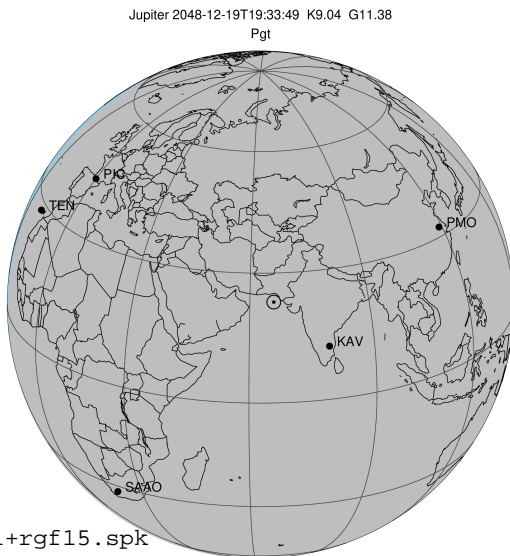


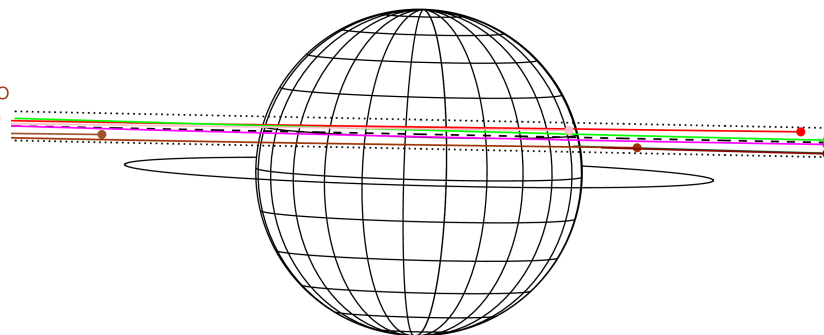
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2048-12-19T19:33:49.310  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 3404277119892461568  
 2Mass ID (if available) : 05375201+2255255

Jupiter 2048-12-19T19:33:49 K9.04 G11.38 Pgt

ICRS Star Coord at Epoch: 05h 37m 52.03631s +22:55:25.45217s  
 RUWE (>1.4 is poor) : 1.74  
 K magnitude : 9.043  
 G magnitude : 11.375  
 RP magnitude : 10.646  
 BP magnitude : 11.959  
 DUPflag : 0  
 Distance (au) : 4.124  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.91  
 Sun-Target sep (deg) : 176.98  
 Sun-Moon sep (deg) : 2.01  
 B (ring opening deg) : 2.53  
 PA of pole (deg) : -1.55  
 Pole direction: RA (deg): 268.05737  
 Dec (deg): 64.49721  
 C/A sky separation (") : 5.606  
 C/A sky separation (km) : 16766.8  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk



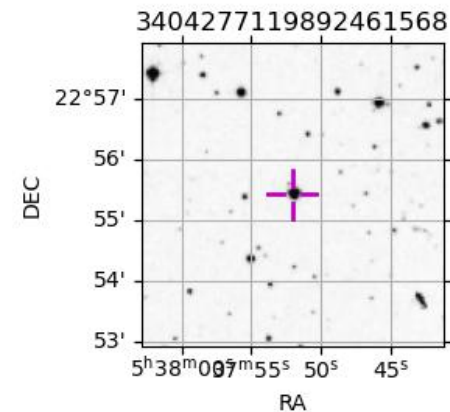
Earth  
 PIC  
 PMO  
 TEN  
 KAV  
 RIO  
 AAT  
 SAAO  
 MSO



2048-12-19T19:33:49.3100 ex: 05 37 52.0363 s : +22 55 25.452 C/A 5.618" PA 178.83 deg v\_sky -16.91 km/s D 04.12 AU  
 Credit: Styled after SORA/Lucky Star

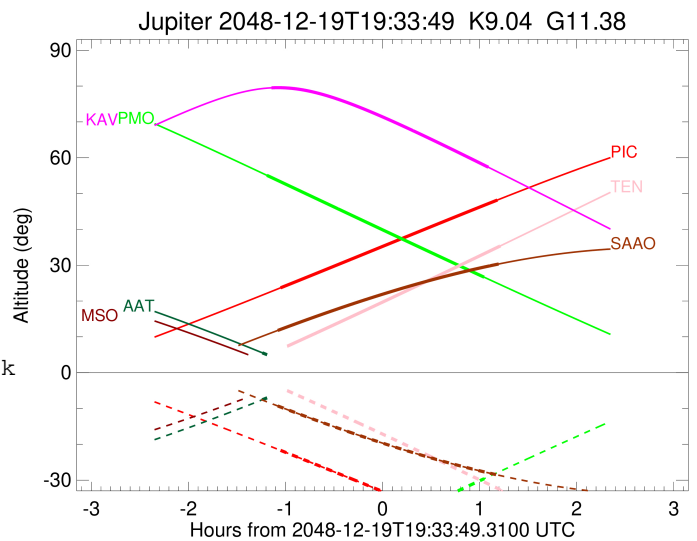
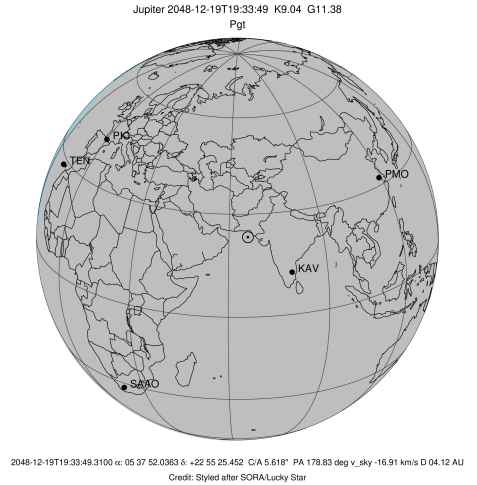
Observable events with sun below -5 deg and altitude above 5 deg

| Obs  | Location                          | lat   | Elon  | Target | Observed Events Interval    | OEcode |
|------|-----------------------------------|-------|-------|--------|-----------------------------|--------|
| PIC  | Pic du Midi                       | 42.9  | 0.1   | + +    | DEC 19 18:30 - DEC 19 20:44 | Pie    |
| PAL  | Palomar Mt (200")                 | 33.4  | 243.1 |        |                             | Pnn    |
| PMO  | Purple Mtn Obs. Nanking           | 32.1  | 118.8 | + +    | DEC 19 18:22 - DEC 19 20:36 | Pie    |
| KPNO | Kitt Peak Natl Obs                | 32.0  | 248.4 |        |                             | Pnn    |
| MCD  | McDonald Obs. 2.7m                | 30.7  | 256.0 |        |                             | Pnn    |
| TEN  | Teide Obs./Tenerife               | 28.3  | 343.5 | + +    | DEC 19 20:46 - DEC 19 20:46 | Pne    |
| IRTF | Mauna Kea/IRTF                    | 19.8  | 204.5 |        |                             | Pnn    |
| KAV  | Kavalur Observatory               | 12.6  | 78.8  | + +    | DEC 19 18:25 - DEC 19 20:39 | Pie    |
| 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 19 18:19 - DEC 19 18:19 | Pin    |
| SAAO | So. Afr. Astro. Obs. (Sutherland) | -32.4 | 20.8  | + +    | DEC 19 18:29 - DEC 19 20:45 | Pie    |
| MSO  | Mt. Stromlo Observatory           | -35.3 | 149.0 |        |                             | Pnn    |



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-12-19T19:37:57.750
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: 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       : 3404277119892461568
2Mass ID (if available) : 05375201+2255255
ICRS Star Coord at Epoch: 05h 37m 52.03631s +22:55:25.45217s
RUWE (>1.4 is poor) : 1.74
K magnitude           : 9.043
G magnitude           : 11.375
RP magnitude         : 10.646
BP magnitude         : 11.959
DUPflag              : 0
Distance (au)        : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.91
Sun-Target sep (deg) : 176.98
Sun-Moon sep (deg)   : 1.54
B (ring opening deg) : 2.53
PA of pole (deg)     : -1.55
Pole direction: RA (deg): 268.05737
Dec (deg): 64.49721
C/A sky separation (") : 6.667
C/A sky separation (km) : 19940.4
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
    
```

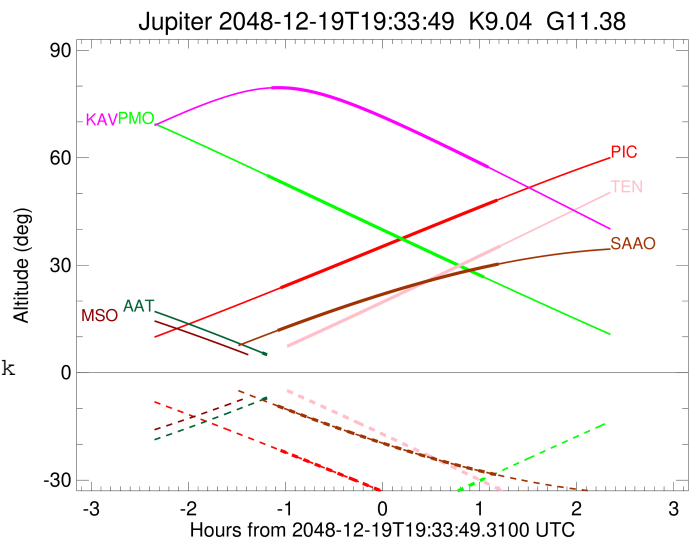
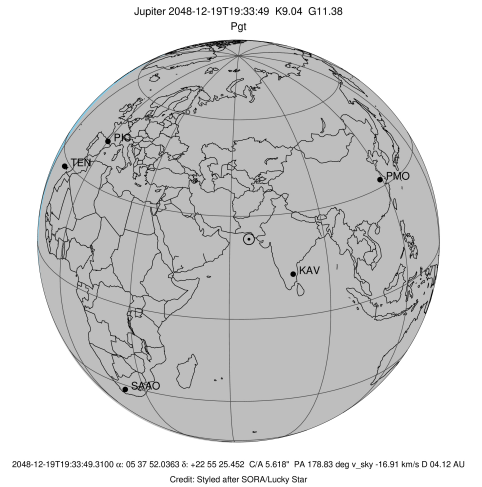


x: target alt < 5.0 deg or sun > -5.0 deg

| Target  | I/E | UTC                     | alt   | alt-sun | radius  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I   | 2048-12-19T18:30:46.907 | 23.68 | -21.68  | 71491.2 | 16.98   | 19.23        |
| Jupiter | E   | 2048-12-19T20:44:48.094 | 48.18 | -46.11  | 71491.4 | 15.44   | 17.52        |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2048-12-19T19:29:17.620
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       : 3404277119892461568
2Mass ID (if available) : 05375201+2255255
ICRS Star Coord at Epoch: 05h 37m 52.03631s +22:55:25.45217s
RUWE (>1.4 is poor) : 1.74
K magnitude           : 9.043
G magnitude           : 11.375
RP magnitude          : 10.646
BP magnitude          : 11.959
DUPflag              : 0
Distance (au)        : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.91
Sun-Target sep (deg) : 176.98
Sun-Moon sep (deg)   : 2.69
B (ring opening deg) : 2.53
PA of pole (deg)     : -1.55
Pole direction: RA (deg): 268.05737
Dec (deg): 64.49721
C/A sky separation (") : 6.216
C/A sky separation (km) : 18591.0
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
    
```

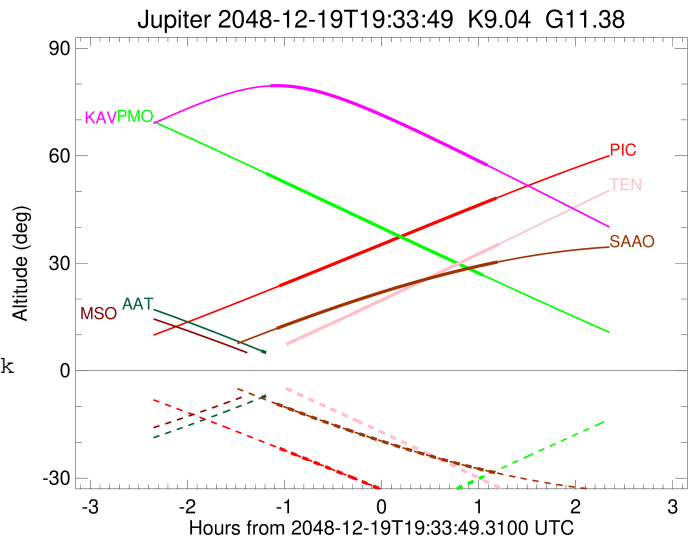
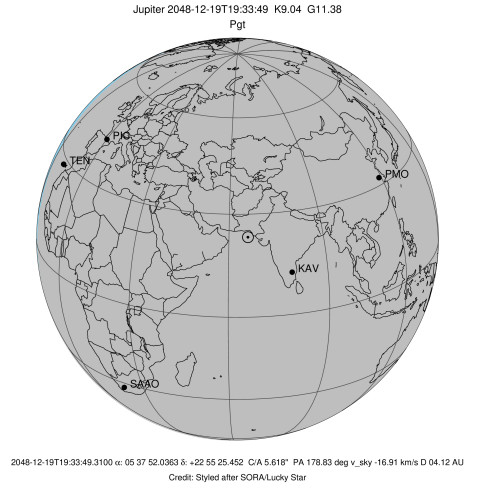


x: target alt < 5.0 deg or sun > -5.0 deg

| Target  | I/E | UTC                     | alt   | alt-sun | radius  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I   | 2048-12-19T18:22:22.018 | 55.08 | -57.96  | 71491.4 | 15.08   | 17.11        |
| Jupiter | E   | 2048-12-19T20:36:35.763 | 26.66 | -29.61  | 71491.4 | 15.13   | 17.18        |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-12-19T19:39:22.550
Event type          : Pgt
: Jupiter occs: geocentric, topocentric
: 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      : 3404277119892461568
2Mass ID (if available) : 05375201+2255255
ICRS Star Coord at Epoch: 05h 37m 52.03631s +22:55:25.45217s
RUWE (>1.4 is poor) : 1.74
K magnitude          : 9.043
G magnitude          : 11.375
RP magnitude         : 10.646
BP magnitude         : 11.959
DUPflag             : 0
Distance (au)       : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.91
Sun-Target sep (deg) : 176.98
Sun-Moon sep (deg)  : 1.31
B (ring opening deg) : 2.53
PA of pole (deg)    : -1.55
Pole direction: RA (deg): 268.05737
Dec (deg): 64.49721
C/A sky separation (") : 6.404
C/A sky separation (km) : 19154.4
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
    
```

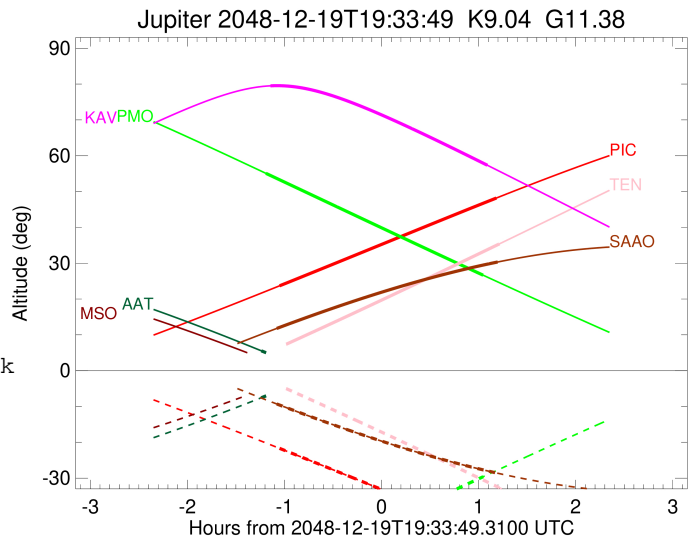
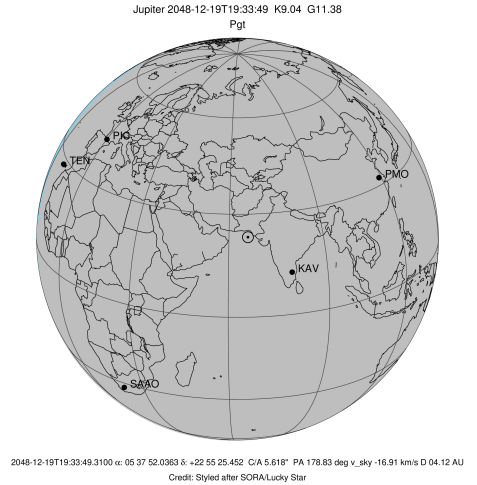


x: target alt < 5.0 deg or sun > -5.0 deg

| Target  | I/E | UTC                     | alt   | alt-sun | radius  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I   | 2048-12-19T18:31:36.657 | 6.70  | -4.35x  | 71491.3 | 16.44   | 18.63        |
| Jupiter | E   | 2048-12-19T20:46:40.431 | 35.39 | -32.68  | 71491.4 | 14.64   | 16.63        |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-12-19T19:32:08.080
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      : 3404277119892461568
2Mass ID (if available) : 05375201+2255255
ICRS Star Coord at Epoch: 05h 37m 52.03631s +22:55:25.45217s
RUWE (>1.4 is poor) : 1.74
K magnitude         : 9.043
G magnitude         : 11.375
RP magnitude        : 10.646
BP magnitude        : 11.959
DUPflag            : 0
Distance (au)       : 4.124
f0 (km)            : 0.00
g0 (km)            : 0.00
skyplane vel. (km/s) : -16.91
Sun-Target sep (deg) : 176.98
Sun-Moon sep (deg)  : 2.28
B (ring opening deg) : 2.53
PA of pole (deg)    : -1.55
Pole direction: RA (deg): 268.05737
Dec (deg): 64.49721
C/A sky separation (" ) : 5.241
C/A sky separation (km) : 15675.2
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
    
```

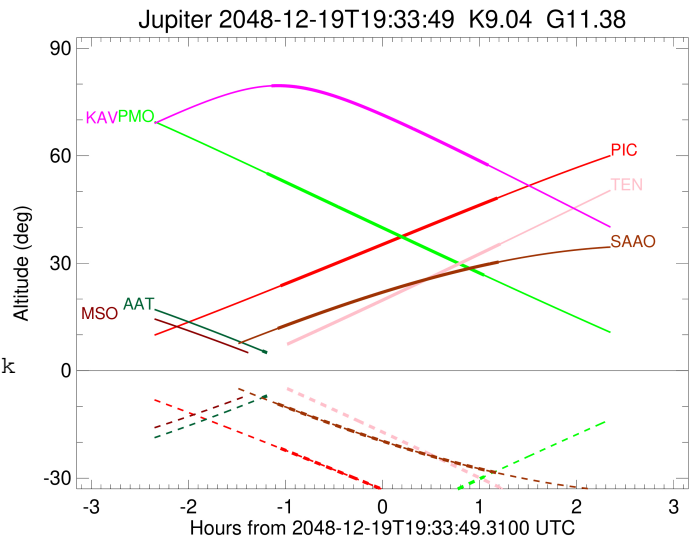
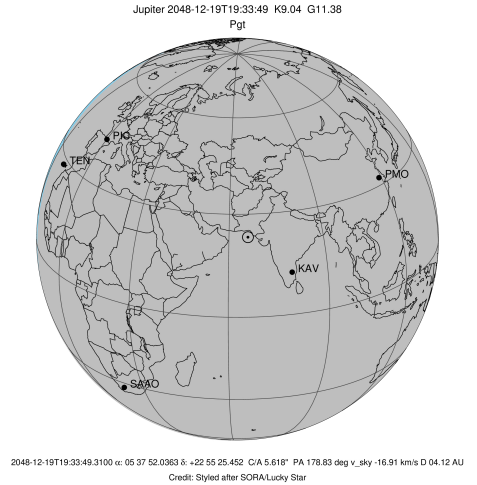


x: target alt < 5.0 deg or sun > -5.0 deg

| Target  | I/E | UTC                     | alt   | alt-sun | radius  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I   | 2048-12-19T18:25:12.315 | 79.50 | -78.36  | 71491.6 | 12.98   | 14.76        |
| Jupiter | E   | 2048-12-19T20:39:12.328 | 57.34 | -60.16  | 71491.6 | 12.50   | 14.22        |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-12-19T19:28:23.570
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       : 3404277119892461568
2Mass ID (if available) : 05375201+2255255
ICRS Star Coord at Epoch: 05h 37m 52.03631s +22:55:25.45217s
RUWE (>1.4 is poor) : 1.74
K magnitude          : 9.043
G magnitude          : 11.375
RP magnitude         : 10.646
BP magnitude         : 11.959
DUPflag             : 0
Distance (au)        : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.91
Sun-Target sep (deg) : 176.98
Sun-Moon sep (deg)   : 2.79
B (ring opening deg) : 2.53
PA of pole (deg)     : -1.55
Pole direction: RA (deg): 268.05737
Dec (deg): 64.49721
C/A sky separation ("): 4.503
C/A sky separation (km): 13469.2
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
    
```

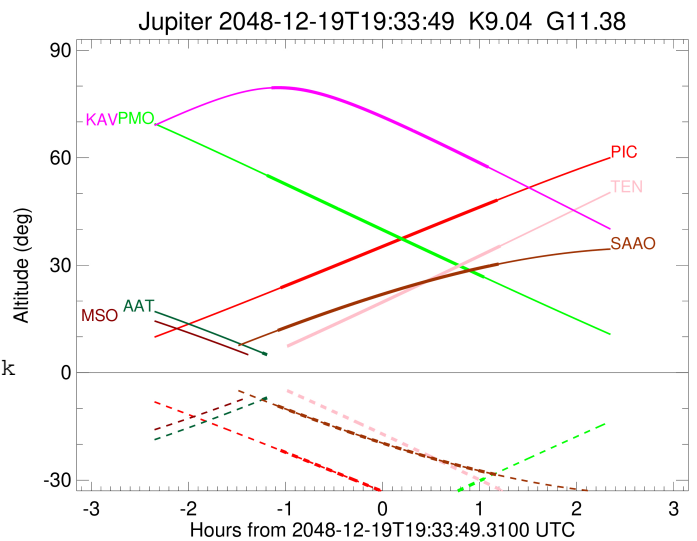
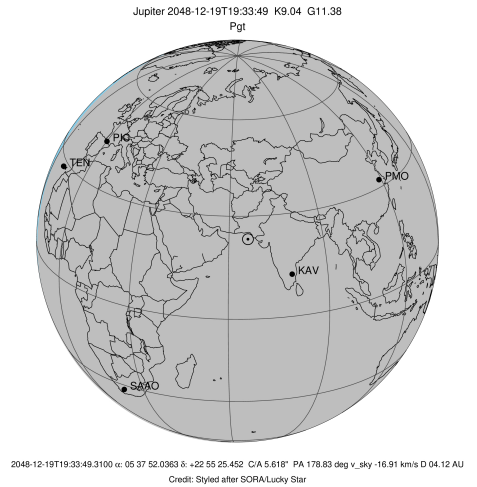


x: target alt < 5.0 deg or sun > -5.0 deg

| Target  | I/E | UTC                     | alt     | alt-sun | radius  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|---------|---------|---------|---------|--------------|
| Jupiter | I   | 2048-12-19T18:19:36.364 | 5.53    | -7.55   | 71491.7 | 10.72   | 12.22        |
| Jupiter | E   | 2048-12-19T20:37:40.329 | -21.79x | 19.27x  | 71491.7 | 11.00   | 12.53        |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2048-12-19T19:37:26.800
Event type          : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code       : SAAO
Location            : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)      : -32.37953
E. Longitude (deg)  : 20.81070
Altitude (km)       : 1.768
Gaia source ID      : 3404277119892461568
2Mass ID (if available) : 05375201+2255255
ICRS Star Coord at Epoch: 05h 37m 52.03631s +22:55:25.45217s
RUWE (>1.4 is poor) : 1.74
K magnitude          : 9.043
G magnitude          : 11.375
RP magnitude         : 10.646
BP magnitude         : 11.959
DUPflag             : 0
Distance (au)       : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.91
Sun-Target sep (deg) : 176.98
Sun-Moon sep (deg)  : 1.60
B (ring opening deg) : 2.53
PA of pole (deg)    : -1.55
Pole direction: RA (deg): 268.05737
Dec (deg): 64.49721
C/A sky separation ("): 4.047
C/A sky separation (km): 12104.7
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   | 2048-12-19T18:29:03.236 | 11.78 | -9.29   | 71491.7 | 10.51   | 11.98        |
| Jupiter | E   | 2048-12-19T20:45:32.307 | 30.32 | -28.62  | 71491.8 | 9.08    | 10.35        |