

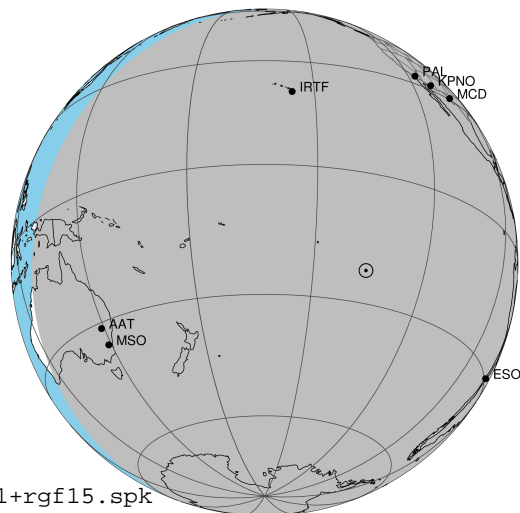
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-07-07T09:10:38.960
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4114658491600967552
 2Mass ID (if available) : 17205748-2243036

Jupiter 2031-07-07T09:10:38 K9.03 G14.32 Pgt

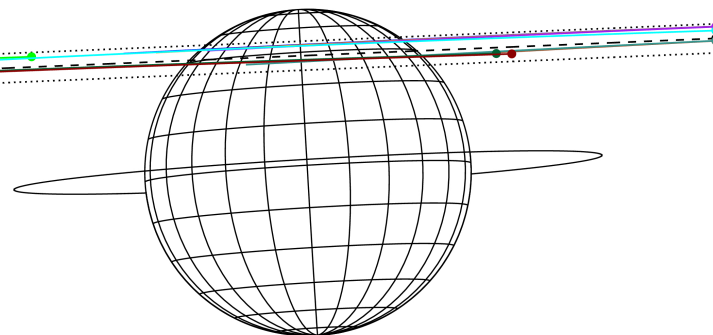
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s

RUWE (>1.4 is poor) : 1.07
 K magnitude : 9.028
 G magnitude : 14.319
 RP magnitude : 12.939
 BP magnitude : 16.658
 DUPflag : 0
 Distance (au) : 4.326
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -14.03
 Sun-Target sep (deg) : 156.34
 Sun-Moon sep (deg) : 60.49
 B (ring opening deg) : -2.57
 PA of pole (deg) : 3.36
 Pole direction: RA (deg): 268.05690
 Dec (deg): 64.49651
 C/A sky separation (") : 16.324
 C/A sky separation (km) : 51215.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-07-07T09:10:38 K9.03 G14.32
 Pgt



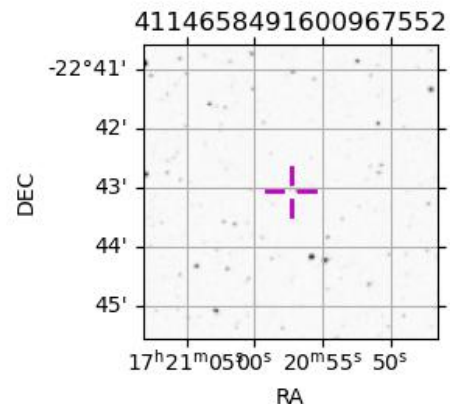
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 RIO
 ESO
 AAT
 MSO



2031-07-07T09:10:38.9600 a: 17 20 57.4720 d: -22 43 03.612 C/A ***** PA 182.40 deg v_sky -14.03 km/s D 04.33 AU
 Credit: Styled after SORA/Lucky Star

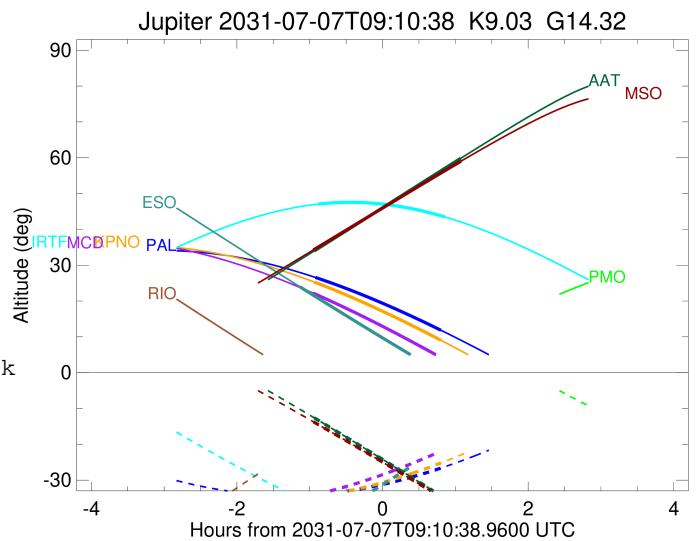
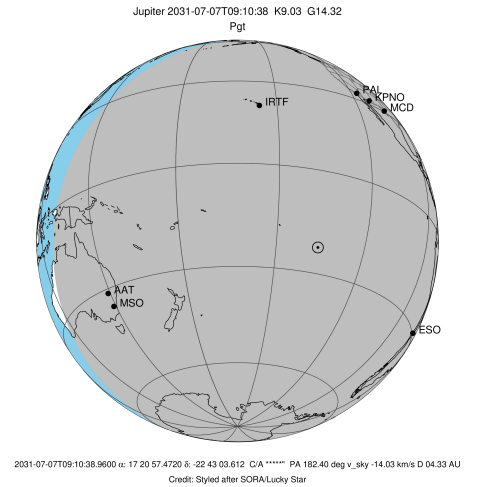
Observable events with sun below -5 deg and altitude above 5 deg

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	+ +	JUL 07 08:15 - JUL 07 09:58	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUL 07 08:14 - JUL 07 09:58	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUL 07 08:13 - JUL 07 08:13	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUL 07 08:18 - JUL 07 10:02	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	+	JUL 07 08:02 - JUL 07 08:02	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	JUL 07 08:14 - JUL 07 10:14	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUL 07 08:13 - JUL 07 10:15	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:06:52.950
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        : 4114658491600967552
2Mass ID (if available) : 17205748-2243036
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.028
G magnitude           : 14.319
RP magnitude          : 12.939
BP magnitude          : 16.658
DUPflag              : 0
Distance (au)         : 4.326
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg)  : 156.34
Sun-Moon sep (deg)    : 60.48
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.36
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 17.865
C/A sky separation (km) : 56050.2
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
    
```

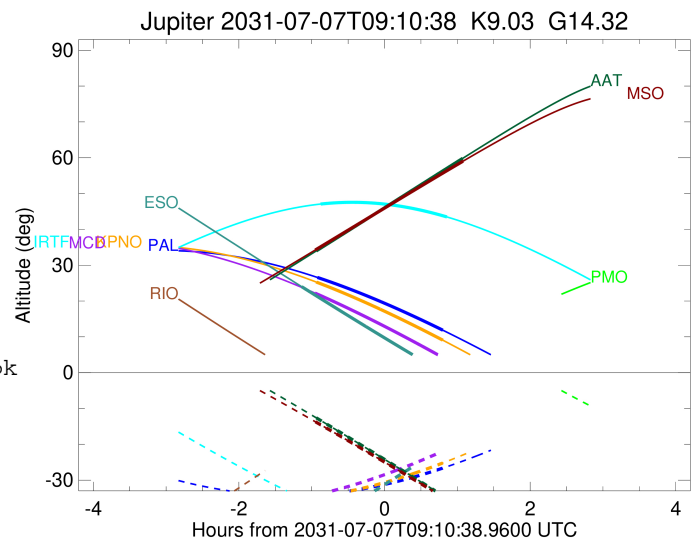
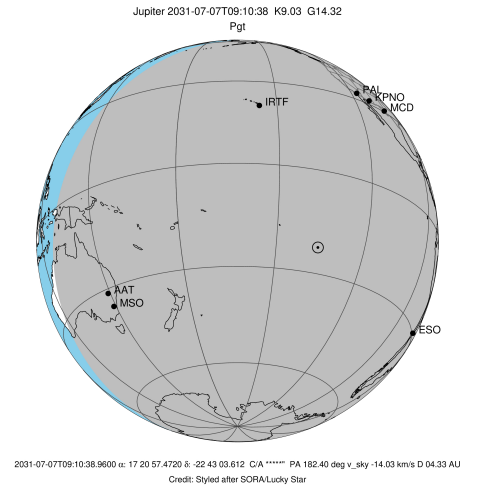


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:15:16.888	26.58	-33.97	71486.6	50.92	54.47
Jupiter	E	2031-07-07T09:58:43.145	11.86	-26.63	71486.4	52.09	55.60

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:06:27.650
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        : 4114658491600967552
2Mass ID (if available) : 17205748-2243036
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.028
G magnitude           : 14.319
RP magnitude          : 12.939
BP magnitude          : 16.658
DUPflag              : 0
Distance (au)         : 4.326
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg)  : 156.34
Sun-Moon sep (deg)    : 60.42
B (ring opening deg) : -2.57
PA of pole (deg)      : 3.36
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 17.795
C/A sky separation (km) : 55831.6
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
    
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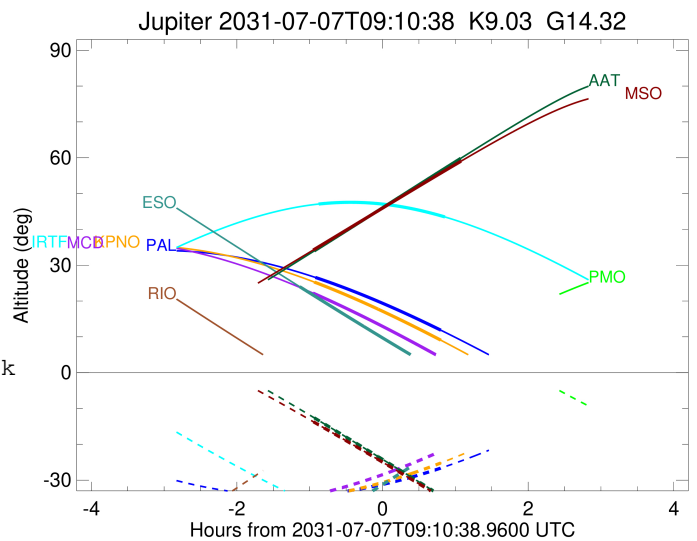
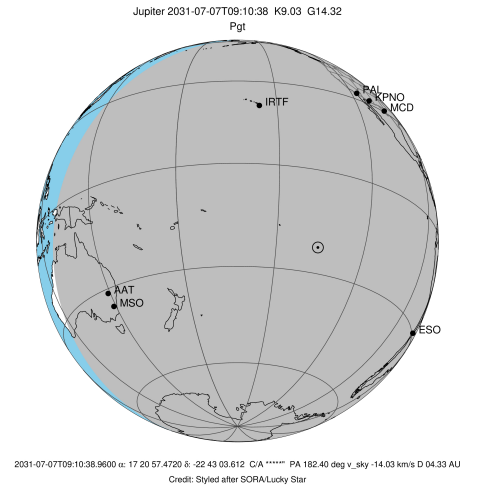


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:14:28.831	25.28	-34.66	71486.6	50.69	54.25
Jupiter	E	2031-07-07T09:58:42.216	9.07	-25.21	71486.4	51.77	55.29

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:05:56.420
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        : 4114658491600967552
2Mass ID (if available) : 17205748-2243036
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.028
G magnitude           : 14.319
RP magnitude          : 12.939
BP magnitude          : 16.658
DUPflag              : 0
Distance (au)         : 4.326
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.34
Sun-Moon sep (deg)   : 60.32
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.36
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 17.701
C/A sky separation (km) : 55536.0
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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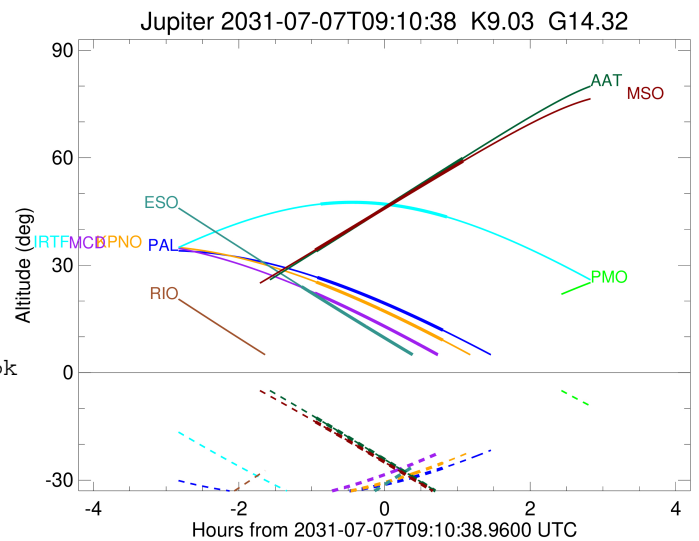
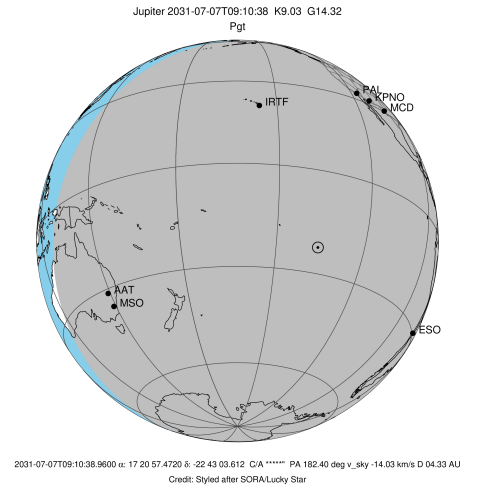


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:13:25.138	22.20	-34.14	71486.6	50.38	53.95
Jupiter	E	2031-07-07T09:58:45.591	4.22x	-21.92	71486.5	51.34	54.87

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-07T09:10:03.170
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      : 4114658491600967552
2Mass ID (if available) : 17205748-2243036
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s
RUWE (>1.4 is poor) : 1.07
K magnitude         : 9.028
G magnitude         : 14.319
RP magnitude        : 12.939
BP magnitude        : 16.658
DUPflag            : 0
Distance (au)       : 4.326
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.34
Sun-Moon sep (deg)  : 61.08
B (ring opening deg) : -2.57
PA of pole (deg)    : 3.36
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 17.699
C/A sky separation (km) : 55529.9
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
    
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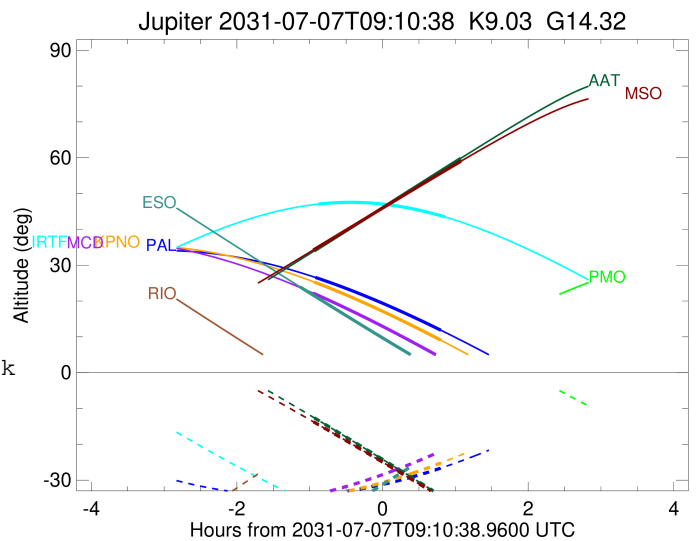
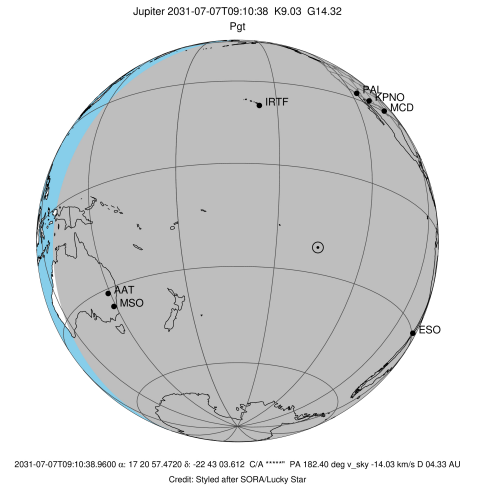


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:18:07.952	47.07	-37.33	71486.7	49.87	53.46
Jupiter	E	2031-07-07T10:02:01.967	43.47	-47.29	71486.4	51.77	55.29

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:04:33.190
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        : 4114658491600967552
2Mass ID (if available) : 17205748-2243036
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.028
G magnitude           : 14.319
RP magnitude          : 12.939
BP magnitude          : 16.658
DUPflag              : 0
Distance (au)         : 4.326
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg)  : 156.34
Sun-Moon sep (deg)    : 60.21
B (ring opening deg) : -2.57
PA of pole (deg)      : 3.36
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 15.485
C/A sky separation (km) : 48582.6
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
    
```

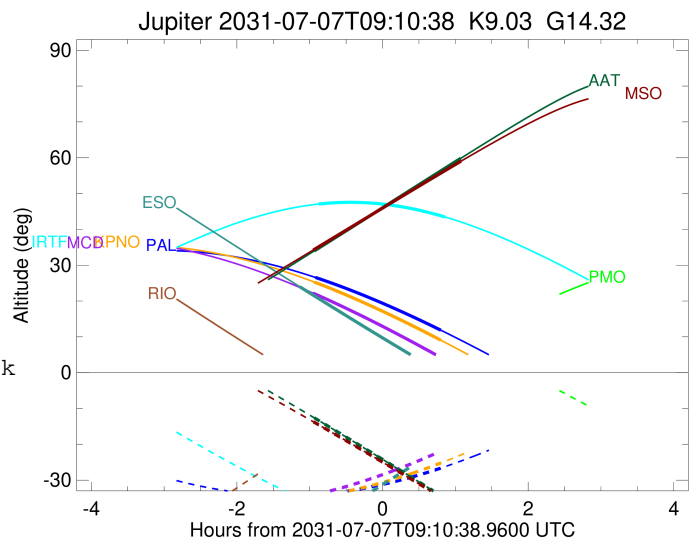
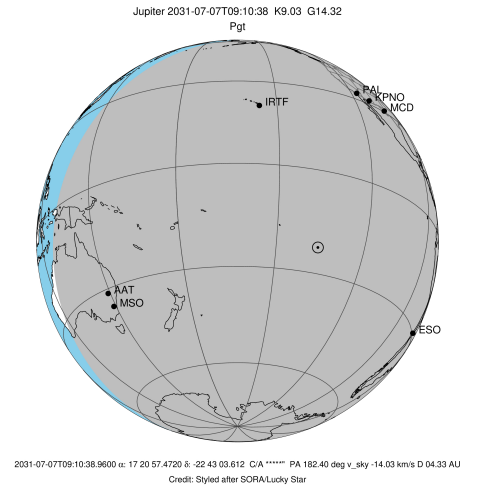


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:02:33.401	23.97	-46.01	71487.9	42.42	46.14
Jupiter	E	2031-07-07T10:07:03.506	-1.57x	-19.24	71487.8	43.08	46.79

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:14:51.670
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        : 4114658491600967552
2Mass ID (if available) : 17205748-2243036
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.028
G magnitude           : 14.319
RP magnitude          : 12.939
BP magnitude          : 16.658
DUPflag              : 0
Distance (au)         : 4.326
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg)  : 156.34
Sun-Moon sep (deg)    : 61.44
B (ring opening deg) : -2.57
PA of pole (deg)      : 3.36
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 15.759
C/A sky separation (km) : 49444.2
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
    
```

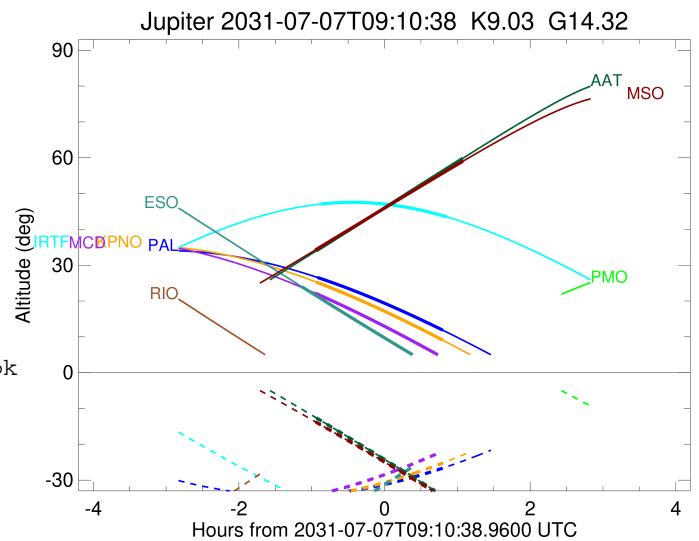
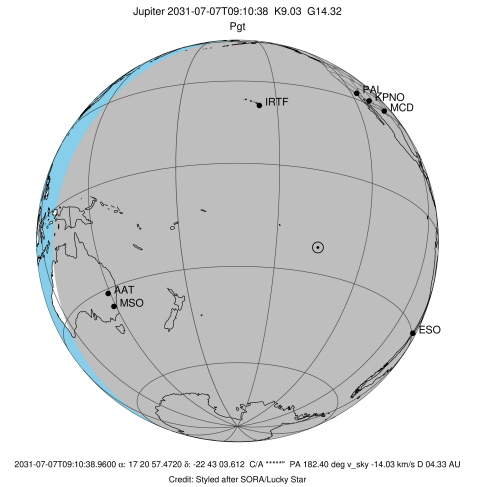


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:14:28.215	34.00	-12.62	71487.9	42.20	45.92
Jupiter	E	2031-07-07T10:14:58.080	59.79	-37.76	71487.5	45.11	48.81

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:14:39.570
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       : 4114658491600967552
2Mass ID (if available) : 17205748-2243036
ICRS Star Coord at Epoch: 17h 20m 57.47198s -22:43:03.61207s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.028
G magnitude           : 14.319
RP magnitude          : 12.939
BP magnitude          : 16.658
DUPflag              : 0
Distance (au)        : 4.326
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.34
Sun-Moon sep (deg)   : 61.43
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.36
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 15.630
C/A sky separation (km) : 49038.8
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	2031-07-07T08:13:46.435	34.27	-13.72	71488.0	41.78	45.50
Jupiter	E	2031-07-07T10:15:16.200	59.01	-38.07	71487.5	44.64	48.35