

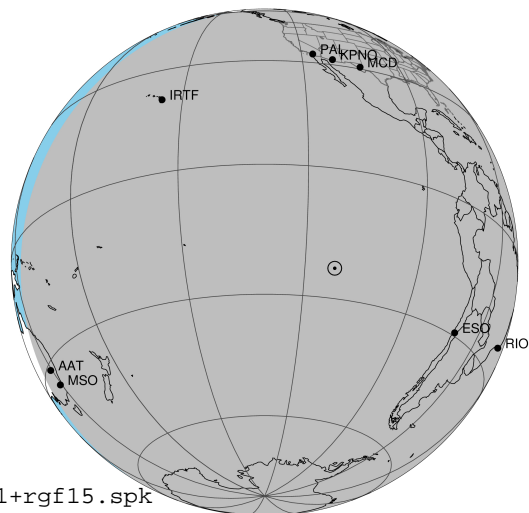
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-30T07:33:30.890
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4111734374771451264
 2Mass ID (if available) : 17242520-2245273

Jupiter 2031-06-30T07:33:30 K8.17 G13.60 Pgt

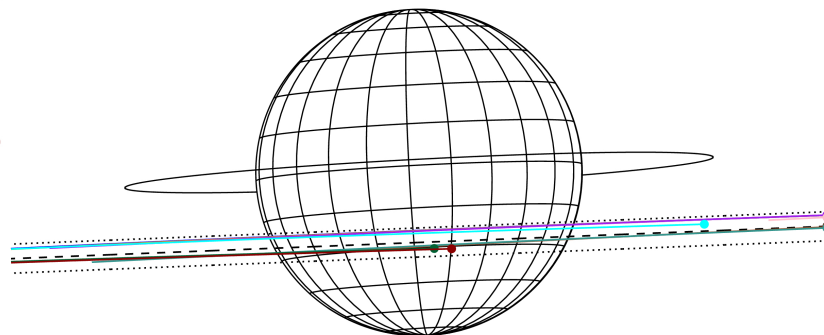
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.174
 G magnitude : 13.599
 RP magnitude : 12.226
 BP magnitude : 15.903
 DUPflag : 0
 Distance (au) : 4.291
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -15.33
 Sun-Target sep (deg) : 163.88
 Sun-Moon sep (deg) : 45.49
 B (ring opening deg) : -2.58
 PA of pole (deg) : 2.99
 Pole direction: RA (deg): 268.05691
 Dec (deg): 64.49651
 C/A sky separation (") : 9.841
 C/A sky separation (km) : 30626.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-30T07:33:30 K8.17 G13.60 Pgt



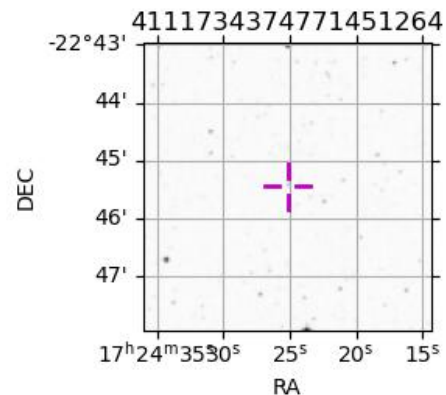
Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 MSO



2031-06-30T07:33:30.8900 a: 17 24 25.20333 s: -22 45 27.509 C/A 9.852" PA 2.27 deg v_sky -15.33 km/s D 04.29 AU
 Credit: Styled after SORA/Lucky Star

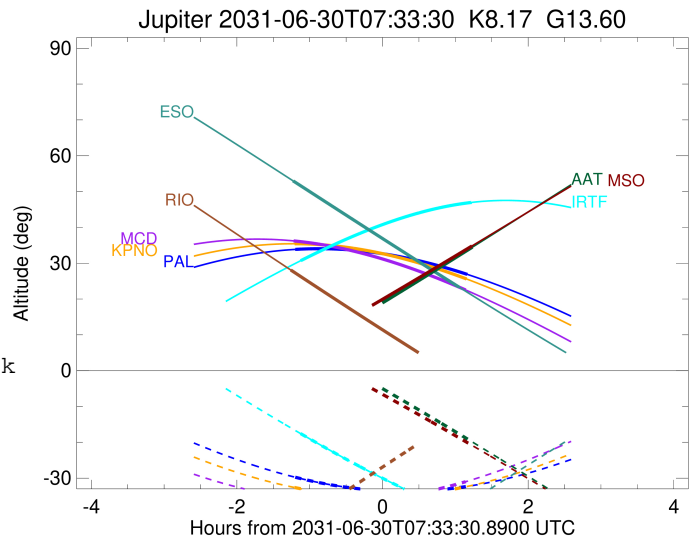
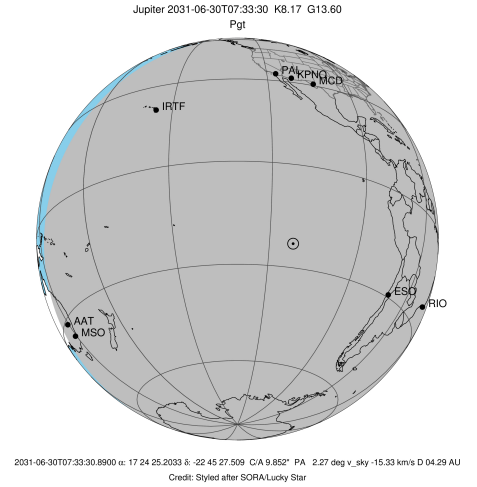
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+ +	JUN 30 06:21 - JUN 30 08:43	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUN 30 06:21 - JUN 30 08:42	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUN 30 06:20 - JUN 30 08:42	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUN 30 06:26 - JUN 30 08:46	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUN 30 06:17 - JUN 30 06:17	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUN 30 06:19 - JUN 30 08:36	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	JUN 30 08:47 - JUN 30 08:47	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	JUN 30 08:47 - JUN 30 08:47	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-30T07:32:23.970
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      : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 8.174
G magnitude          : 13.599
RP magnitude         : 12.226
BP magnitude         : 15.903
DUPflag             : 0
Distance (au)       : 4.291
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg) : 163.88
Sun-Moon sep (deg)  : 46.00
B (ring opening deg) : -2.58
PA of pole (deg)    : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 8.148
C/A sky separation (km): 25357.2
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
    
```

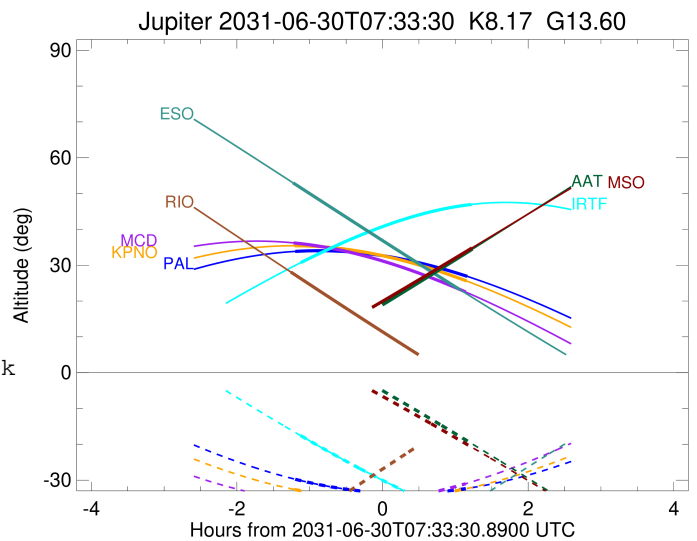
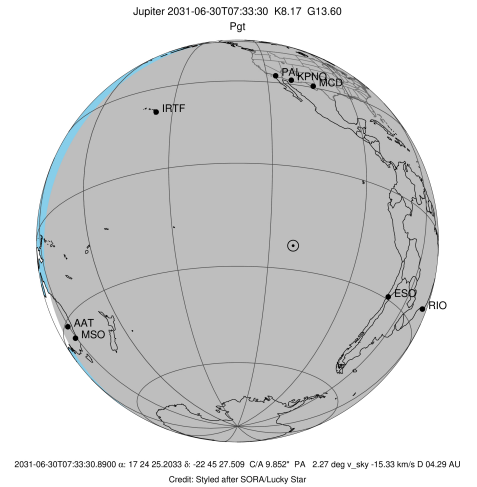


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-30T06:21:34.905	33.84	-29.75	71490.8	-21.48	-24.20
Jupiter	E	2031-06-30T08:43:21.718	26.88	-32.30	71490.9	-20.19	-22.79

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-30T07:31:50.520
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      : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor) : 1.04
K magnitude         : 8.174
G magnitude         : 13.599
RP magnitude        : 12.226
BP magnitude        : 15.903
DUPflag            : 0
Distance (au)       : 4.291
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg) : 163.88
Sun-Moon sep (deg)  : 46.05
B (ring opening deg) : -2.58
PA of pole (deg)    : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 8.186
C/A sky separation (km) : 25477.4
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
    
```

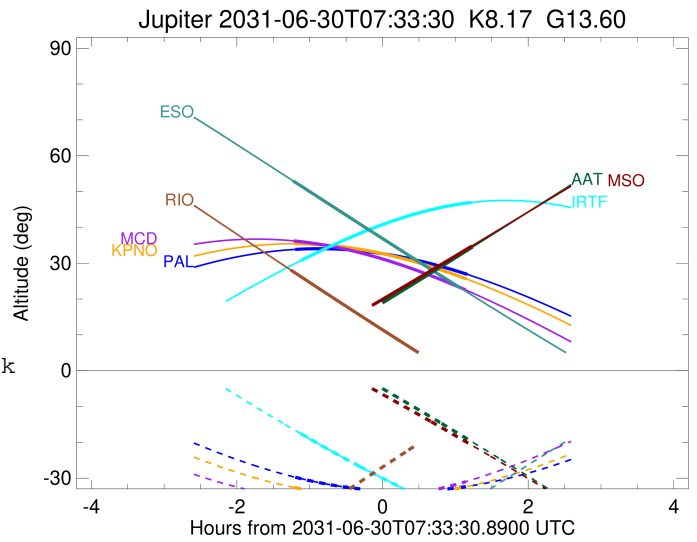
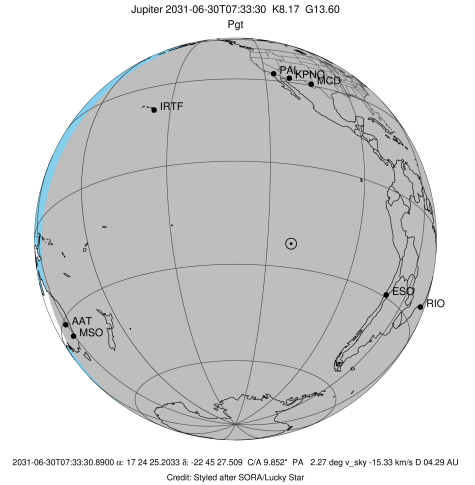


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-30T06:21:05.102	35.43	-32.62	71490.8	-21.54	-24.26
Jupiter	E	2031-06-30T08:42:47.593	25.59	-32.36	71490.9	-20.35	-22.95

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-30T07:31:03.620
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       : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 8.174
G magnitude           : 13.599
RP magnitude          : 12.226
BP magnitude          : 15.903
DUPflag              : 0
Distance (au)        : 4.291
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg) : 163.88
Sun-Moon sep (deg)  : 46.11
B (ring opening deg) : -2.58
PA of pole (deg)    : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 8.238
C/A sky separation (km): 25639.2
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
    
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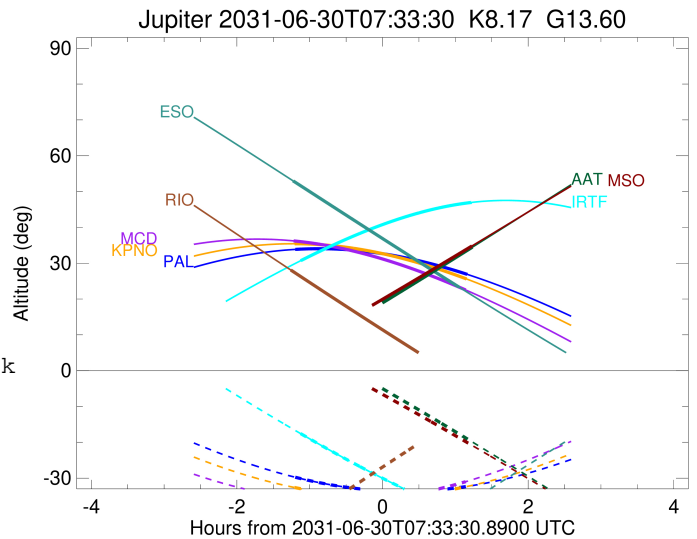
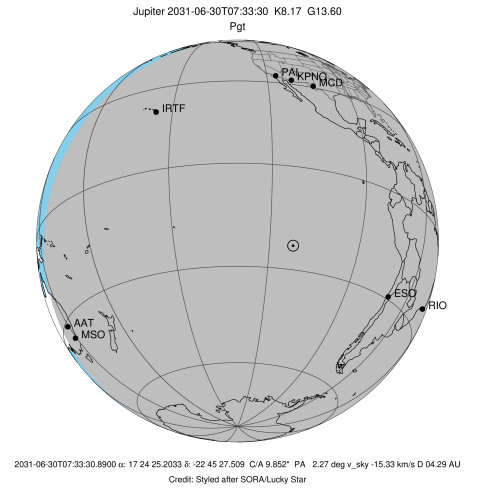


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-30T06:20:20.723	36.22	-35.50	71490.8	-21.60	-24.33
Jupiter	E	2031-06-30T08:42:02.363	22.52	-30.99	71490.9	-20.55	-23.18

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-30T07:36:33.790
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       : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 8.174
G magnitude           : 13.599
RP magnitude         : 12.226
BP magnitude         : 15.903
DUPflag              : 0
Distance (au)        : 4.291
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg) : 163.88
Sun-Moon sep (deg)   : 45.67
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 8.555
C/A sky separation (km): 26625.3
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
    
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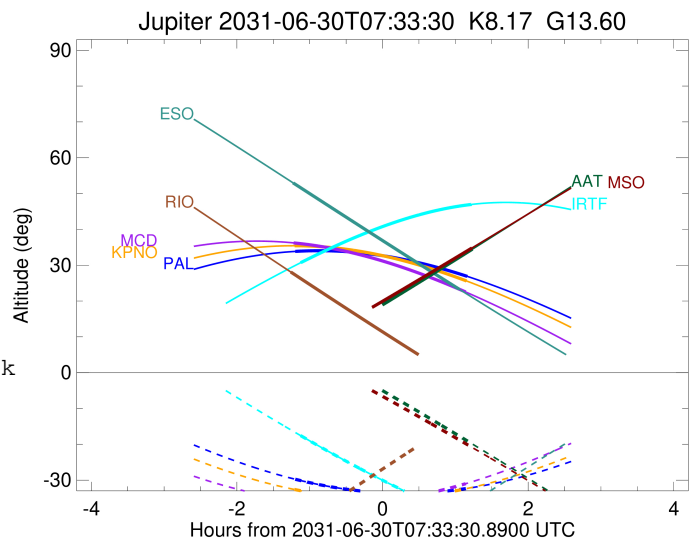
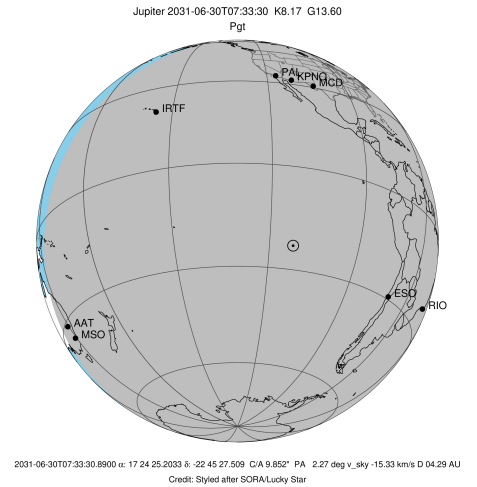


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-30T06:26:08.929	30.70	-17.59	71490.6	-22.95	-25.80
Jupiter	E	2031-06-30T08:46:44.849	46.95	-40.82	71490.8	-20.90	-23.57

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-30T07:26:41.640
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      : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 8.174
G magnitude          : 13.599
RP magnitude         : 12.226
BP magnitude         : 15.903
DUPflag             : 0
Distance (au)       : 4.291
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg) : 163.88
Sun-Moon sep (deg)  : 46.25
B (ring opening deg) : -2.58
PA of pole (deg)    : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 10.440
C/A sky separation (km): 32491.3
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
    
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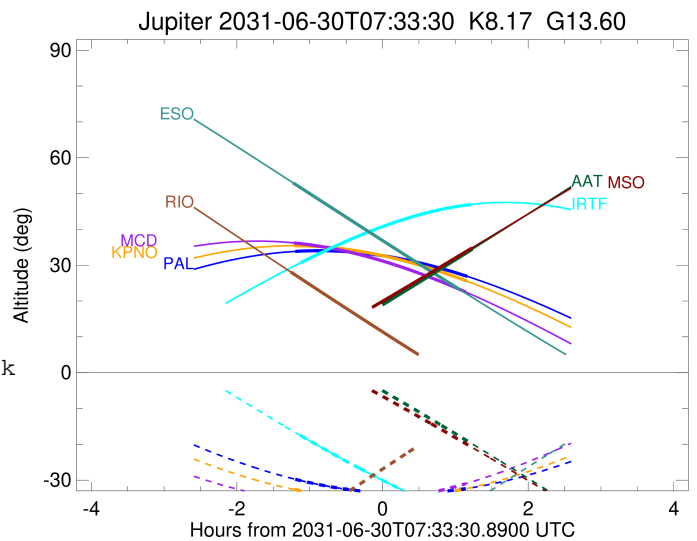
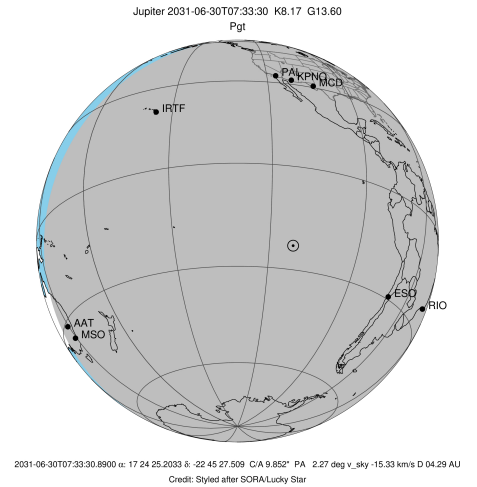


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-30T06:17:59.080	28.08	-43.87	71490.1	-27.14	-30.32
Jupiter	E	2031-06-30T08:36:01.050	-1.91x	-13.19	71490.1	-26.91	-30.08

```

target                : Jupiter
target radius (km)    : 71492.00
C/A epoch             : 2031-06-30T07:28:02.420
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        : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor)  : 1.04
K magnitude           : 8.174
G magnitude           : 13.599
RP magnitude          : 12.226
BP magnitude          : 15.903
DUPflag              : 0
Distance (au)         : 4.291
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg)  : 163.88
Sun-Moon sep (deg)    : 46.42
B (ring opening deg)  : -2.58
PA of pole (deg)      : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 10.335
C/A sky separation (km) : 32166.4
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
    
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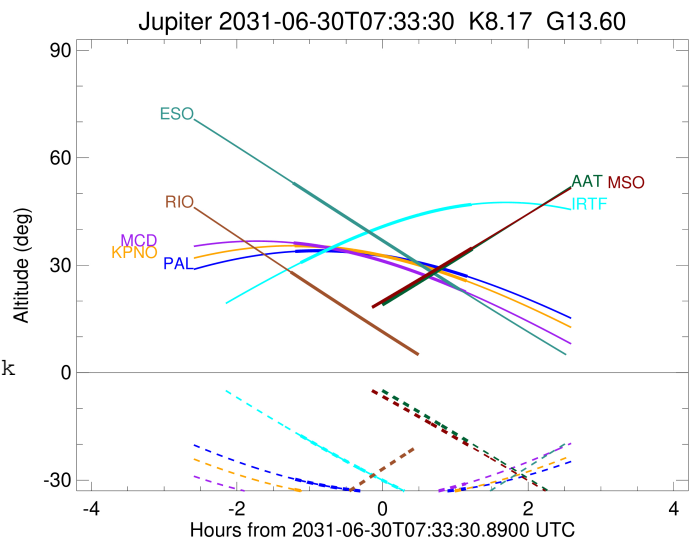
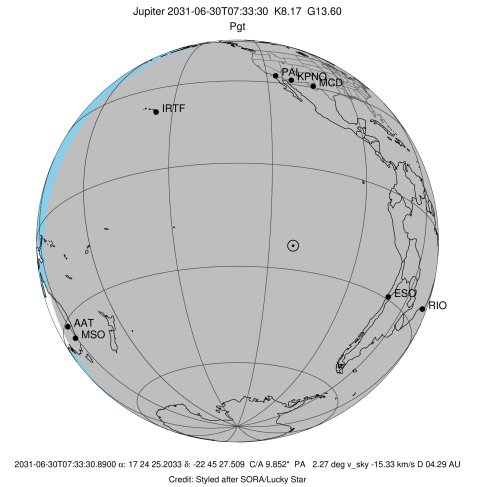


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-30T06:19:53.088	52.97	-68.28	71490.1	-27.03	-30.21
Jupiter	E	2031-06-30T08:36:40.636	23.30	-38.51	71490.2	-26.50	-29.65


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-30T07:39:36.110
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      : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 8.174
G magnitude          : 13.599
RP magnitude         : 12.226
BP magnitude         : 15.903
DUPflag             : 0
Distance (au)       : 4.291
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg) : 163.88
Sun-Moon sep (deg)  : 45.13
B (ring opening deg) : -2.58
PA of pole (deg)    : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 10.754
C/A sky separation (km) : 33469.8
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
    
```

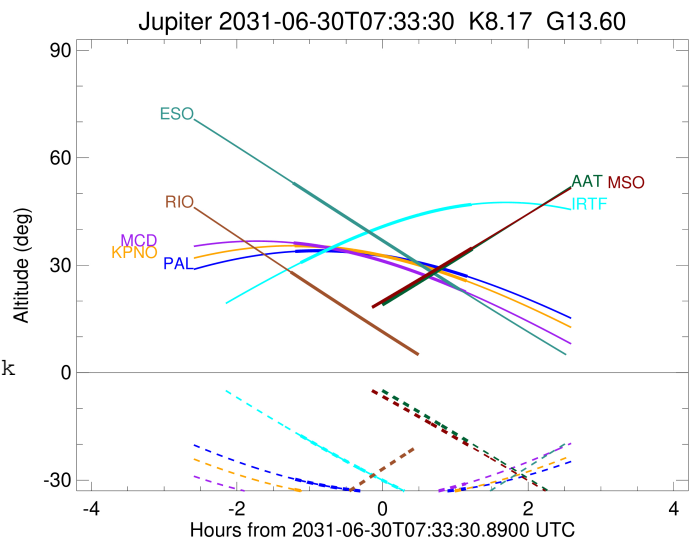
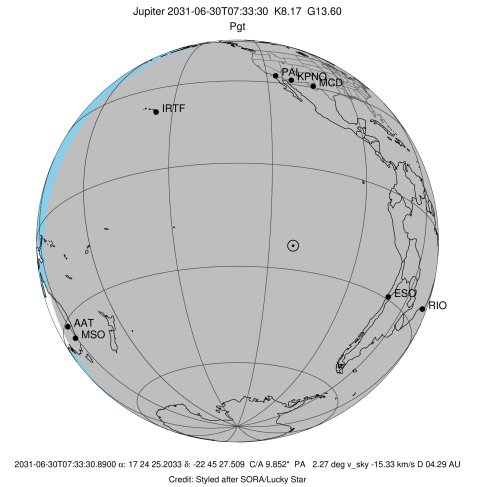


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-30T06:30:59.092	6.25	6.78x	71489.8	-29.17	-32.50
Jupiter	E	2031-06-30T08:47:43.299	34.50	-19.94	71490.2	-26.62	-29.77


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-30T07:39:18.830
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        : 4111734374771451264
2Mass ID (if available) : 17242520-2245273
ICRS Star Coord at Epoch: 17h 24m 25.20333s -22:45:27.50895s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 8.174
G magnitude           : 13.599
RP magnitude          : 12.226
BP magnitude          : 15.903
DUPflag              : 0
Distance (au)         : 4.291
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.33
Sun-Target sep (deg) : 163.88
Sun-Moon sep (deg)   : 45.17
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.99
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 10.869
C/A sky separation (km): 33828.0
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	2031-06-30T06:30:53.964	7.74	4.67x	71489.8	-29.47	-32.81
Jupiter	E	2031-06-30T08:47:15.428	34.81	-20.84	71490.1	-26.97	-30.14