

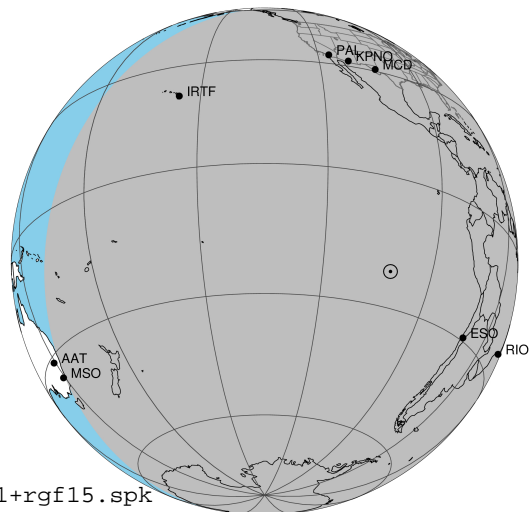
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-07-13T06:54:19.680
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4114694122652255104
 2Mass ID (if available) : 17182129-2241472

Jupiter 2031-07-13T06:54:19 K8.75 G14.00 Pgt

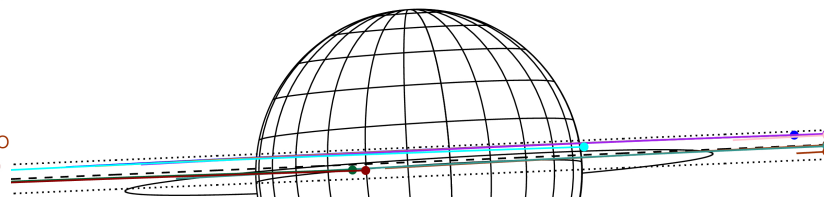
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s

RUWE (>1.4 is poor) : 1.12
 K magnitude : 8.746
 G magnitude : 14.002
 RP magnitude : 12.609
 BP magnitude : 16.356
 DUPflag : 0
 Distance (au) : 4.365
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -12.62
 Sun-Target sep (deg) : 150.12
 Sun-Moon sep (deg) : 140.82
 B (ring opening deg) : -2.56
 PA of pole (deg) : 3.64
 Pole direction: RA (deg): 268.05690
 Dec (deg): 64.49651
 C/A sky separation (") : 1.472
 C/A sky separation (km) : 4660.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-07-13T06:54:19 K8.75 G14.00
 Pgt



Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO

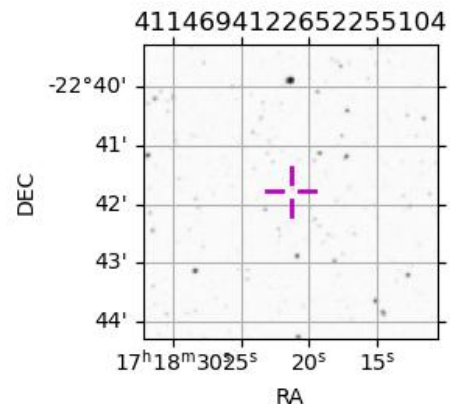


2031-07-13T06:54:19.6800 at: 17 18 21.2873 s: -22 41 47.239 C/A 1.460" PA 182.41 deg v_sky -12.62 km/s D 04.37 AU

Credit: Styled after SORA/Lucky Star

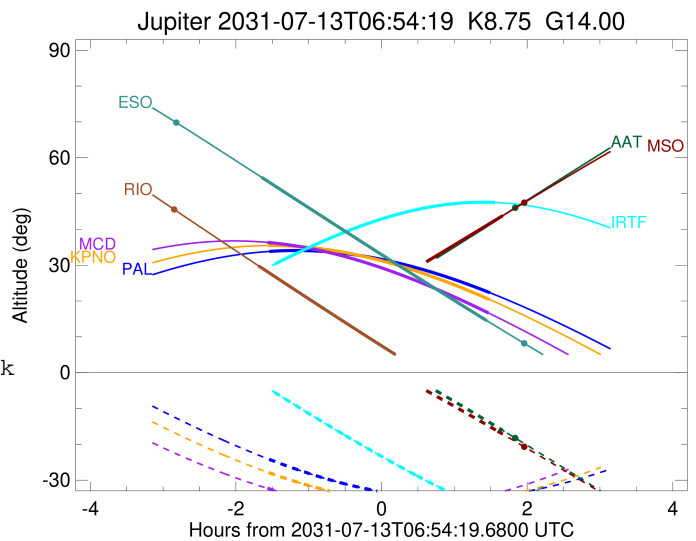
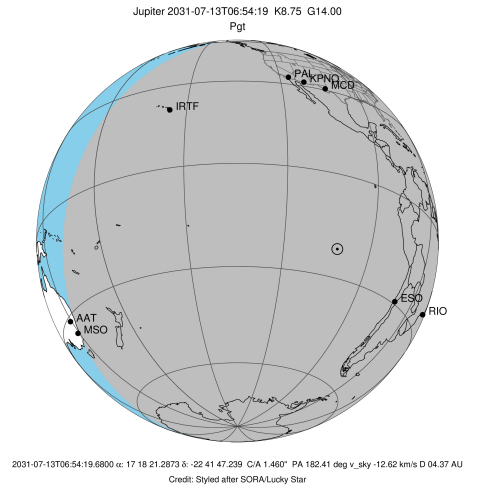
Observable events with sun below -5 deg and altitude above 5 deg

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	+ +	JUL 13 05:21 - JUL 13 08:23	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUL 13 05:21 - JUL 13 08:23	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUL 13 05:20 - JUL 13 08:22	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUL 13 05:26 - JUL 13 08:27	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUL 13 05:12 - JUL 13 05:12	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUL 13 05:15 - JUL 13 08:21	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	JUL 13 08:34 - JUL 13 08:34	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	JUL 13 08:34 - JUL 13 08:34	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-13T06:52:32.740
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      : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude          : 8.746
G magnitude          : 14.002
RP magnitude         : 12.609
BP magnitude         : 16.356
DUPflag             : 0
Distance (au)       : 4.365
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg) : 150.12
Sun-Moon sep (deg)  : 141.29
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 3.128
C/A sky separation (km): 9903.5
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
    
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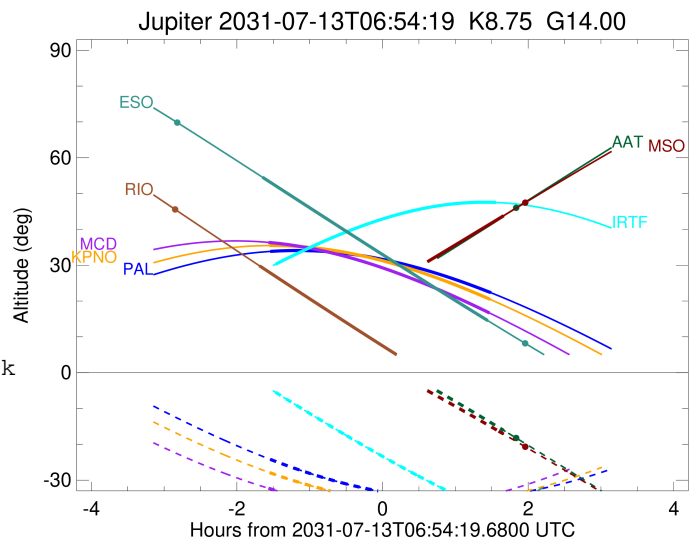
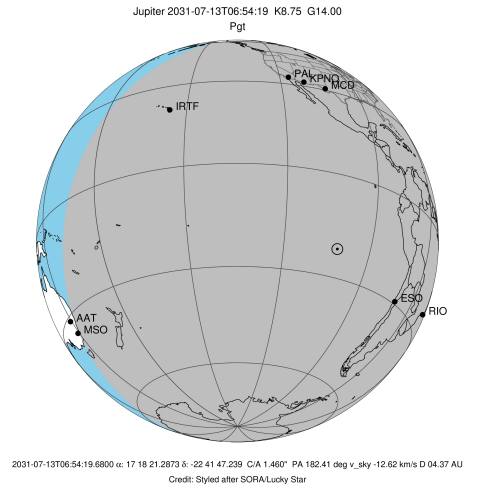


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-13T05:21:50.266	33.84	-24.20	71491.9	6.73	7.69
Jupiter	E	2031-07-13T08:23:39.509	22.32	-34.52	71491.8	8.92	10.17

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-13T06:51:55.130
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        : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 8.746
G magnitude           : 14.002
RP magnitude          : 12.609
BP magnitude          : 16.356
DUPflag              : 0
Distance (au)         : 4.365
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg)  : 150.12
Sun-Moon sep (deg)    : 141.34
B (ring opening deg) : -2.56
PA of pole (deg)      : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 3.086
C/A sky separation (km) : 9770.4
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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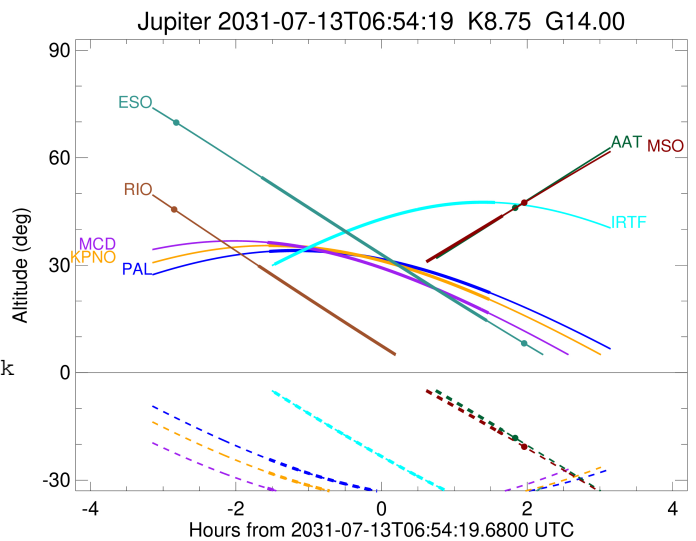
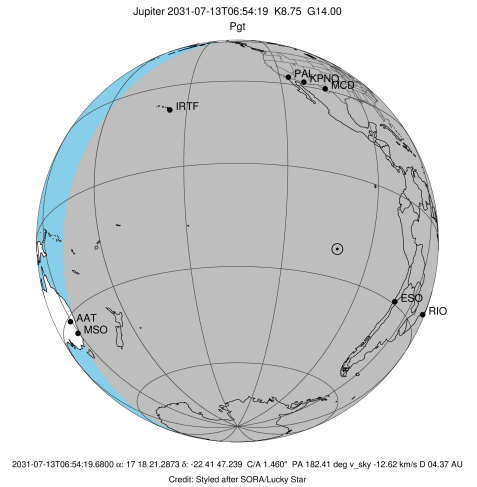


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-13T05:21:11.915	35.48	-27.88	71491.9	6.69	7.63
Jupiter	E	2031-07-13T08:23:08.416	20.44	-35.01	71491.8	8.75	9.98

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-13T06:51:03.150
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        : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 8.746
G magnitude           : 14.002
RP magnitude          : 12.609
BP magnitude          : 16.356
DUPflag              : 0
Distance (au)         : 4.365
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg) : 150.12
Sun-Moon sep (deg)   : 141.40
B (ring opening deg) : -2.56
PA of pole (deg)     : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 3.029
C/A sky separation (km) : 9590.8
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
    
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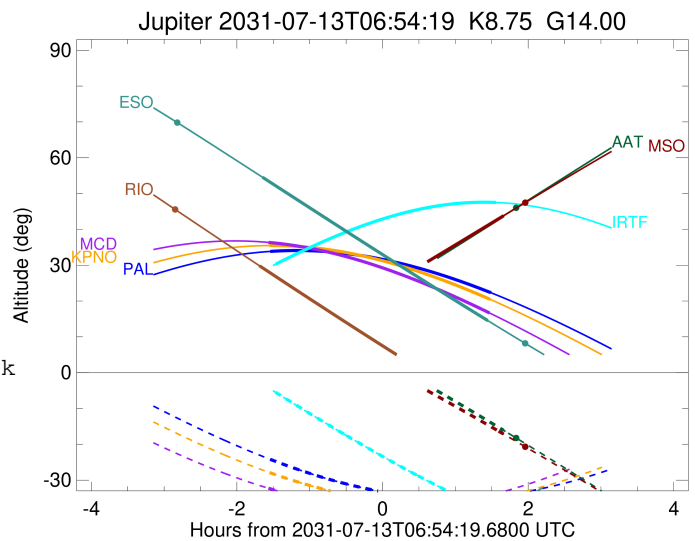
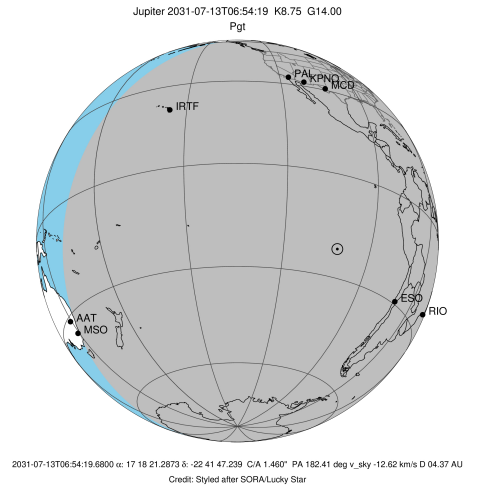


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-13T05:20:15.338	36.36	-32.25	71491.9	6.63	7.57
Jupiter	E	2031-07-13T08:22:29.153	16.67	-34.20	71491.8	8.53	9.73

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-13T06:57:13.210
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       : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 8.746
G magnitude           : 14.002
RP magnitude         : 12.609
BP magnitude         : 16.356
DUPflag              : 0
Distance (au)        : 4.365
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg) : 150.12
Sun-Moon sep (deg)  : 140.96
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 2.760
C/A sky separation (km): 8737.2
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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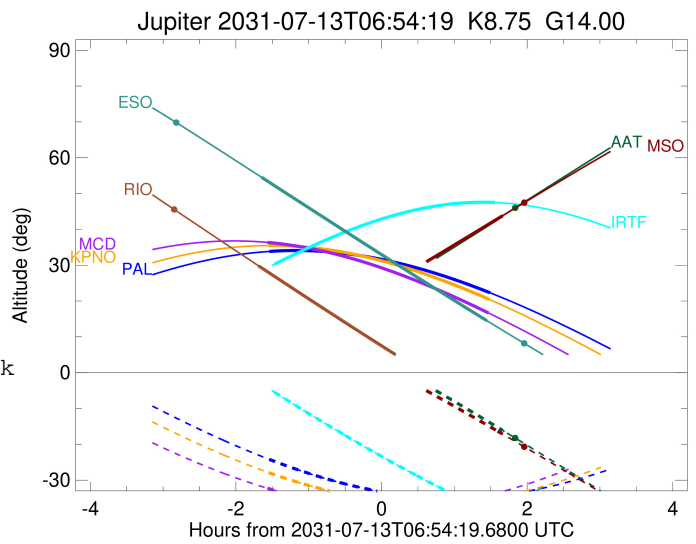
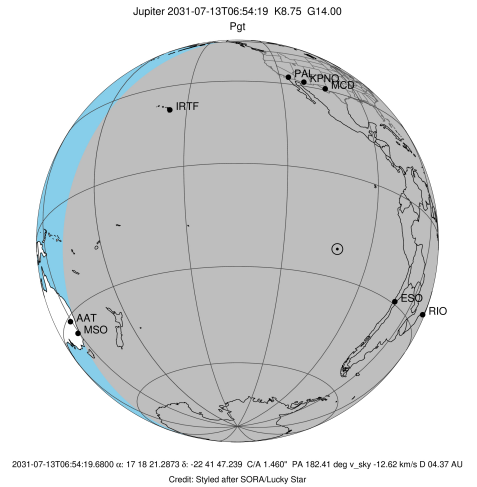


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-13T05:26:11.468	30.26	-5.48	71491.9	5.34	6.10
Jupiter	E	2031-07-13T08:27:55.692	47.50	-39.20	71491.8	8.42	9.61

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-13T06:46:30.130
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       : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 8.746
G magnitude           : 14.002
RP magnitude         : 12.609
BP magnitude         : 16.356
DUPflag              : 0
Distance (au)        : 4.365
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg) : 150.12
Sun-Moon sep (deg)  : 141.57
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 0.835
C/A sky separation (km) : 2643.5
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
    
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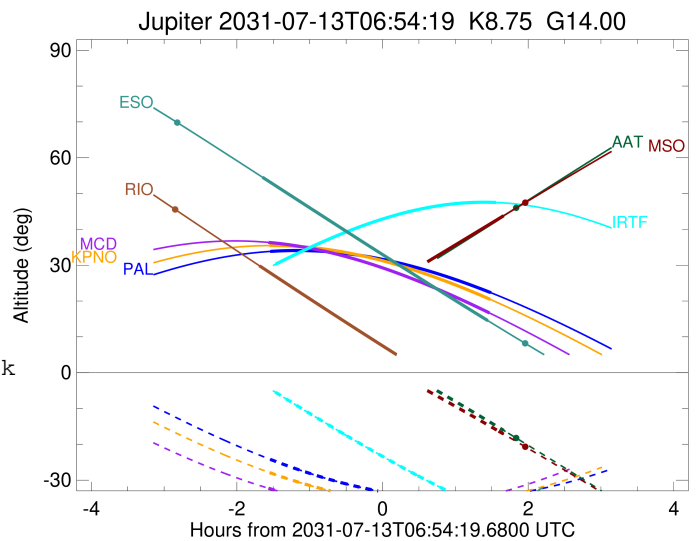
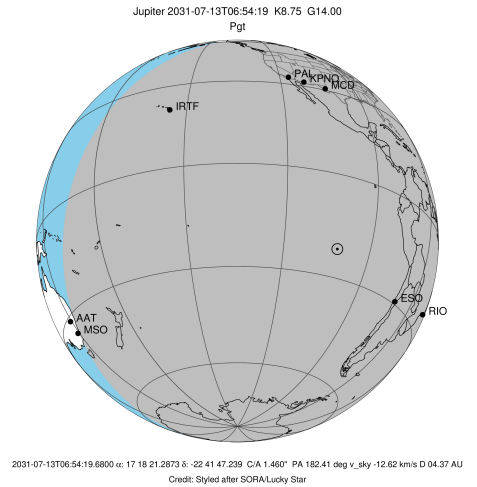


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-13T05:12:57.203	29.83	-58.99	71492.0	1.60	1.83
Jupiter	E	2031-07-13T08:21:27.862	-10.63x	-16.39	71492.0	2.59	2.96

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-13T06:47:46.590
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      : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude          : 8.746
G magnitude          : 14.002
RP magnitude         : 12.609
BP magnitude         : 16.356
DUPflag             : 0
Distance (au)       : 4.365
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg) : 150.12
Sun-Moon sep (deg)  : 141.71
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 0.948
C/A sky separation (km): 3000.0
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
    
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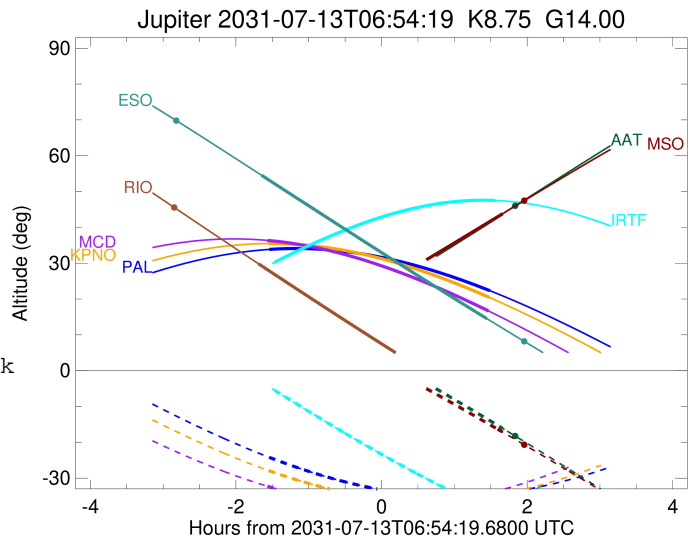
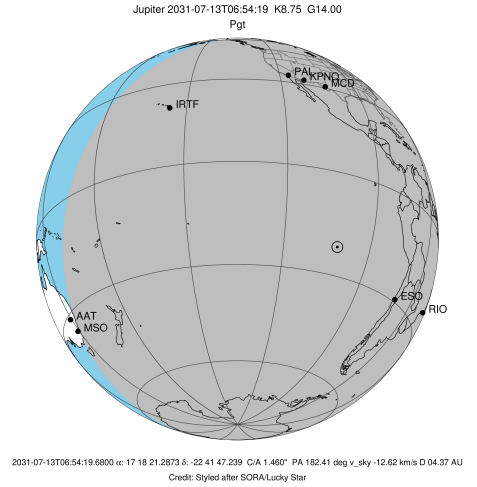


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-13T05:15:25.211	54.55	-80.57	71492.0	1.67	1.91
Jupiter	E	2031-07-13T08:21:16.633	14.49	-41.86	71492.0	2.97	3.40


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-13T07:01:07.030
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      : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude          : 8.746
G magnitude          : 14.002
RP magnitude         : 12.609
BP magnitude         : 16.356
DUPflag             : 0
Distance (au)       : 4.365
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg) : 150.12
Sun-Moon sep (deg)  : 140.46
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (" ) : 0.624
C/A sky separation (km) : 1975.3
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
    
```

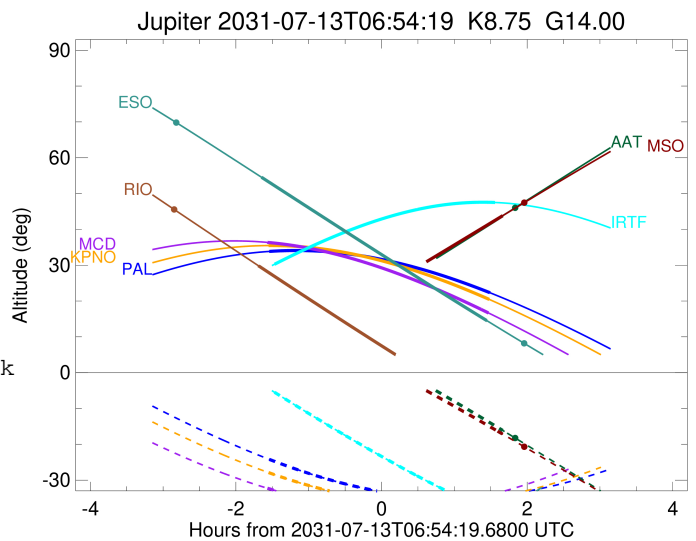
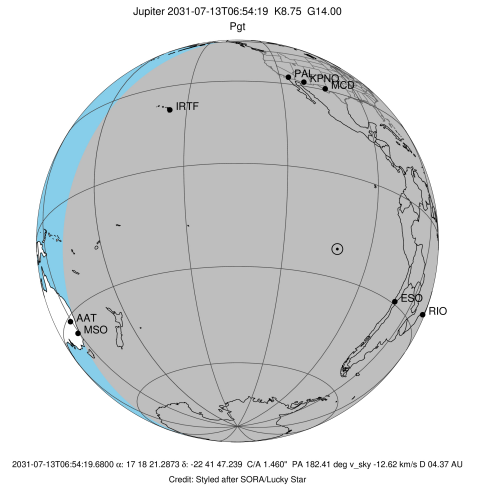


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-13T05:26:55.975	4.86x	18.98x	71492.0	-0.33	-0.38
Jupiter	E	2031-07-13T08:34:16.344	43.83	-16.13	71492.0	3.44	3.94


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-13T07:00:47.720
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      : 4114694122652255104
2Mass ID (if available) : 17182129-2241472
ICRS Star Coord at Epoch: 17h 18m 21.28733s -22:41:47.23942s
RUWE (>1.4 is poor) : 1.12
K magnitude          : 8.746
G magnitude          : 14.002
RP magnitude         : 12.609
BP magnitude         : 16.356
DUPflag             : 0
Distance (au)        : 4.365
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.62
Sun-Target sep (deg) : 150.12
Sun-Moon sep (deg)  : 140.49
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.64
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 0.508
C/A sky separation (km) : 1609.5
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	2031-07-13T05:26:35.159	6.36	16.36x	71492.0	-0.59	-0.68
Jupiter	E	2031-07-13T08:34:01.499	43.78	-17.12	71492.0	3.12	3.57