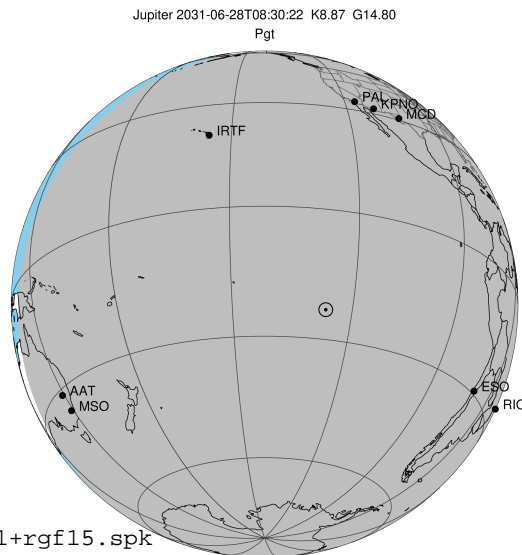


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-28T08:30:22.690
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4111726124093505664
 2Mass ID (if available) : 17252615-2245423

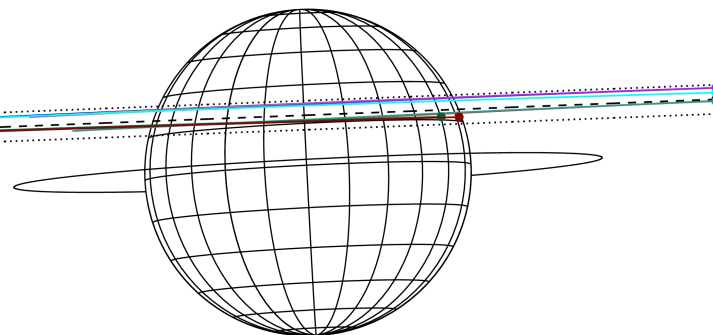
Jupiter 2031-06-28T08:30:22 K8.87 G14.80 Pgt

ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s

RUWE (>1.4 is poor) : 1.10
 K magnitude : 8.874
 G magnitude : 14.803
 RP magnitude : 13.372
 BP magnitude : 17.391
 DUPflag : 0
 Distance (au) : 4.284
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -15.61
 Sun-Target sep (deg) : 165.98
 Sun-Moon sep (deg) : 71.98
 B (ring opening deg) : -2.59
 PA of pole (deg) : 2.88
 Pole direction: RA (deg): 268.05691
 Dec (deg): 64.49651
 C/A sky separation (") : 8.078
 C/A sky separation (km) : 25100.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 RIO
 ESO
 AAT
 MSO

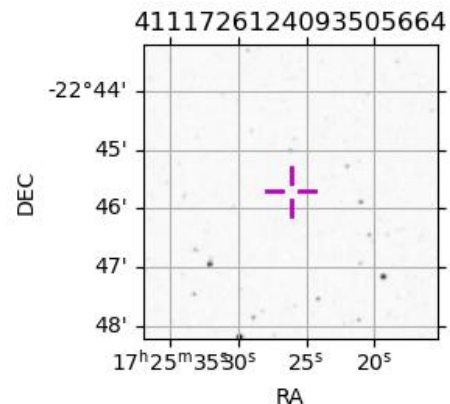


2031-06-28T08:30:22.6900 at: 17 25 26.1502 s: -22 45 42.652 s: C/A 8.066" PA 182.22 deg v_sky -15.61 km/s D 04.28 AU

Credit: Styled after SORA/Lucky Star

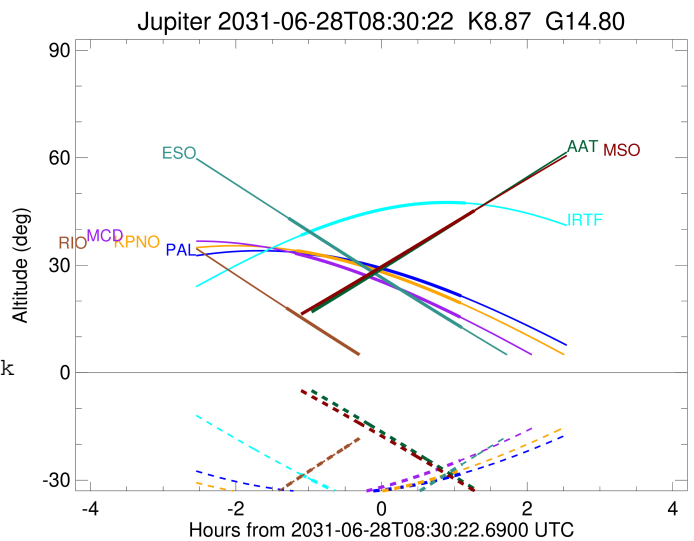
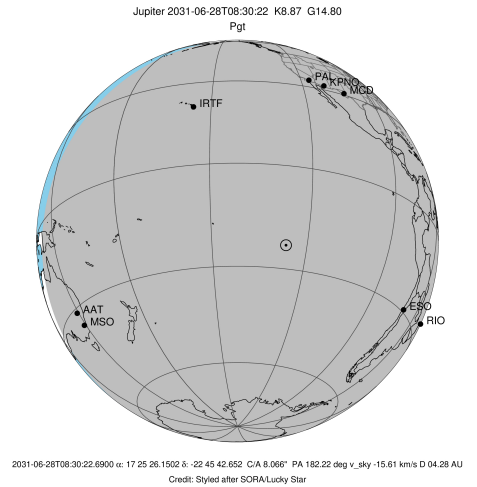
Observable events with sun below -5 deg and altitude above 5 deg

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	+ +	JUN 28 07:20 - JUN 28 09:36	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUN 28 07:20 - JUN 28 09:35	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUN 28 07:19 - JUN 28 09:35	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUN 28 07:24 - JUN 28 09:39	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUN 28 07:12 - JUN 28 07:12	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUN 28 07:13 - JUN 28 09:36	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	JUN 28 09:46 - JUN 28 09:46	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	JUN 28 09:46 - JUN 28 09:46	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T08:28:18.060
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      : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude          : 8.874
G magnitude          : 14.803
RP magnitude         : 13.372
BP magnitude         : 17.391
DUPflag             : 0
Distance (au)       : 4.284
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)  : 72.52
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 9.742
C/A sky separation (km) : 30269.4
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
    
```

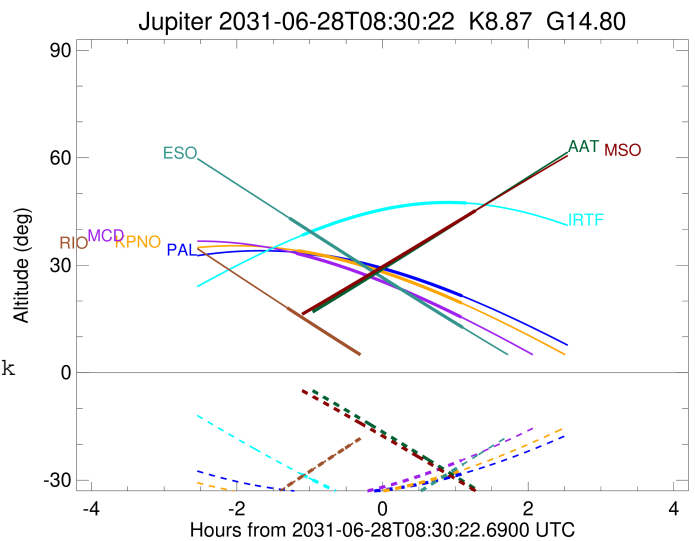
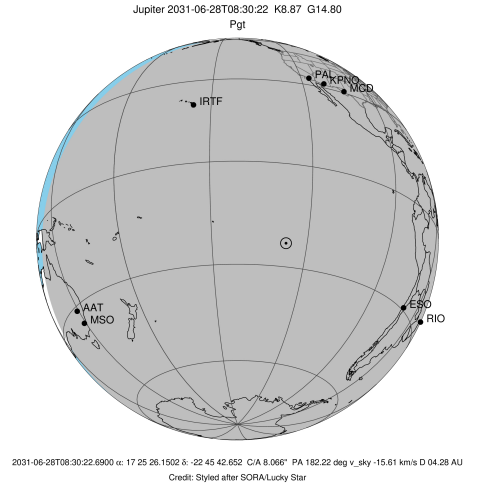


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T07:20:44.914	33.55	-33.10	71490.4	24.46	27.45
Jupiter	E	2031-06-28T09:36:04.250	21.40	-28.22	71490.3	25.43	28.49

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T08:27:49.360
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       : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude          : 8.874
G magnitude          : 14.803
RP magnitude         : 13.372
BP magnitude         : 17.391
DUPflag             : 0
Distance (au)        : 4.284
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)   : 72.53
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 9.691
C/A sky separation (km): 30109.9
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
    
```

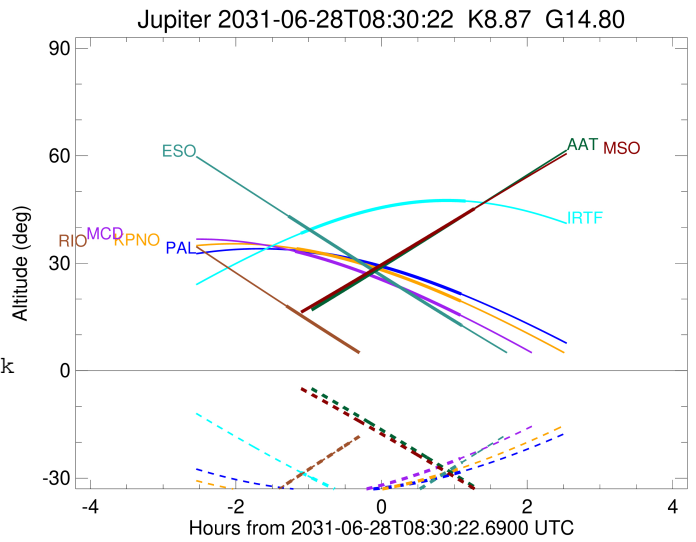
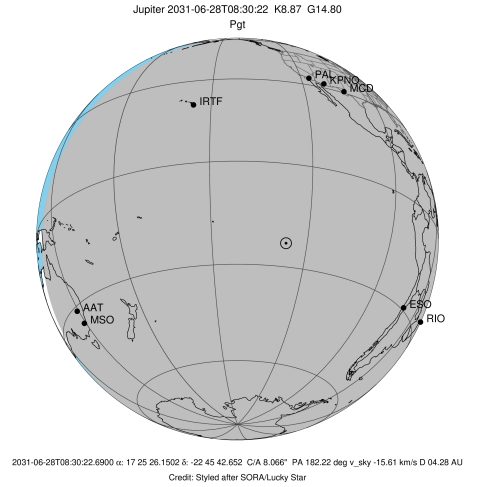


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T07:20:10.343	34.06	-34.89	71490.4	24.37	27.35
Jupiter	E	2031-06-28T09:35:43.983	19.41	-27.23	71490.3	25.24	28.29

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T08:27:10.710
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       : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude           : 8.874
G magnitude           : 14.803
RP magnitude         : 13.372
BP magnitude         : 17.391
DUPflag              : 0
Distance (au)        : 4.284
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)   : 72.52
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 9.621
C/A sky separation (km): 29892.8
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
    
```

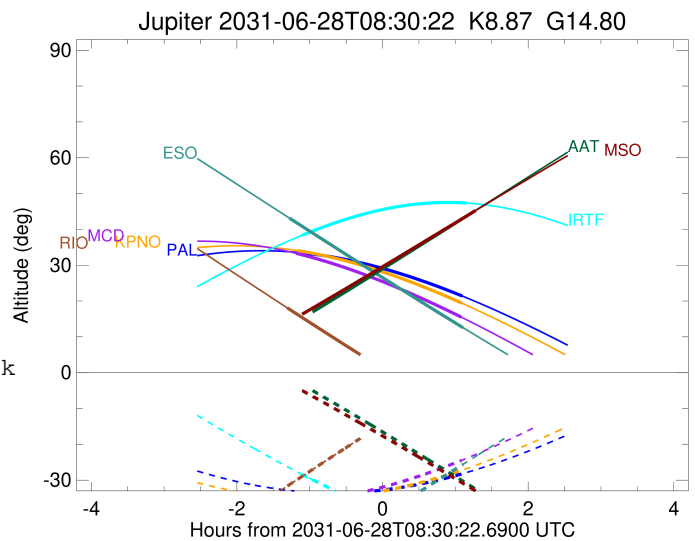
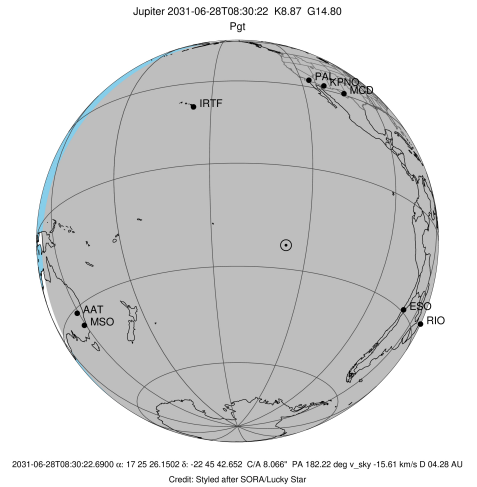


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T07:19:21.465	33.30	-36.01	71490.5	24.25	27.21
Jupiter	E	2031-06-28T09:35:19.101	15.50	-24.50	71490.4	24.99	28.01

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-28T08:31:53.100
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       : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude           : 8.874
G magnitude           : 14.803
RP magnitude         : 13.372
BP magnitude         : 17.391
DUPflag              : 0
Distance (au)        : 4.284
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)   : 72.57
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 9.430
C/A sky separation (km): 29298.4
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
    
```

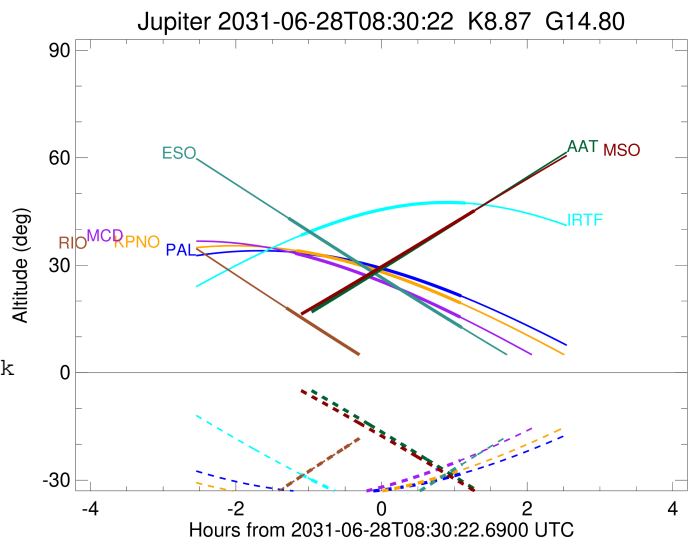
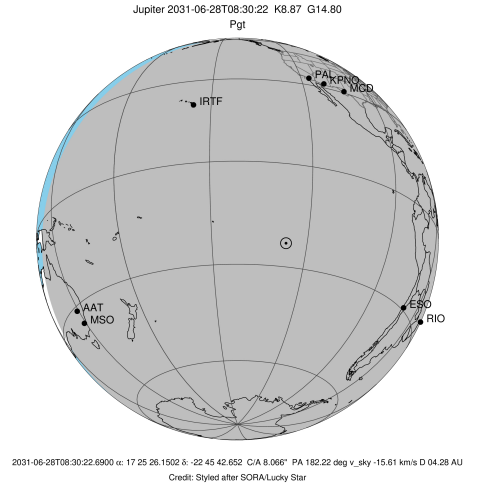


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T07:23:59.594	38.34	-28.38	71490.6	23.23	26.11
Jupiter	E	2031-06-28T09:39:40.431	47.34	-45.62	71490.4	24.93	27.95

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T08:24:19.210
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : RIO
Location             : Rio de Janeiro
Latitude (deg)       : -22.89506
E. Longitude (deg)   : 316.77708
Altitude (km)        : 0.033
Gaia source ID       : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude          : 8.874
G magnitude          : 14.803
RP magnitude         : 13.372
BP magnitude         : 17.391
DUPflag             : 0
Distance (au)        : 4.284
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)   : 72.26
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 7.321
C/A sky separation (km): 22747.7
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
    
```

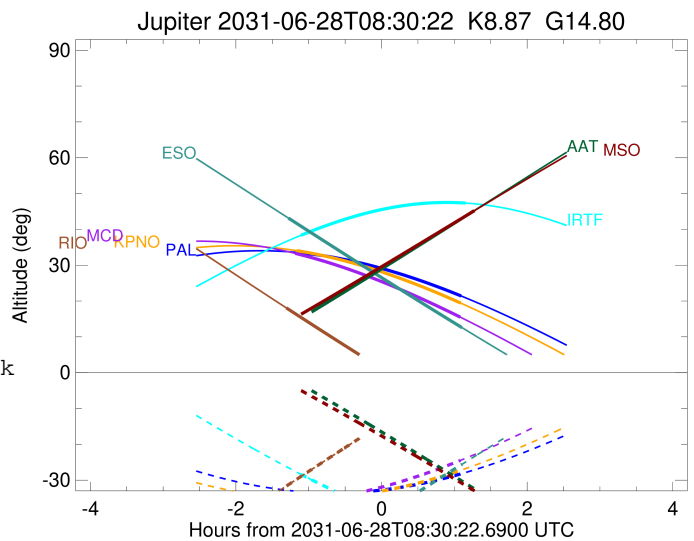
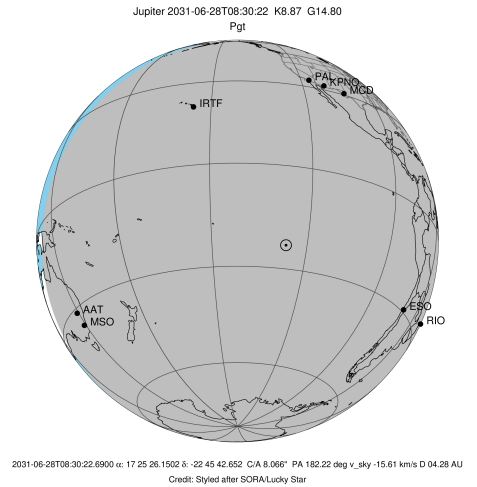


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T07:12:04.501	18.05	-31.63	71491.1	18.47	20.89
Jupiter	E	2031-06-28T09:37:12.627	-12.52x	-0.11x	71491.1	18.59	21.02

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T08:24:56.440
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      : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude          : 8.874
G magnitude          : 14.803
RP magnitude         : 13.372
BP magnitude         : 17.391
DUPflag             : 0
Distance (au)       : 4.284
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)  : 72.61
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 7.457
C/A sky separation (km) : 23170.0
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
    
```

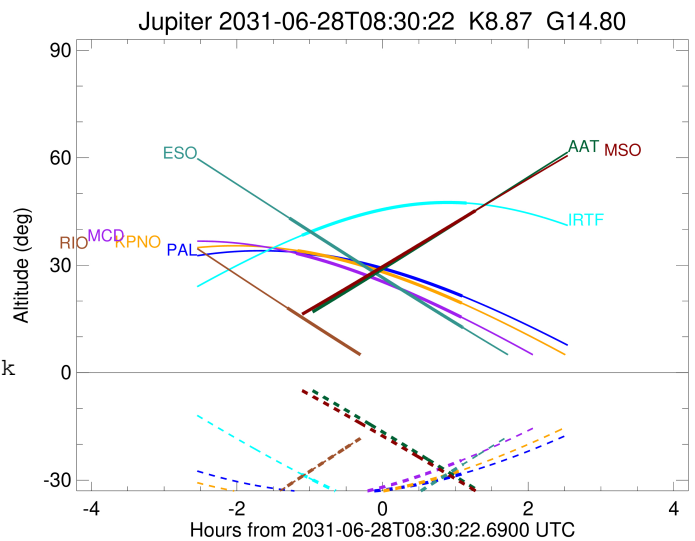
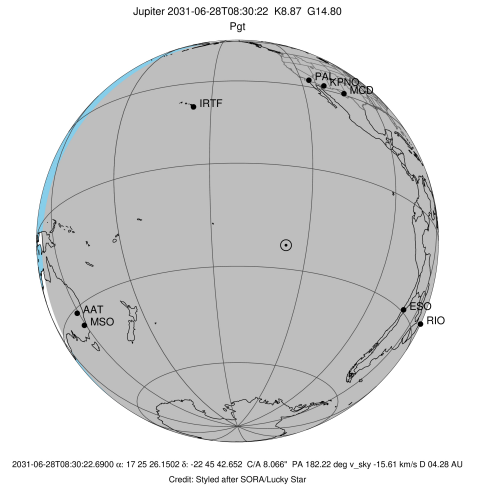


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T07:13:39.507	43.15	-56.55	71491.1	18.70	21.14
Jupiter	E	2031-06-28T09:36:46.693	12.56	-25.57	71491.0	19.00	21.47

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T08:35:27.080
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       : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude           : 8.874
G magnitude           : 14.803
RP magnitude         : 13.372
BP magnitude         : 17.391
DUPflag              : 0
Distance (au)        : 4.284
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)   : 72.18
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 7.303
C/A sky separation (km) : 22691.6
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
    
```

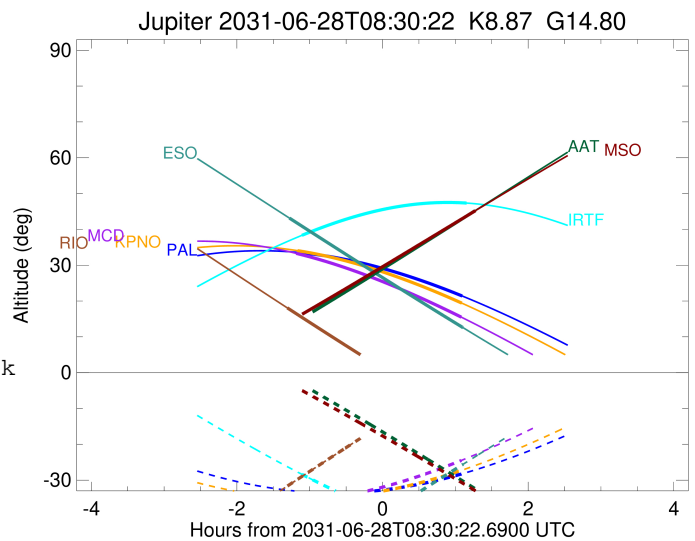
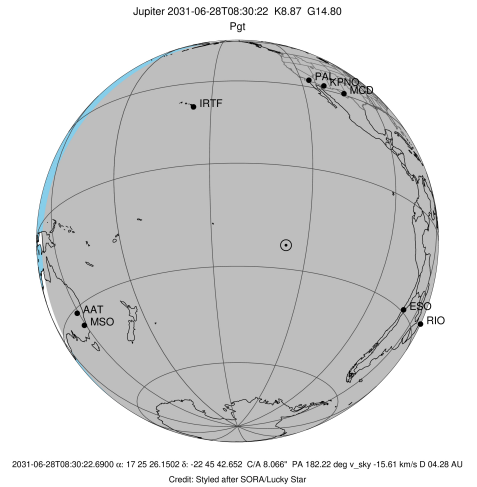


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T07:23:29.074	15.03	-3.20x	71491.2	17.27	19.55
Jupiter	E	2031-06-28T09:46:55.763	45.27	-32.43	71491.0	19.65	22.19


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-28T08:35:12.690
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        : 4111726124093505664
2Mass ID (if available) : 17252615-2245423
ICRS Star Coord at Epoch: 17h 25m 26.15019s -22:45:42.65243s
RUWE (>1.4 is poor) : 1.10
K magnitude           : 8.874
G magnitude           : 14.803
RP magnitude          : 13.372
BP magnitude          : 17.391
DUPflag              : 0
Distance (au)         : 4.284
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.61
Sun-Target sep (deg) : 165.98
Sun-Moon sep (deg)   : 72.20
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.88
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 7.182
C/A sky separation (km): 22314.2
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	2031-06-28T07:23:05.424	16.11	-4.80x	71491.2	16.97	19.23
Jupiter	E	2031-06-28T09:46:51.865	45.20	-32.94	71491.0	19.31	21.81