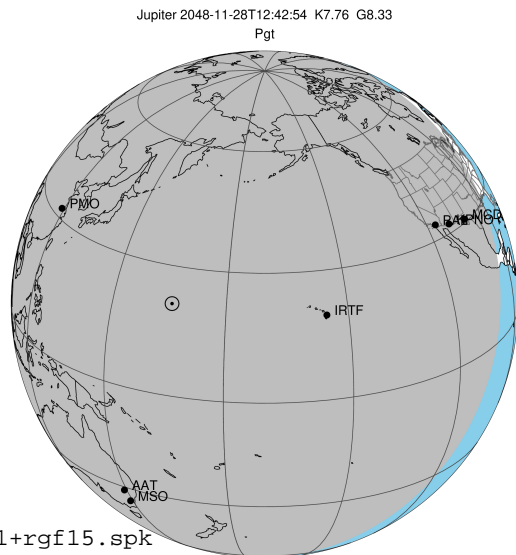


target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2048-11-28T12:42:54.390  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 3427356414417315584  
 2Mass ID (if available) : 05495962+2257322

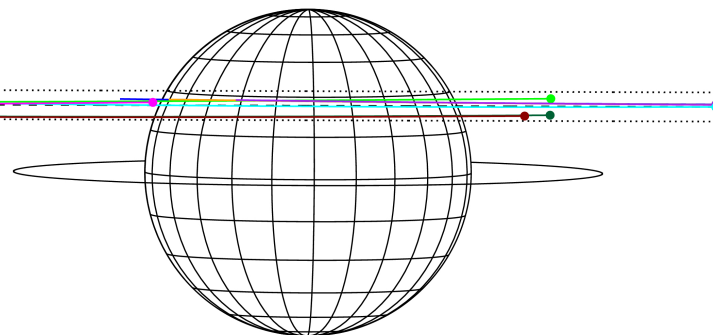
Jupiter 2048-11-28T12:42:54 K7.76 G8.33 Pgt

ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s  
 RUWE (>1.4 is poor) : 1.25  
 K magnitude : 7.760  
 G magnitude : 8.327  
 RP magnitude : 8.126  
 BP magnitude : 8.424  
 DUPflag : 1  
 Distance (au) : 4.168  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -14.97  
 Sun-Target sep (deg) : 158.57  
 Sun-Moon sep (deg) : 66.79  
 B (ring opening deg) : 2.54  
 PA of pole (deg) : -0.24  
 Pole direction: RA (deg): 268.05736  
 Dec (deg): 64.49721  
 C/A sky separation (") : 9.674  
 C/A sky separation (km) : 29247.7  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 naif0012.tls  
 nep097.bsp  
 nep101.bsp  
 sat4401.bsp



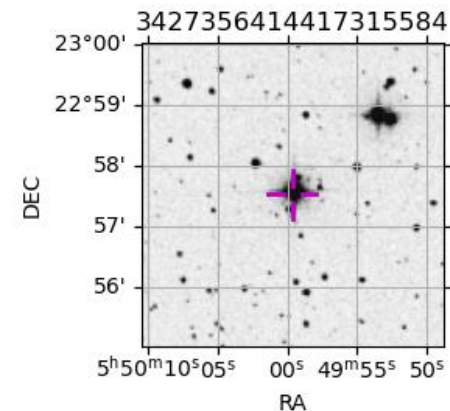
2048-11-28T12:42:54.3900 ex: 05 49 59.62889 s: +22 57 30.653 C/A 9.686" PA 179.82 deg v\_sky -14.97 km/s D 04.17 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 KAV  
 AAT  
 MSO



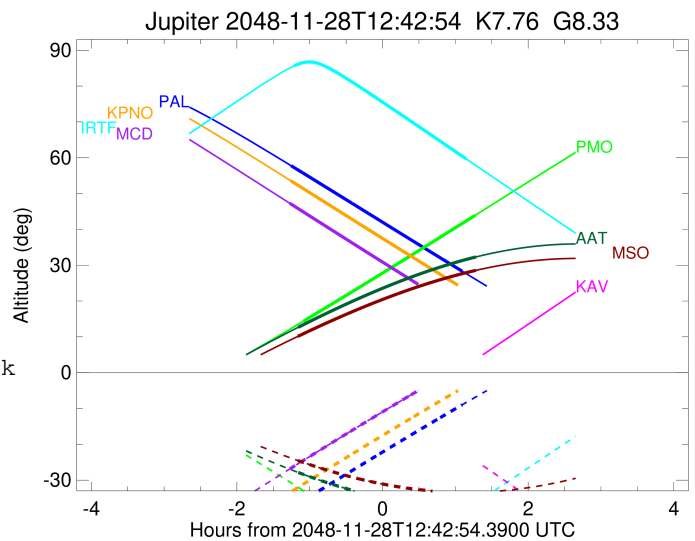
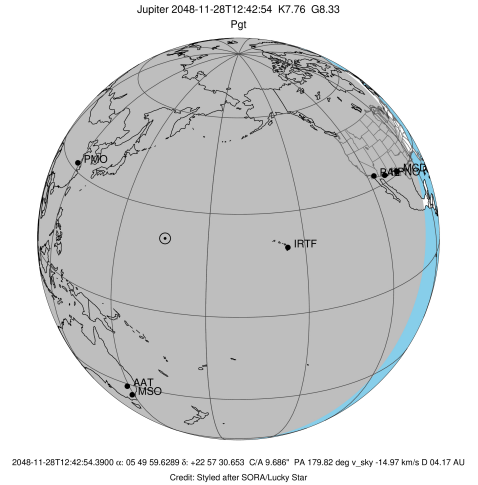
Observable events with sun below -5 deg and altitude above 5 deg

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	+ +	NOV 28 11:27 - NOV 28 13:48	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8	+ +	NOV 28 11:37 - NOV 28 13:59	Pie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	NOV 28 11:27 - NOV 28 11:27	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	NOV 28 11:26 - NOV 28 11:26	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	NOV 28 11:30 - NOV 28 13:51	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	+ +	NOV 28 11:33 - NOV 28 13:59	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	NOV 28 11:33 - NOV 28 13:59	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-11-28T12:37:55.410
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      : 3427356414417315584
2Mass ID (if available) : 05495962+2257322
ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s
RUWE (>1.4 is poor) : 1.25
K magnitude         : 7.760
G magnitude         : 8.327
RP magnitude        : 8.126
BP magnitude        : 8.424
DUPflag            : 1
Distance (au)       : 4.168
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.97
Sun-Target sep (deg) : 158.57
Sun-Moon sep (deg)  : 67.13
B (ring opening deg) : 2.54
PA of pole (deg)    : -0.24
Pole direction: RA (deg): 268.05736
Dec (deg): 64.49721
C/A sky separation (") : 10.321
C/A sky separation (km) : 31201.5
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
    
```

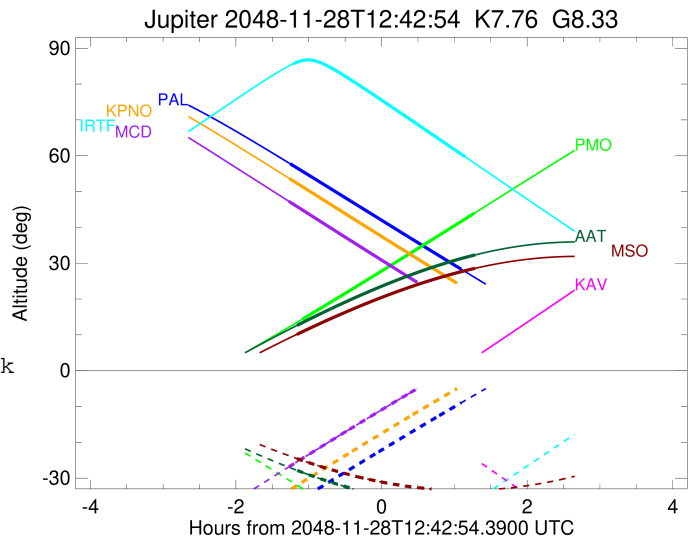
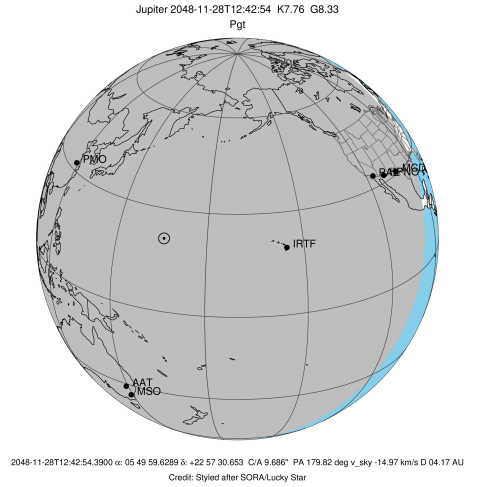


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2048-11-28T11:27:38.720	57.75	-37.77	71490.4	25.52	28.58
Jupiter	E	2048-11-28T13:48:36.206	28.31	-8.97	71490.3	26.29	29.42

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-11-28T12:48:52.280
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      : 3427356414417315584
2Mass ID (if available) : 05495962+2257322
ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s
RUWE (>1.4 is poor) : 1.25
K magnitude          : 7.760
G magnitude          : 8.327
RP magnitude         : 8.126
BP magnitude         : 8.424
DUPflag             : 1
Distance (au)       : 4.168
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.97
Sun-Target sep (deg) : 158.57
Sun-Moon sep (deg)  : 67.48
B (ring opening deg) : 2.54
PA of pole (deg)    : -0.24
Pole direction: RA (deg): 268.05736
Dec (deg): 64.49721
C/A sky separation (") : 10.448
C/A sky separation (km) : 31584.7
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
    
```

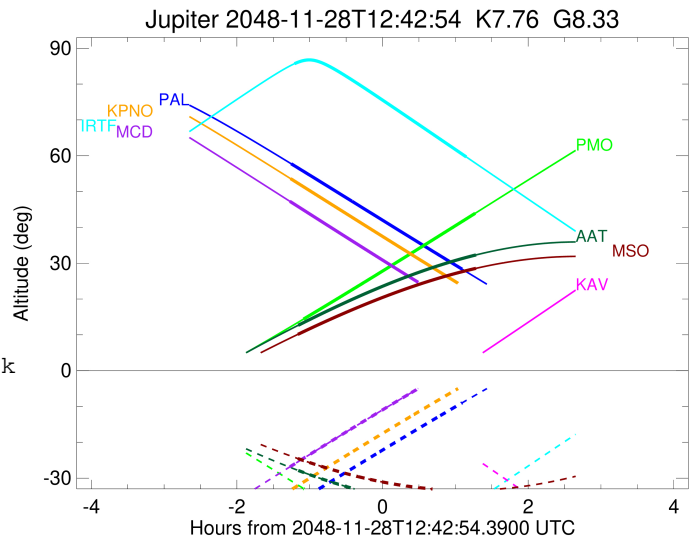
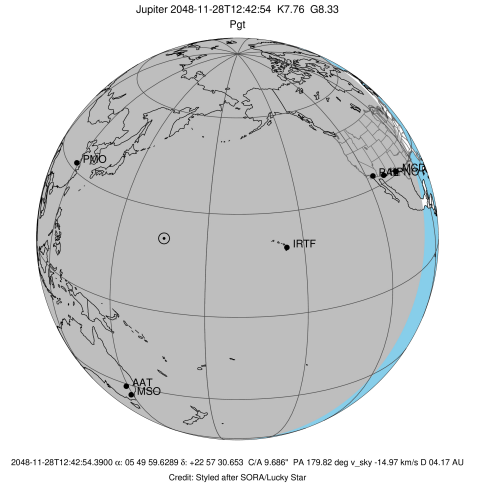


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2048-11-28T11:37:51.897	14.40	-32.91	71490.2	26.82	29.99
Jupiter	E	2048-11-28T13:59:17.730	43.93	-62.71	71490.3	25.63	28.71

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-11-28T12:37:30.940
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       : 3427356414417315584
2Mass ID (if available) : 05495962+2257322
ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s
RUWE (>1.4 is poor) : 1.25
K magnitude          : 7.760
G magnitude          : 8.327
RP magnitude         : 8.126
BP magnitude         : 8.424
DUPflag             : 1
Distance (au)        : 4.168
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.97
Sun-Target sep (deg) : 158.57
Sun-Moon sep (deg)  : 67.05
B (ring opening deg) : 2.54
PA of pole (deg)    : -0.24
Pole direction: RA (deg): 268.05736
Dec (deg): 64.49721
C/A sky separation (") : 10.327
C/A sky separation (km) : 31219.0
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
    
```

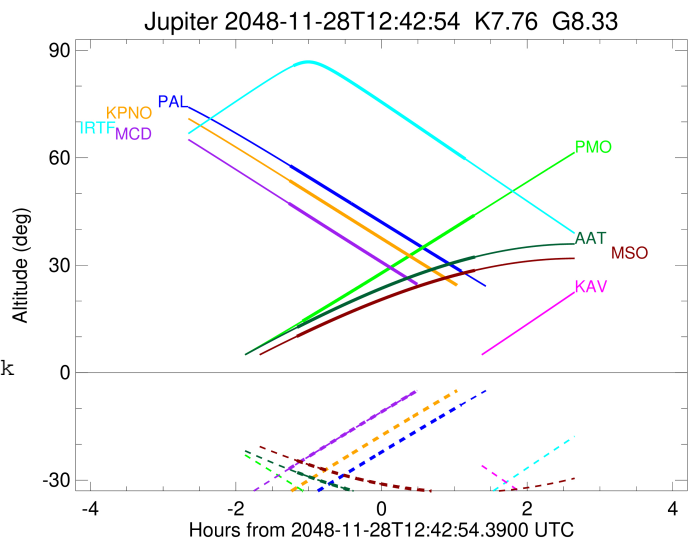
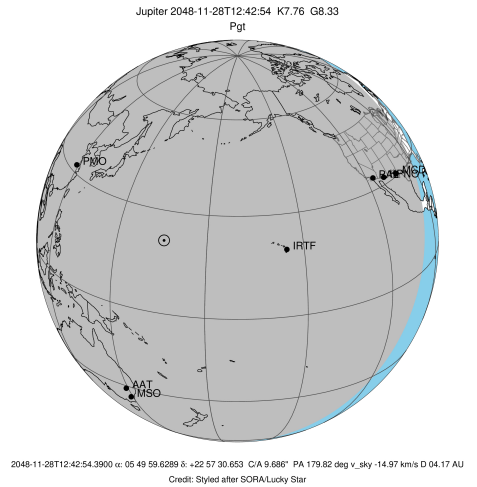


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2048-11-28T11:27:08.775	53.60	-33.34	71490.4	25.49	28.55
Jupiter	E	2048-11-28T13:48:19.514	23.74	-4.38x	71490.3	26.34	29.47

```

target          : Jupiter
target radius (km) : 71492.00
C/A epoch       : 2048-11-28T12:37:02.200
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  : 3427356414417315584
2Mass ID (if available) : 05495962+2257322
ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s
RUWE (>1.4 is poor) : 1.25
K magnitude     : 7.760
G magnitude     : 8.327
RP magnitude    : 8.126
BP magnitude    : 8.424
DUPflag        : 1
Distance (au)   : 4.168
f0 (km)        : 0.00
g0 (km)        : 0.00
skyplane vel. (km/s) : -14.97
Sun-Target sep (deg) : 158.57
Sun-Moon sep (deg) : 66.95
B (ring opening deg) : 2.54
PA of pole (deg) : -0.24
Pole direction: RA (deg): 268.05736
Dec (deg): 64.49721
C/A sky separation (") : 10.365
C/A sky separation (km) : 31336.6
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
    
```

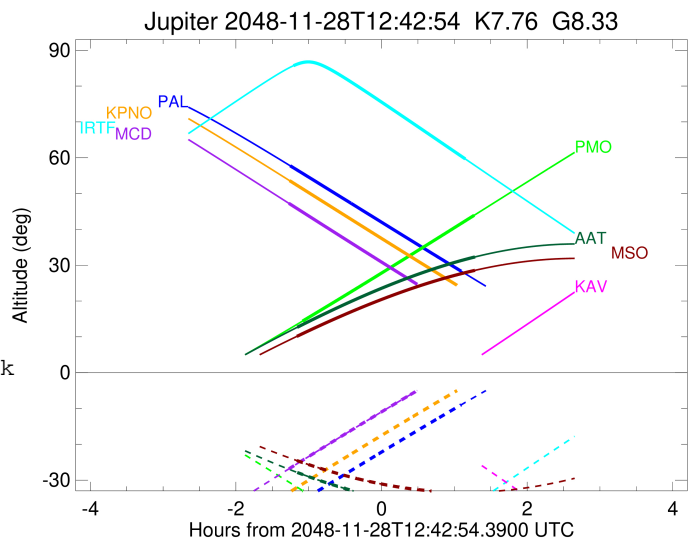
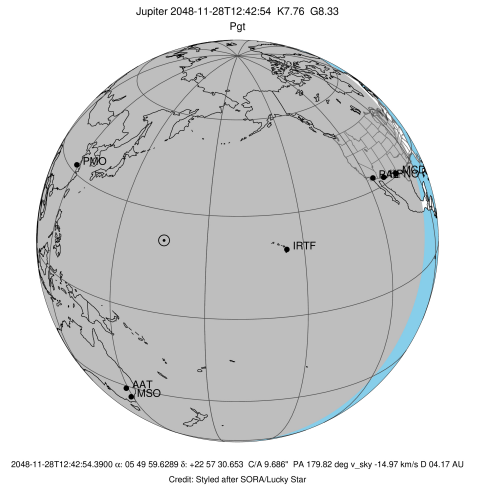


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2048-11-28T11:26:33.066	47.27	-26.86	71490.4	25.54	28.61
Jupiter	E	2048-11-28T13:48:00.525	17.21	1.99x	71490.2	26.48	29.62

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-11-28T12:41:07.060
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      : 3427356414417315584
2Mass ID (if available) : 05495962+2257322
ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s
RUWE (>1.4 is poor) : 1.25
K magnitude          : 7.760
G magnitude          : 8.327
RP magnitude         : 8.126
BP magnitude         : 8.424
DUPflag             : 1
Distance (au)       : 4.168
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.97
Sun-Target sep (deg) : 158.57
Sun-Moon sep (deg)  : 67.53
B (ring opening deg) : 2.54
PA of pole (deg)    : -0.24
Pole direction: RA (deg): 268.05736
Dec (deg): 64.49721
C/A sky separation (") : 9.581
C/A sky separation (km) : 28964.2
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
    
```

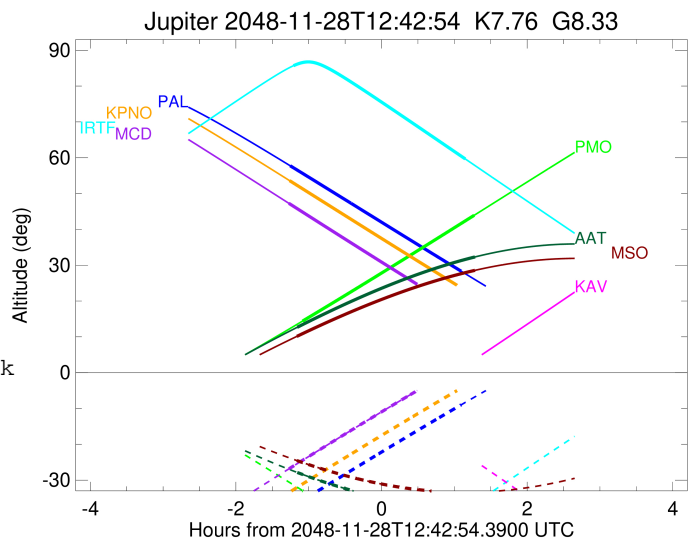
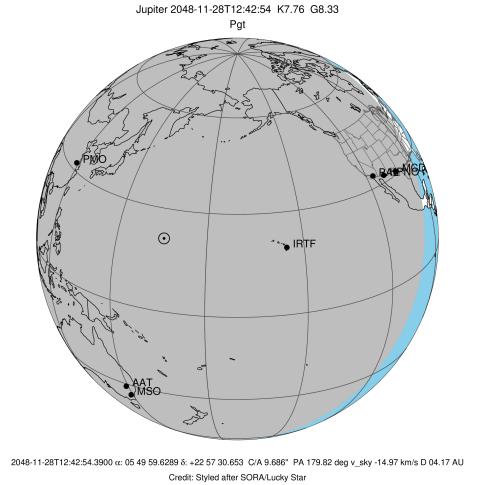


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2048-11-28T11:30:26.151	85.69	-71.08	71490.5	23.87	26.80
Jupiter	E	2048-11-28T13:51:54.926	59.66	-38.29	71490.5	24.07	27.02

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-11-28T12:46:55.200
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       : 3427356414417315584
2Mass ID (if available) : 05495962+2257322
ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s
RUWE (>1.4 is poor) : 1.25
K magnitude           : 7.760
G magnitude           : 8.327
RP magnitude          : 8.126
BP magnitude          : 8.424
DUPflag              : 1
Distance (au)         : 4.168
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.97
Sun-Target sep (deg) : 158.57
Sun-Moon sep (deg)   : 67.31
B (ring opening deg) : 2.54
PA of pole (deg)     : -0.24
Pole direction: RA (deg): 268.05736
Dec (deg): 64.49721
C/A sky separation (") : 8.125
C/A sky separation (km) : 24561.9
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
    
```



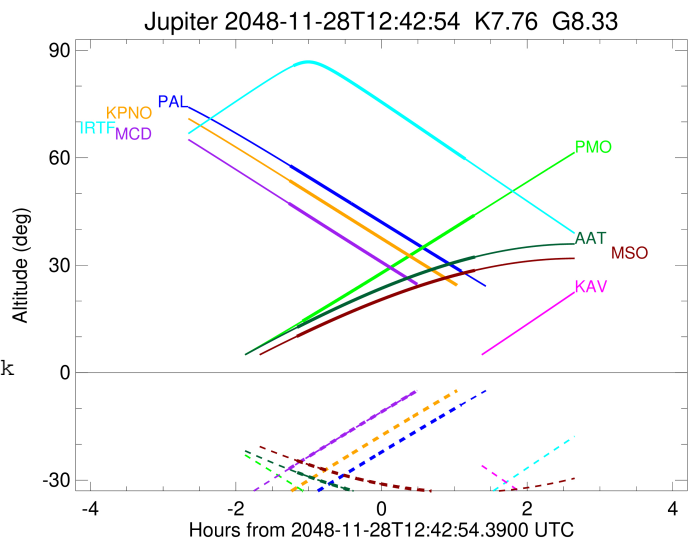
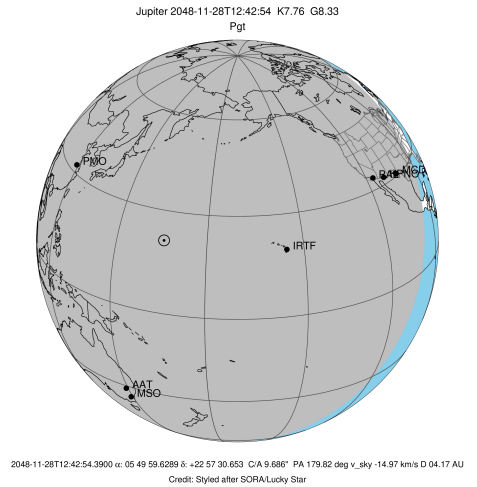
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2048-11-28T11:33:28.759	12.67	-27.86	71490.9	20.57	23.20
Jupiter	E	2048-11-28T13:59:55.572	32.30	-37.38	71491.0	19.73	22.28



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-11-28T12:46:44.660
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      : 3427356414417315584
2Mass ID (if available) : 05495962+2257322
ICRS Star Coord at Epoch: 05h 49m 59.62889s +22:57:30.65295s
RUWE (>1.4 is poor) : 1.25
K magnitude          : 7.760
G magnitude          : 8.327
RP magnitude         : 8.126
BP magnitude         : 8.424
DUPflag             : 1
Distance (au)       : 4.168
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.97
Sun-Target sep (deg) : 158.57
Sun-Moon sep (deg)  : 67.25
B (ring opening deg) : 2.54
PA of pole (deg)    : -0.24
Pole direction: RA (deg): 268.05736
Dec (deg): 64.49721
C/A sky separation (") : 8.036
C/A sky separation (km) : 24294.1
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	2048-11-28T11:33:08.076	10.13	-24.53	71490.9	20.32	22.93
Jupiter	E	2048-11-28T13:59:56.029	28.56	-33.36	71491.0	19.51	22.04