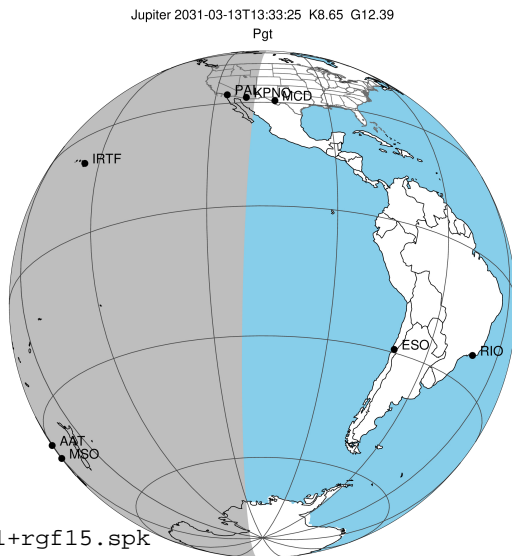


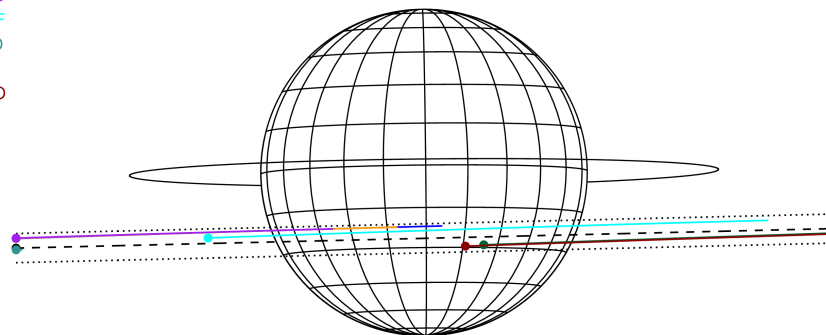
target : Jupiter
target radius (km) : 71492.00
C/A epoch : 2031-03-13T13:33:25.930
Event type : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Gaia source ID : 4068843761867766784
2Mass ID (if available) : 17463281-2251564

Jupiter 2031-03-13T13:33:25 K8.65 G12.39 Pgt

ICRS Star Coord at Epoch: 17h 46m 32.81573s -22:51:56.40315s
RUWE (>1.4 is poor) : 1.08
K magnitude : 8.650
G magnitude : 12.394
RP magnitude : 11.357
BP magnitude : 13.486
DUPflag : 0
Distance (au) : 5.297
f0 (km) : 0.00
g0 (km) : 0.00
skyplane vel. (km/s) : 15.52
Sun-Target sep (deg) : 85.44
Sun-Moon sep (deg) : 39.79
B (ring opening deg) : -2.63
PA of pole (deg) : 0.61
Pole direction: RA (deg): 268.05700
Dec (deg): 64.49651
C/A sky separation (") : 7.507
C/A sky separation (km) : 28841.5
NAIF SPICE kernels : RAJobs_U111+rgf15.spk



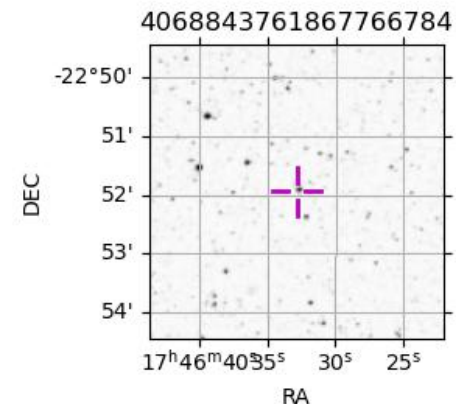
Earth
PAL
KPNO
MCD
IRTF
ESO
AAT
MSO



2031-03-13T13:33:25.9300 a: 17 46 32.8157 s: -22 51 56.403 C/A 7.517" PA 1.37 deg v_sky +15.52 km/s D 05.30 AU
Credit: Styled after SORA/Lucky Star

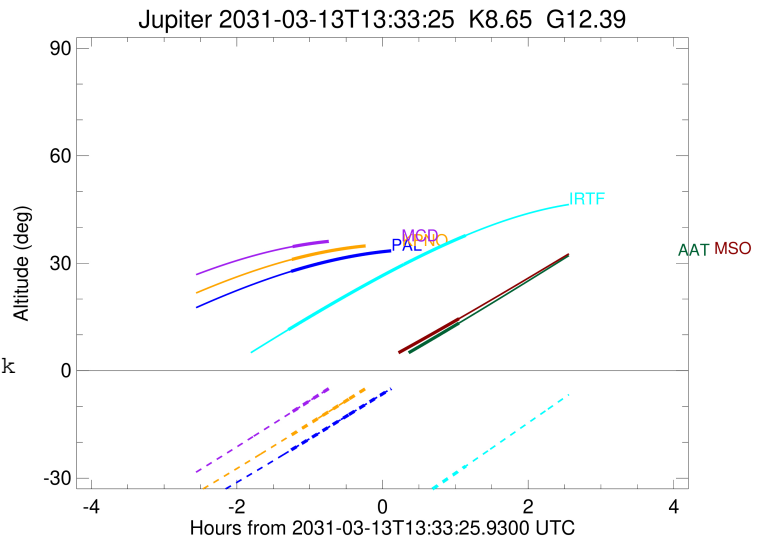
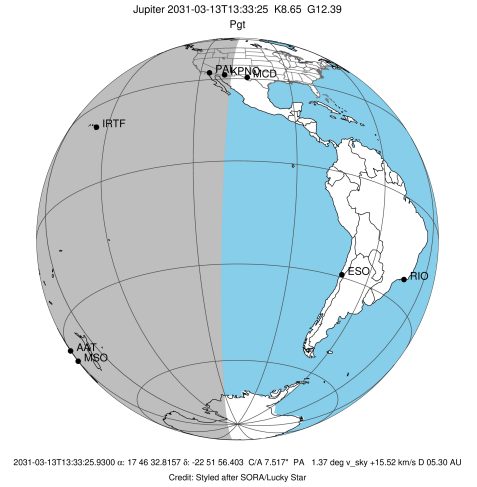
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+	MAR 13 12:18 - MAR 13 12:18	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAR 13 12:18 - MAR 13 12:18	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAR 13 12:19 - MAR 13 12:19	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAR 13 12:15 - MAR 13 14:42	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	+	MAR 13 14:36 - MAR 13 14:36	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAR 13 14:36 - MAR 13 14:36	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-03-13T13:32:23.370
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       : 4068843761867766784
2Mass ID (if available) : 17463281-2251564
ICRS Star Coord at Epoch: 17h 46m 32.81573s -22:51:56.40315s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 8.650
G magnitude           : 12.394
RP magnitude          : 11.357
BP magnitude          : 13.486
DUPflag              : 0
Distance (au)         : 5.297
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : 15.52
Sun-Target sep (deg) : 85.44
Sun-Moon sep (deg)   : 40.05
B (ring opening deg) : -2.63
PA of pole (deg)     : 0.61
Pole direction: RA (deg): 268.05700
Dec (deg): 64.49651
C/A sky separation (") : 6.144
C/A sky separation (km) : 23605.1
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
    
```

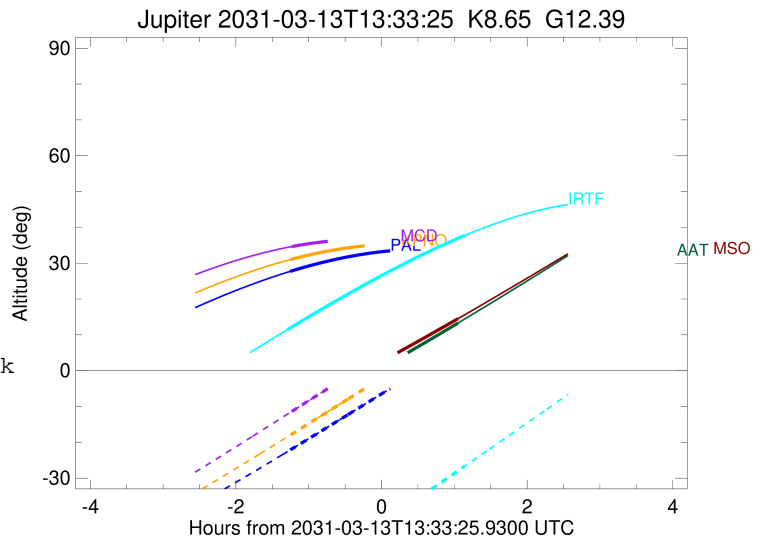
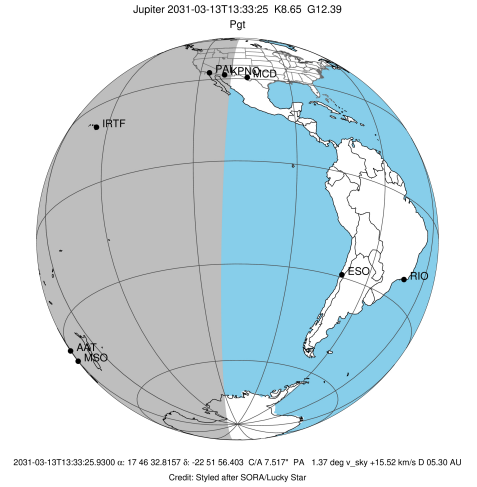


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-03-13T12:18:16.017	27.73	-22.12	71490.9	-20.23	-22.83
Jupiter	E	2031-03-13T14:46:45.017	33.33	8.81x	71491.1	-18.47	-20.88

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-03-13T13:32:53.730
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        : 4068843761867766784
2Mass ID (if available) : 17463281-2251564
ICRS Star Coord at Epoch: 17h 46m 32.81573s -22:51:56.40315s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 8.650
G magnitude           : 12.394
RP magnitude          : 11.357
BP magnitude          : 13.486
DUPflag              : 0
Distance (au)         : 5.297
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : 15.52
Sun-Target sep (deg) : 85.44
Sun-Moon sep (deg)   : 40.12
B (ring opening deg) : -2.63
PA of pole (deg)     : 0.61
Pole direction: RA (deg): 268.05700
Dec (deg): 64.49651
C/A sky separation (") : 6.158
C/A sky separation (km) : 23657.8
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
    
```

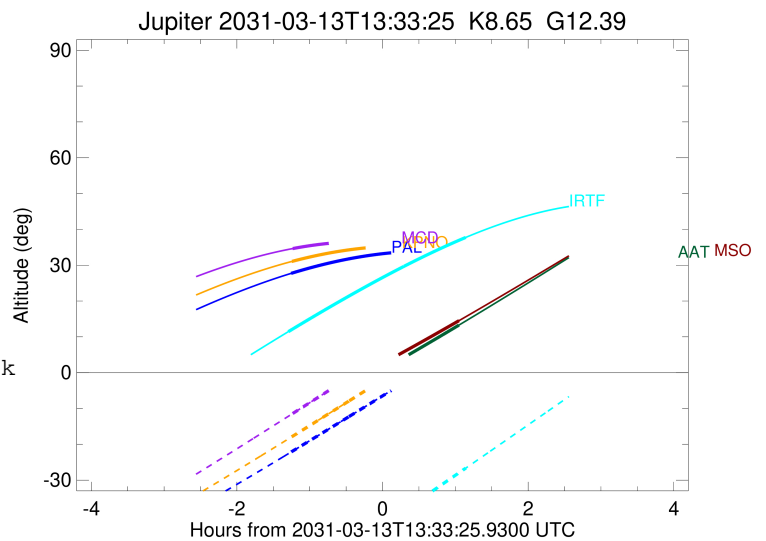
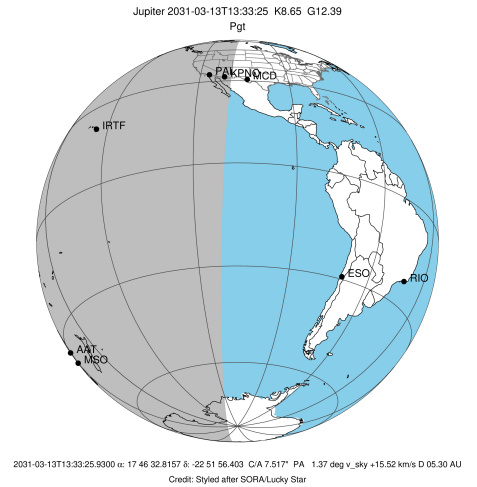


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-03-13T12:18:42.813	31.04	-17.88	71490.9	-20.23	-22.82
Jupiter	E	2031-03-13T14:47:15.622	33.69	13.53x	71491.0	-18.57	-20.99

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-03-13T13:33:39.310
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       : 4068843761867766784
2Mass ID (if available) : 17463281-2251564
ICRS Star Coord at Epoch: 17h 46m 32.81573s -22:51:56.40315s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 8.650
G magnitude           : 12.394
RP magnitude          : 11.357
BP magnitude          : 13.486
DUPflag              : 0
Distance (au)        : 5.297
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : 15.52
Sun-Target sep (deg) : 85.44
Sun-Moon sep (deg)   : 40.22
B (ring opening deg) : -2.63
PA of pole (deg)     : 0.61
Pole direction: RA (deg): 268.05700
Dec (deg): 64.49651
C/A sky separation (") : 6.175
C/A sky separation (km) : 23723.4
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
    
```

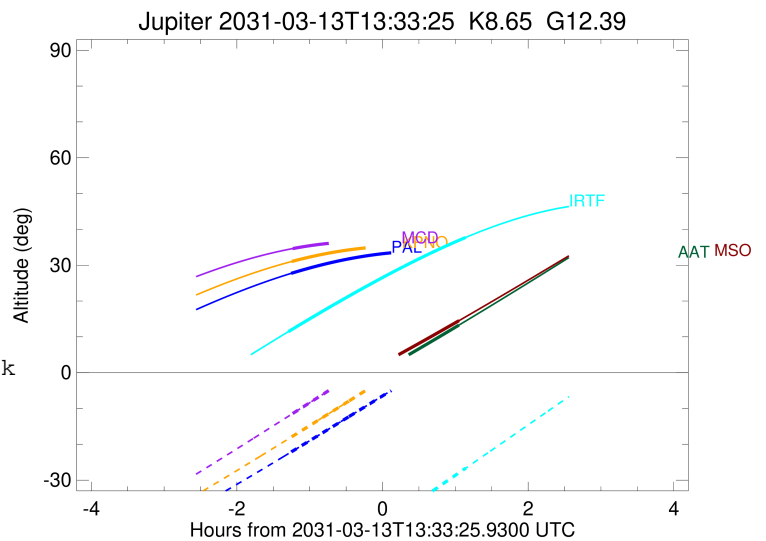
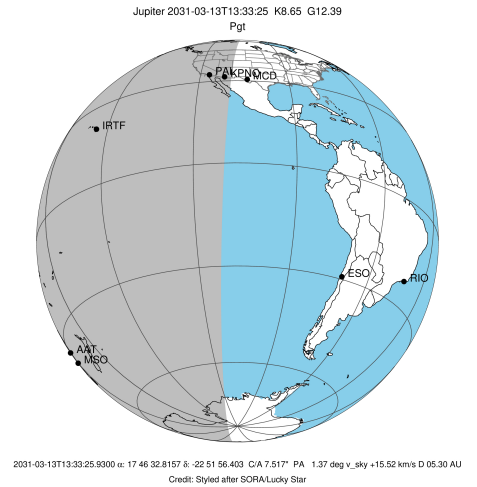


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-03-13T12:19:25.540	34.63	-11.40	71490.9	-20.21	-22.80
Jupiter	E	2031-03-13T14:47:59.025	32.63	20.29x	71491.0	-18.70	-21.14

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-03-13T13:28:41.920
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       : 4068843761867766784
2Mass ID (if available) : 17463281-2251564
ICRS Star Coord at Epoch: 17h 46m 32.81573s -22:51:56.40315s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 8.650
G magnitude           : 12.394
RP magnitude         : 11.357
BP magnitude         : 13.486
DUPflag              : 0
Distance (au)        : 5.297
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : 15.52
Sun-Target sep (deg) : 85.44
Sun-Moon sep (deg)   : 39.55
B (ring opening deg) : -2.63
PA of pole (deg)     : 0.61
Pole direction: RA (deg): 268.05700
Dec (deg): 64.49651
C/A sky separation (") : 6.620
C/A sky separation (km) : 25436.3
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
    
```

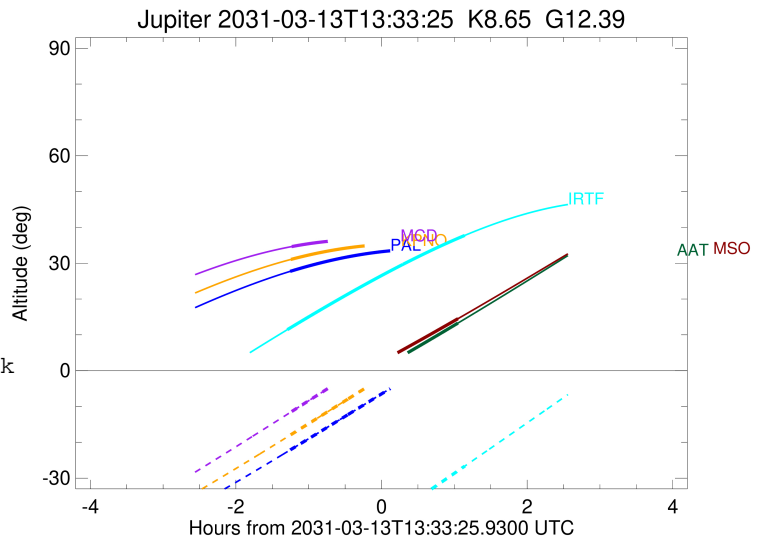
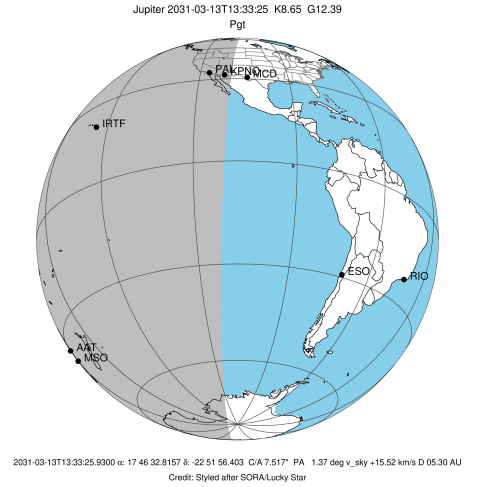


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-03-13T12:15:58.575	11.48	-59.43	71490.7	-22.13	-24.91
Jupiter	E	2031-03-13T14:42:02.802	37.75	-26.64	71490.9	-19.63	-22.16

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-03-13T13:28:10.820
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       : 4068843761867766784
2Mass ID (if available) : 17463281-2251564
ICRS Star Coord at Epoch: 17h 46m 32.81573s -22:51:56.40315s
RUWE (>1.4 is poor) : 1.08
K magnitude          : 8.650
G magnitude          : 12.394
RP magnitude         : 11.357
BP magnitude         : 13.486
DUPflag             : 0
Distance (au)        : 5.297
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : 15.52
Sun-Target sep (deg) : 85.44
Sun-Moon sep (deg)   : 39.16
B (ring opening deg) : -2.63
PA of pole (deg)     : 0.61
Pole direction: RA (deg): 268.05700
Dec (deg): 64.49651
C/A sky separation (") : 8.468
C/A sky separation (km) : 32533.7
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
    
```

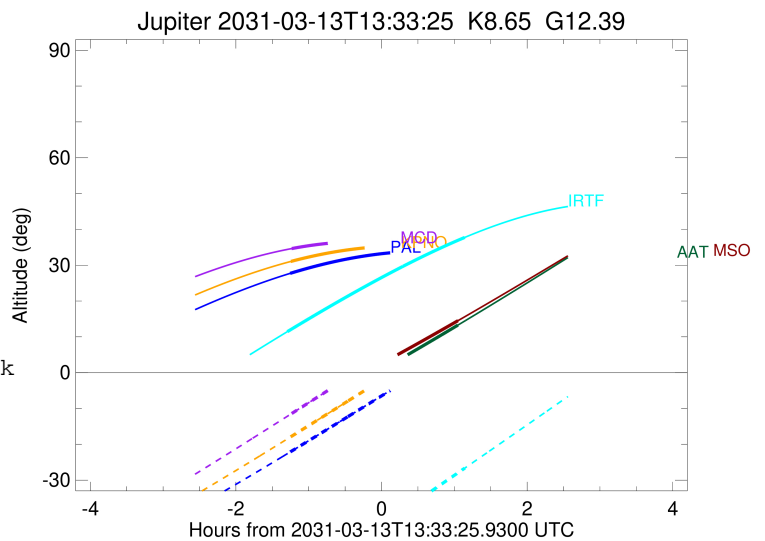
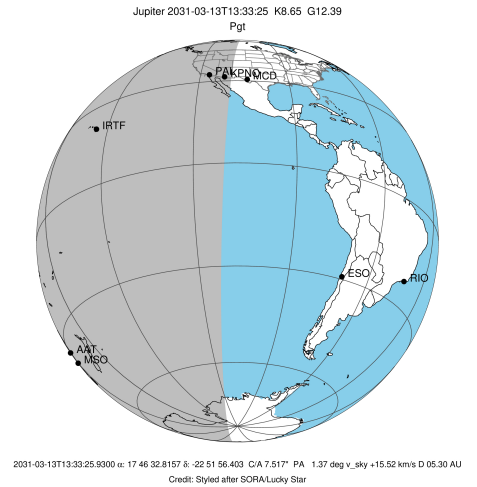


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-03-13T12:20:32.752	-12.52x	-46.71	71489.9	-28.30	-31.57
Jupiter	E	2031-03-13T14:36:24.177	13.27	-55.60	71490.2	-25.72	-28.81

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-03-13T13:28:25.880
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       : 4068843761867766784
2Mass ID (if available) : 17463281-2251564
ICRS Star Coord at Epoch: 17h 46m 32.81573s -22:51:56.40315s
RUWE (>1.4 is poor) : 1.08
K magnitude          : 8.650
G magnitude          : 12.394
RP magnitude         : 11.357
BP magnitude         : 13.486
DUPflag             : 0
Distance (au)        : 5.297
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : 15.52
Sun-Target sep (deg) : 85.44
Sun-Moon sep (deg)   : 39.21
B (ring opening deg) : -2.63
PA of pole (deg)     : 0.61
Pole direction: RA (deg): 268.05700
Dec (deg): 64.49651
C/A sky separation (") : 8.550
C/A sky separation (km) : 32848.8
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	2031-03-13T12:20:56.229	-10.06x	-43.73	71489.8	-28.56	-31.84
Jupiter	E	2031-03-13T14:36:29.353	14.52	-51.63	71490.2	-26.03	-29.14