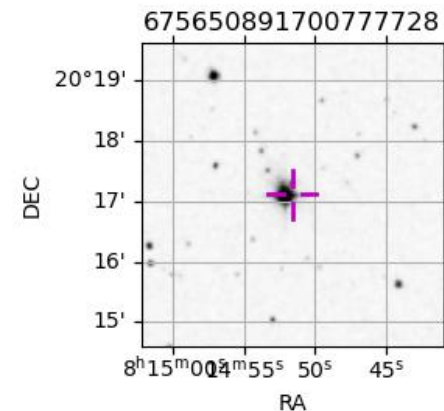


2049-12-28T14:23:13.5700 or: 08 14 51.4401 s: +20 17 07.678 C/A 0.717'' PA 14.20 deg v\_sky -14.67 km/s D 04.33 AU

Credit: Styled after SORA/Lucky Star

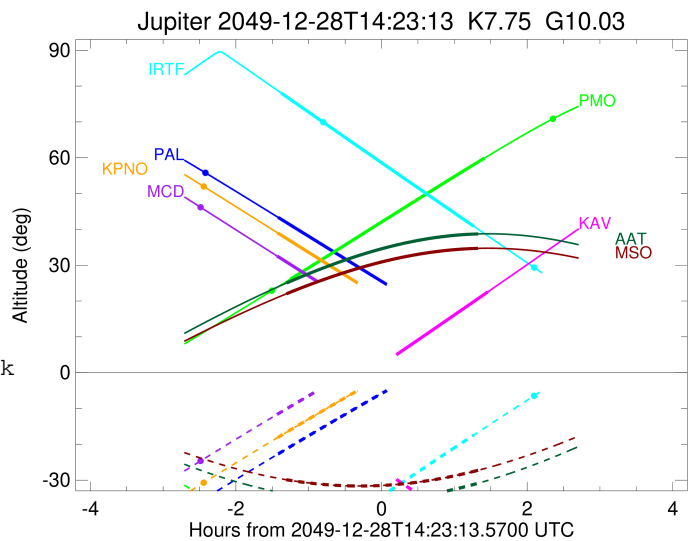
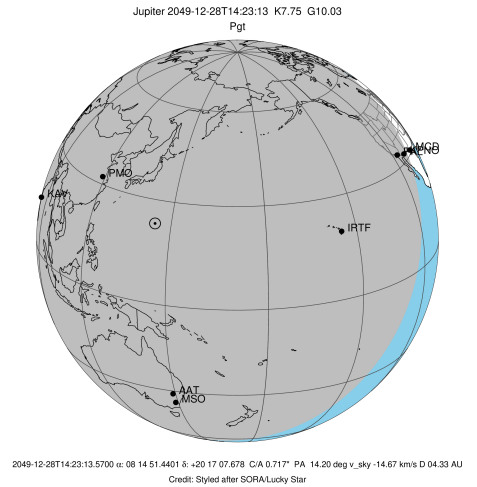
Observable events with sun below -5 deg and altitude above 5 deg

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	+	DEC 28 12:58 - DEC 28 12:58	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8	+ +	DEC 28 13:08 - DEC 28 15:47	Pie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	DEC 28 12:57 - DEC 28 12:57	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	DEC 28 12:57 - DEC 28 12:57	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	DEC 28 13:00 - DEC 28 15:39	Pie
KAV	Kavalur Observatory	12.6	78.8	+	DEC 28 15:50 - DEC 28 15:50	Pne
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	+ +	DEC 28 13:05 - DEC 28 15:42	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	DEC 28 13:04 - DEC 28 15:42	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2049-12-28T14:18:25.240
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      : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67807s
RUWE (>1.4 is poor) : 1.20
K magnitude          : 7.748
G magnitude          : 10.035
RP magnitude         : 9.294
BP magnitude         : 10.369
DUPflag             : 0
Distance (au)        : 4.331
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg) : 155.21
Sun-Moon sep (deg)  : 150.54
B (ring opening deg) : 0.87
PA of pole (deg)    : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (" ) : 0.500
C/A sky separation (km) : 1570.7
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
    
```

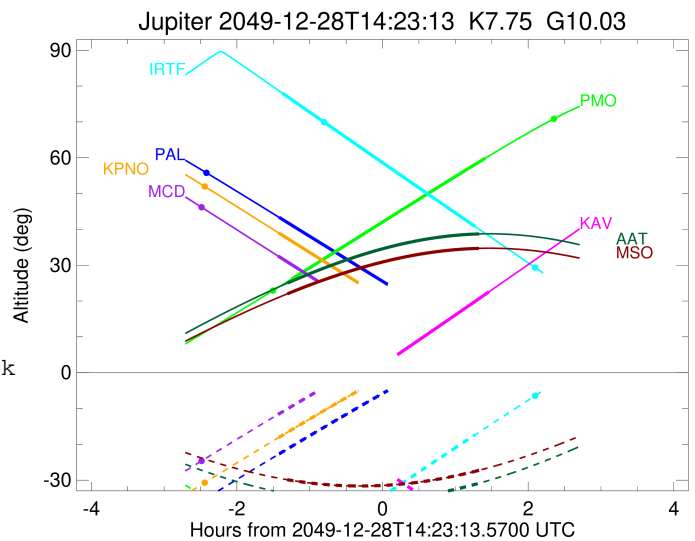
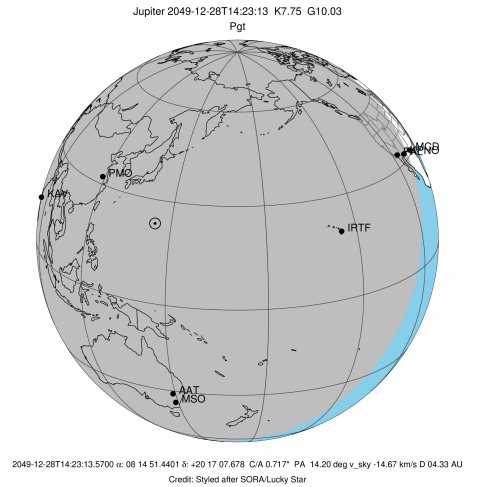


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2049-12-28T12:58:00.317	43.35	-22.69	71492.0	0.31	0.36
Jupiter	E	2049-12-28T15:39:28.351	9.94	8.07x	71492.0	2.15	2.45

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2049-12-28T14:28:24.740
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : PMO
Location            : Purple Mtn Obs. Nanking
Latitude (deg)      : 32.06667
E. Longitude (deg)  : 118.82089
Altitude (km)       : 0.364
Gaia source ID      : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67808s
RUWE (>1.4 is poor) : 1.20
K magnitude          : 7.748
G magnitude          : 10.035
RP magnitude         : 9.294
BP magnitude         : 10.369
DUPflag             : 0
Distance (au)       : 4.331
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg) : 155.21
Sun-Moon sep (deg)  : 151.79
B (ring opening deg) : 0.87
PA of pole (deg)    : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (") : 0.445
C/A sky separation (km) : 1397.5
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
    
```

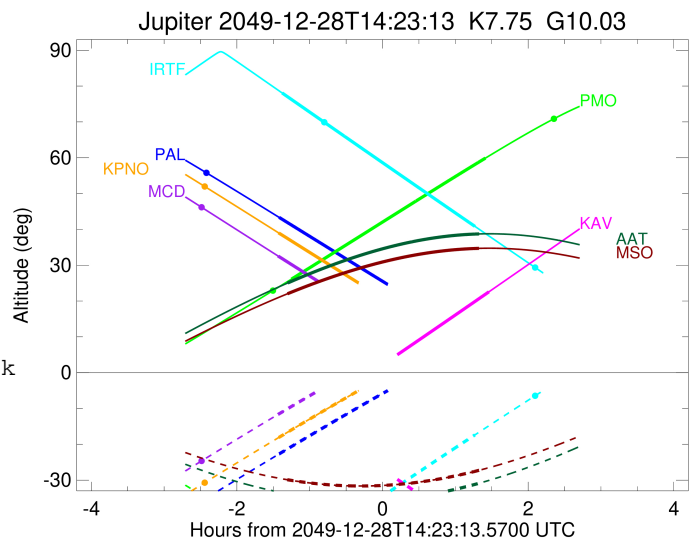
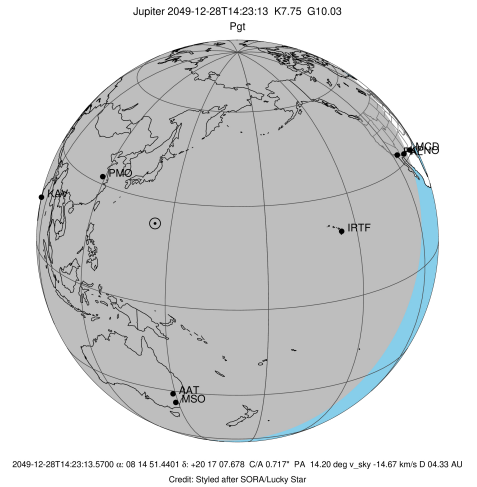


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2049-12-28T13:08:18.999	26.13	-49.90	71492.0	-1.19	-1.36
Jupiter	E	2049-12-28T15:47:56.080	59.86	-80.42	71492.0	-0.83	-0.95

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2049-12-28T14:18:11.240
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       : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67807s
RUWE (>1.4 is poor) : 1.20
K magnitude           : 7.748
G magnitude           : 10.035
RP magnitude         : 9.294
BP magnitude         : 10.369
DUPflag              : 0
Distance (au)        : 4.331
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg) : 155.21
Sun-Moon sep (deg)   : 150.48
B (ring opening deg) : 0.87
PA of pole (deg)     : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (") : 0.527
C/A sky separation (km) : 1655.3
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
    
```

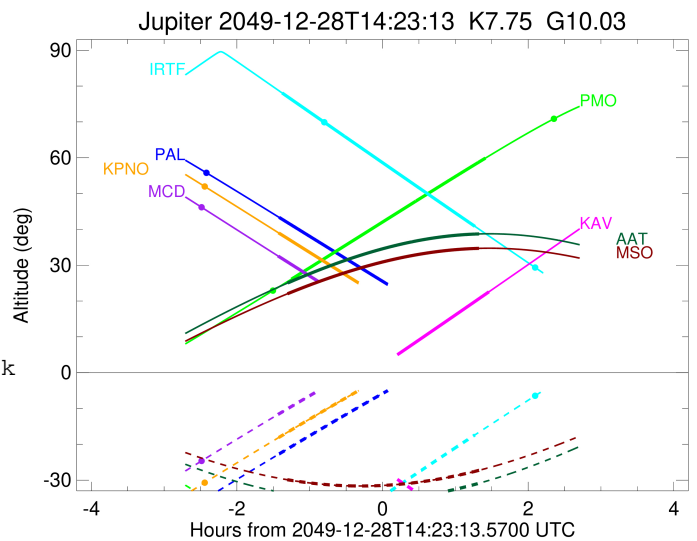
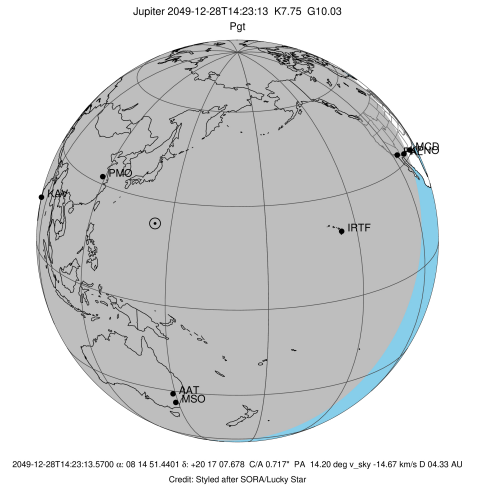


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2049-12-28T12:57:36.701	39.02	-18.12	71492.0	0.38	0.43
Jupiter	E	2049-12-28T15:39:25.685	5.29	12.47x	71492.0	2.20	2.51

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2049-12-28T14:18:00.070
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       : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67807s
RUWE (>1.4 is poor) : 1.20
K magnitude           : 7.748
G magnitude           : 10.035
RP magnitude         : 9.294
BP magnitude         : 10.369
DUPflag              : 0
Distance (au)        : 4.331
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg) : 155.21
Sun-Moon sep (deg)  : 150.41
B (ring opening deg) : 0.87
PA of pole (deg)    : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (") : 0.581
C/A sky separation (km) : 1824.8
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
    
```

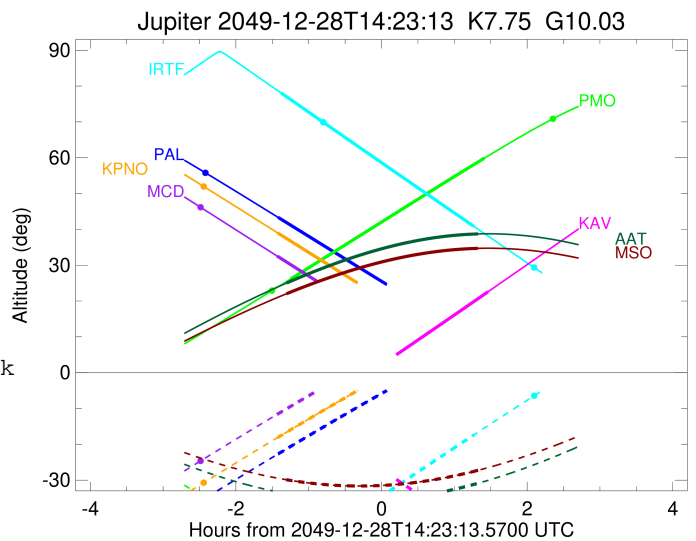
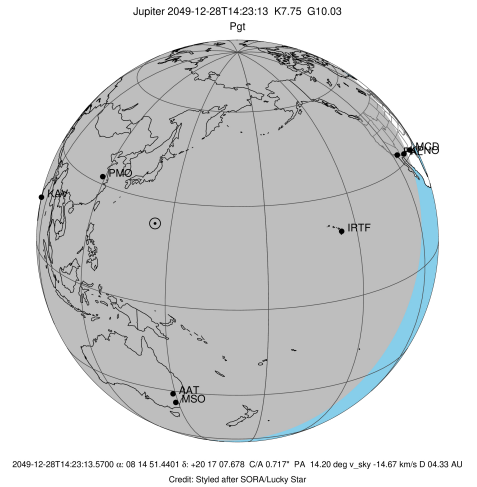


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2049-12-28T12:57:10.268	32.56	-11.65	71492.0	0.53	0.60
Jupiter	E	2049-12-28T15:39:31.333	-1.21x	18.27x	71492.0	2.29	2.62

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2049-12-28T14:19:45.820
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        : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67807s
RUWE (>1.4 is poor) : 1.20
K magnitude           : 7.748
G magnitude           : 10.035
RP magnitude          : 9.294
BP magnitude          : 10.369
DUPflag              : 0
Distance (au)         : 4.331
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg)  : 155.21
Sun-Moon sep (deg)    : 150.83
B (ring opening deg) : 0.87
PA of pole (deg)      : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (") : 0.382
C/A sky separation (km) : 1199.3
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
    
```

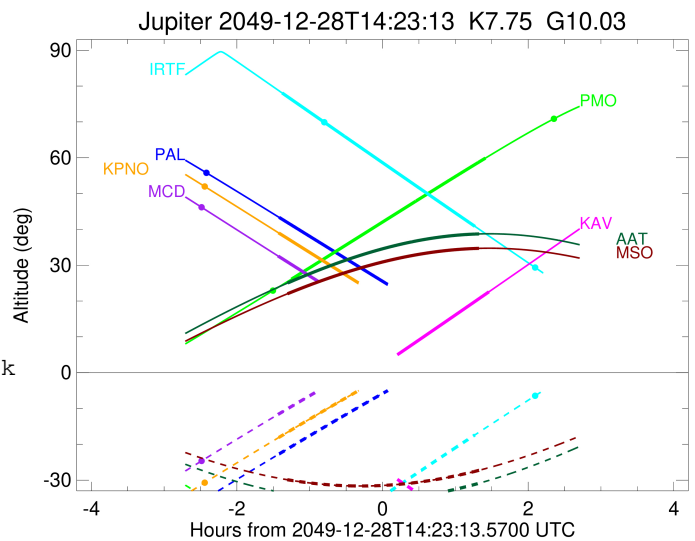
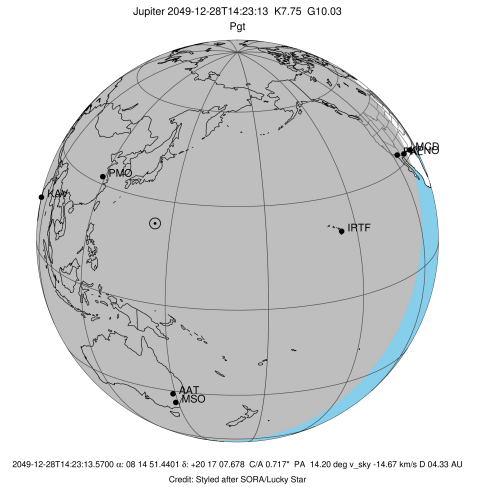


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2049-12-28T13:00:31.371	78.07	-53.40	71492.0	-1.89	-2.16
Jupiter	E	2049-12-28T15:39:24.783	40.83	-17.37	71492.0	0.06	0.06

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2049-12-28T14:30:25.230
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : KAV
Location              : Kavalur Observatory
Latitude (deg)       : 12.57556
E. Longitude (deg)   : 78.83167
Altitude (km)        : 0.722
Gaia source ID       : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67808s
RUWE (>1.4 is poor) : 1.20
K magnitude           : 7.748
G magnitude           : 10.035
RP magnitude          : 9.294
BP magnitude          : 10.369
DUPflag              : 0
Distance (au)        : 4.331
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg) : 155.21
Sun-Moon sep (deg)   : 151.69
B (ring opening deg) : 0.87
PA of pole (deg)     : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (") : 0.814
C/A sky separation (km) : 2557.2
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
    
```

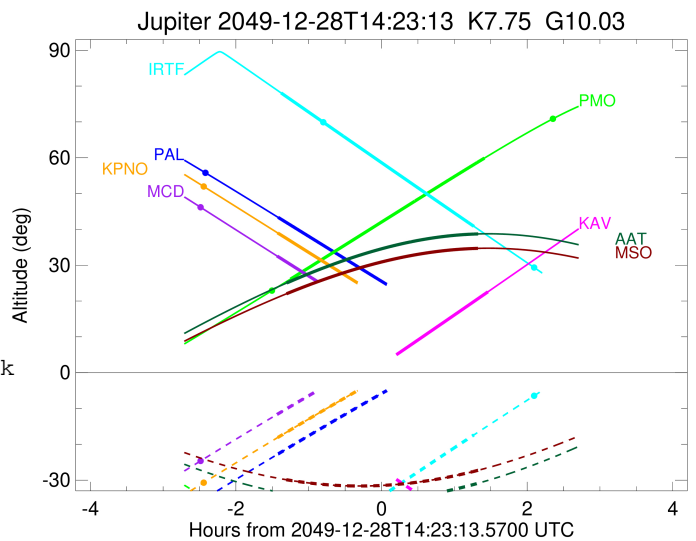
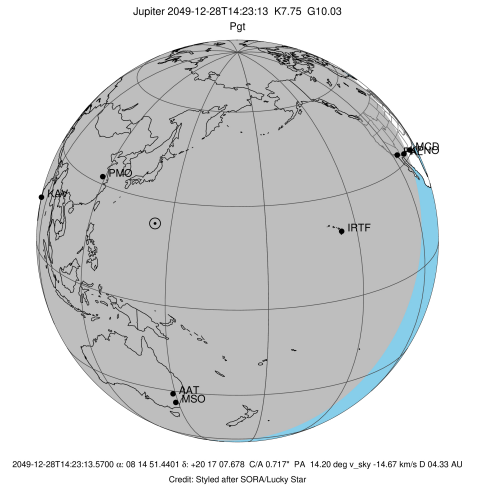


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2049-12-28T13:08:57.643	-14.63x	-10.03	71492.0	-1.72	-1.96
Jupiter	E	2049-12-28T15:50:57.952	22.58	-47.10	71492.0	-2.22	-2.54

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2049-12-28T14:24:06.660
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        : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67807s
RUWE (>1.4 is poor)  : 1.20
K magnitude           : 7.748
G magnitude           : 10.035
RP magnitude          : 9.294
BP magnitude          : 10.369
DUPflag              : 0
Distance (au)         : 4.331
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg)  : 155.21
Sun-Moon sep (deg)    : 151.06
B (ring opening deg) : 0.87
PA of pole (deg)      : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (") : 2.376
C/A sky separation (km) : 7462.8
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
    
```



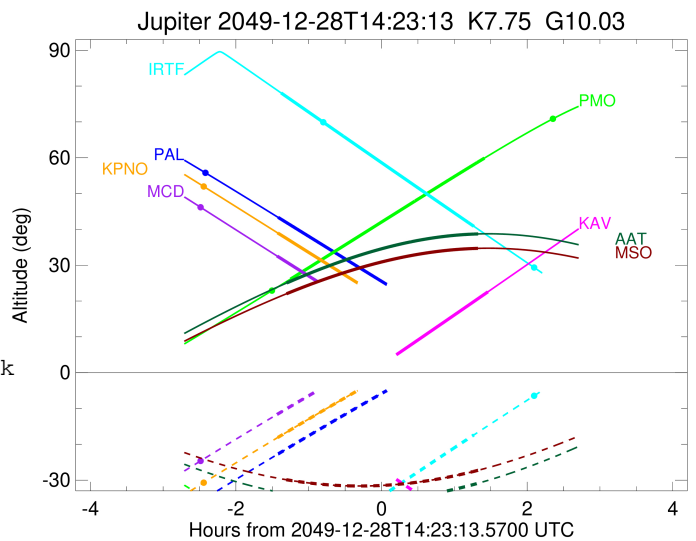
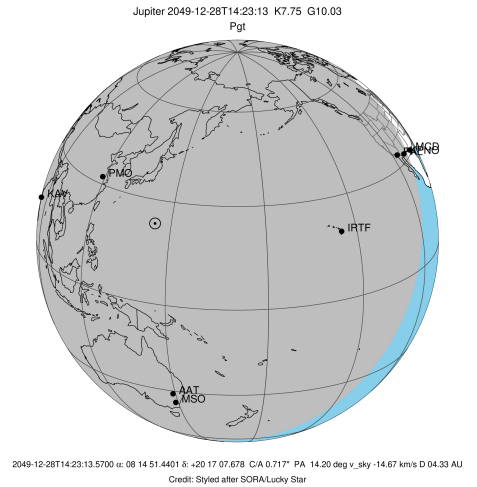
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2049-12-28T13:05:06.806	25.03	-33.78	71492.0	-6.38	-7.28
Jupiter	E	2049-12-28T15:42:50.635	38.73	-30.86	71492.0	-5.39	-6.16



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2049-12-28T14:23:56.510
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       : 675650891700777728
2Mass ID (if available) : 08145186+2017060
ICRS Star Coord at Epoch: 08h 14m 51.44007s +20:17:07.67807s
RUWE (>1.4 is poor) : 1.20
K magnitude          : 7.748
G magnitude          : 10.035
RP magnitude         : 9.294
BP magnitude         : 10.369
DUPflag             : 0
Distance (au)        : 4.331
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.67
Sun-Target sep (deg) : 155.21
Sun-Moon sep (deg)  : 151.00
B (ring opening deg) : 0.87
PA of pole (deg)    : 14.54
Pole direction: RA (deg): 268.05755
Dec (deg): 64.49714
C/A sky separation (") : 2.453
C/A sky separation (km) : 7705.2
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
    
```



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	2049-12-28T13:04:53.375	22.02	-29.88	71492.0	-6.57	-7.50
Jupiter	E	2049-12-28T15:42:44.219	34.69	-27.26	71492.0	-5.60	-6.40