

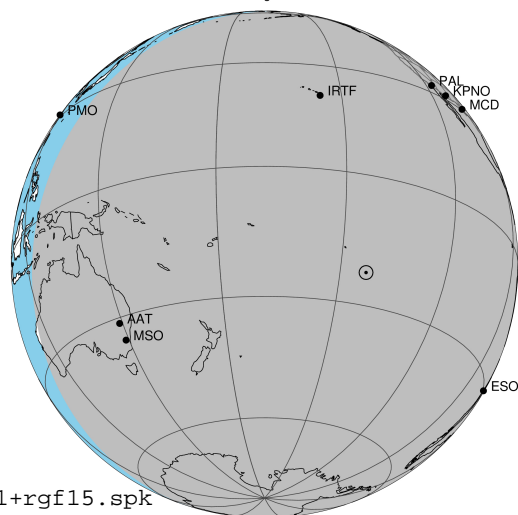
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-07-07T09:37:50.490
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4114658491600968064
 2Mass ID (if available) : 17205694-2243056

Jupiter 2031-07-07T09:37:50 K9.11 G13.75 Pgt

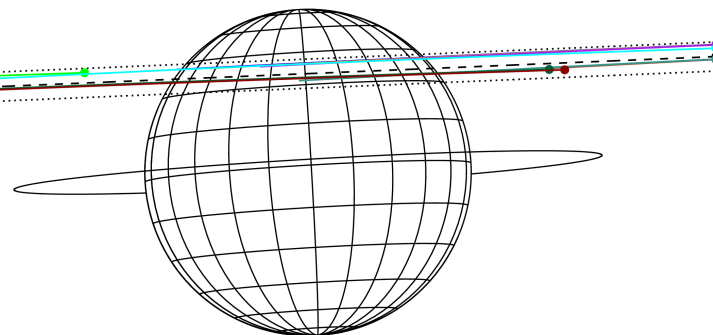
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s

RUWE (>1.4 is poor) : 1.07
 K magnitude : 9.111
 G magnitude : 13.750
 RP magnitude : 12.539
 BP magnitude : 15.340
 DUPflag : 0
 Distance (au) : 4.326
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -14.03
 Sun-Target sep (deg) : 156.32
 Sun-Moon sep (deg) : 60.78
 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 (") : 13.790
 C/A sky separation (km) : 43268.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-07-07T09:37:50 K9.11 G13.75
 Pgt



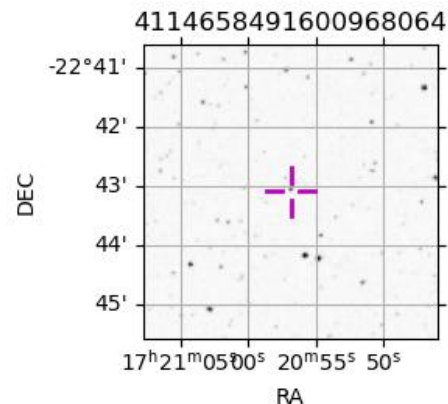
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 RIO
 ESO
 AAT
 MSO



2031-07-07T09:37:50.4900 a: 17 20 56.93738 d: -22 43 05.838 C/A ***** PA 182.40 deg v_sky -14.03 km/s D 04.33 AU
 Credit: Styled after SORA/Lucky Star

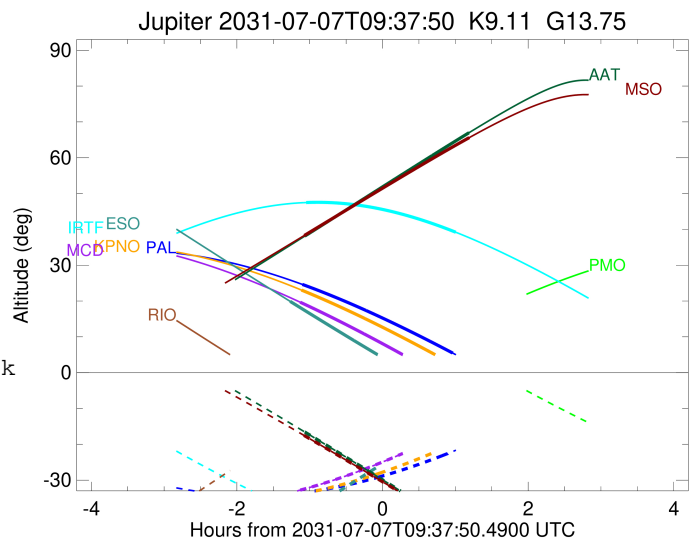
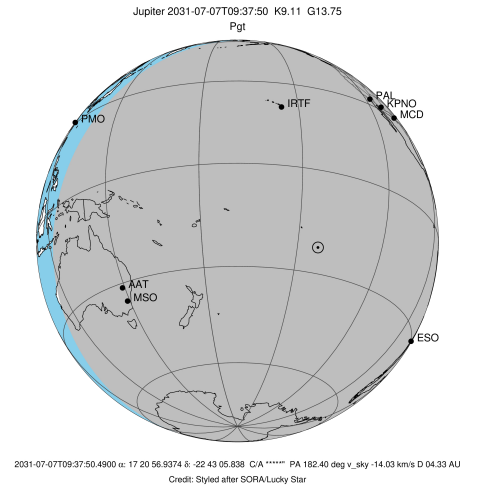
Observable events with sun below -5 deg and altitude above 5 deg

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 08:31 - JUL 07 10:35	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUL 07 08:31 - JUL 07 08:31	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUL 07 08:30 - JUL 07 08:30	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUL 07 08:34 - JUL 07 10:38	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 08:21 - JUL 07 08:21	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	JUL 07 08:33 - JUL 07 10:49	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUL 07 08:33 - JUL 07 10:49	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-07T09:33:33.440
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      : 4114658491600968064
2Mass ID (if available) : 17205694-2243056
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s
RUWE (>1.4 is poor) : 1.07
K magnitude         : 9.111
G magnitude         : 13.750
RP magnitude        : 12.539
BP magnitude        : 15.340
DUPflag            : 0
Distance (au)       : 4.326
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.32
Sun-Moon sep (deg)  : 60.67
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 (" ) : 15.280
C/A sky separation (km) : 47941.1
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
    
```

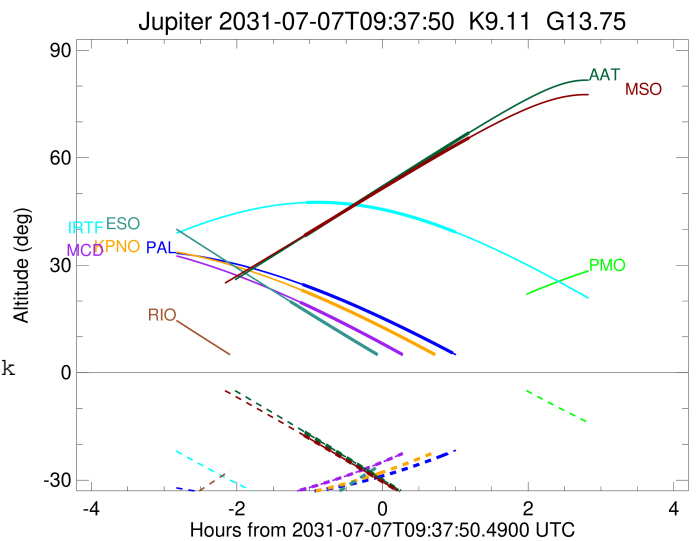
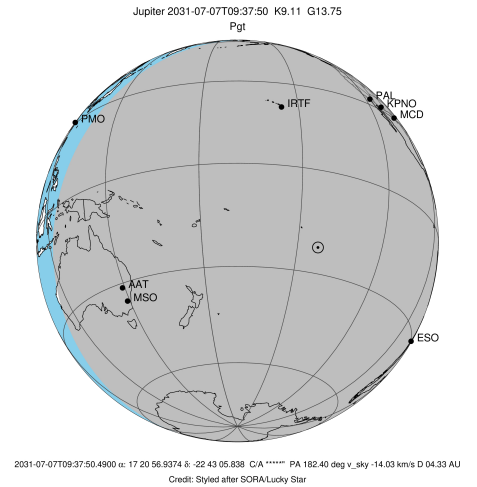


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:31:47.098	24.63	-33.45	71488.0	41.47	45.19
Jupiter	E	2031-07-07T10:35:42.297	5.47	-22.01	71487.9	42.54	46.26

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:33:10.000
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       : 4114658491600968064
2Mass ID (if available) : 17205694-2243056
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.111
G magnitude           : 13.750
RP magnitude          : 12.539
BP magnitude          : 15.340
DUPflag              : 0
Distance (au)        : 4.326
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.32
Sun-Moon sep (deg)   : 60.61
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 (") : 15.204
C/A sky separation (km) : 47704.0
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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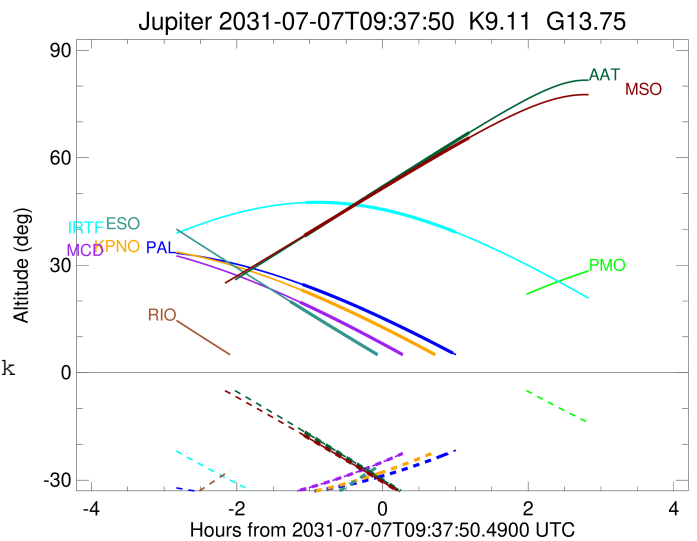
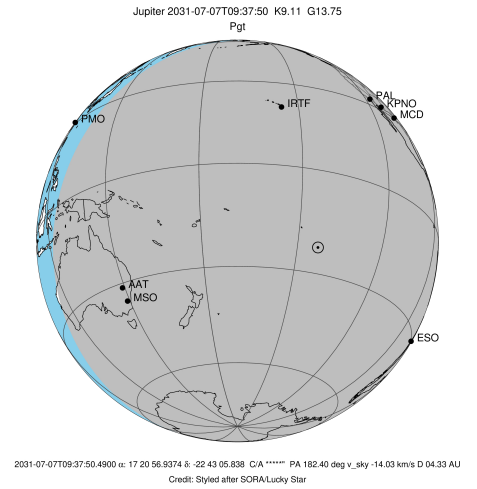


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:31:03.702	23.06	-33.78	71488.1	41.26	44.98
Jupiter	E	2031-07-07T10:35:40.890	2.34x	-20.01	71487.9	42.24	45.96

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:32:42.210
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        : 4114658491600968064
2Mass ID (if available) : 17205694-2243056
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.111
G magnitude           : 13.750
RP magnitude          : 12.539
BP magnitude          : 15.340
DUPflag              : 0
Distance (au)         : 4.326
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg)  : 156.32
Sun-Moon sep (deg)    : 60.50
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 (") : 15.103
C/A sky separation (km) : 47384.9
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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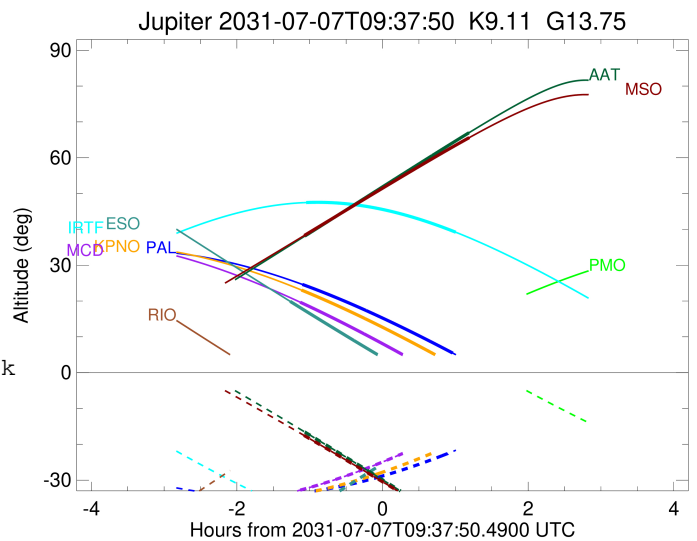
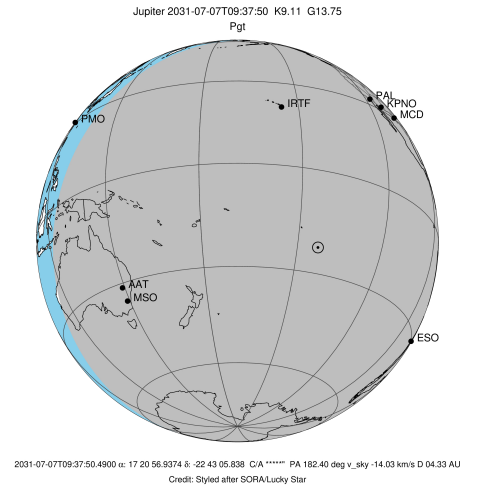


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:30:06.922	19.65	-32.77	71488.1	40.98	44.70
Jupiter	E	2031-07-07T10:35:44.765	-2.89x	-16.05	71488.0	41.85	45.57

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-07T09:36:30.300
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       : 4114658491600968064
2Mass ID (if available) : 17205694-2243056
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.111
G magnitude           : 13.750
RP magnitude         : 12.539
BP magnitude         : 15.340
DUPflag              : 0
Distance (au)        : 4.326
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.32
Sun-Moon sep (deg)   : 61.29
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 ("): 15.159
C/A sky separation (km): 47563.0
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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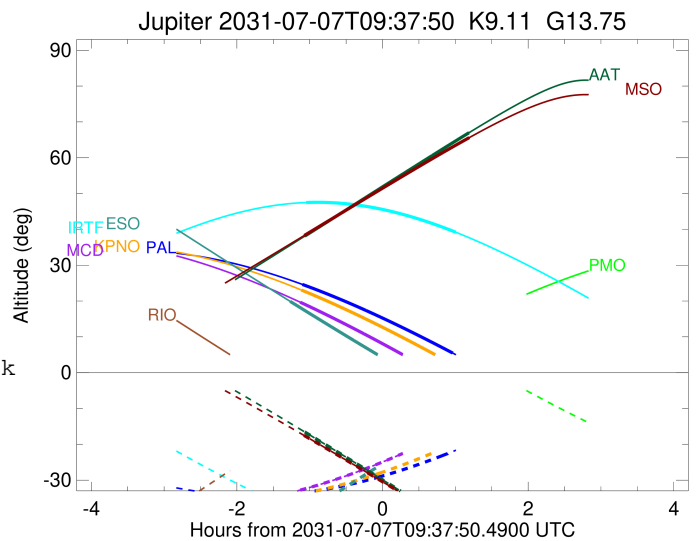
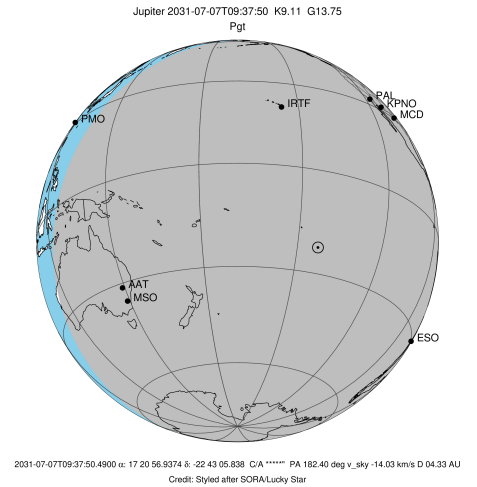


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:34:56.877	47.48	-39.67	71488.2	40.69	44.41
Jupiter	E	2031-07-07T10:38:12.105	39.20	-47.63	71487.9	42.44	46.16

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-07T09:31:40.320
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       : 4114658491600968064
2Mass ID (if available) : 17205694-2243056
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 9.111
G magnitude          : 13.750
RP magnitude         : 12.539
BP magnitude         : 15.340
DUPflag             : 0
Distance (au)        : 4.326
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.32
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 ("): 12.869
C/A sky separation (km): 40378.0
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
    
```

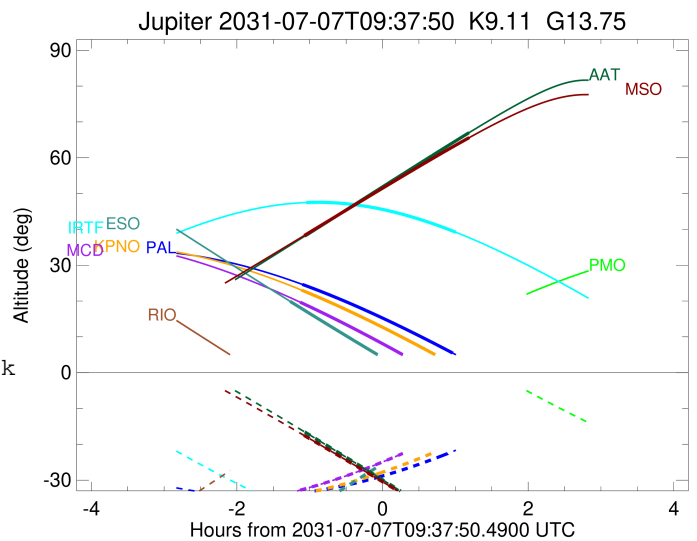
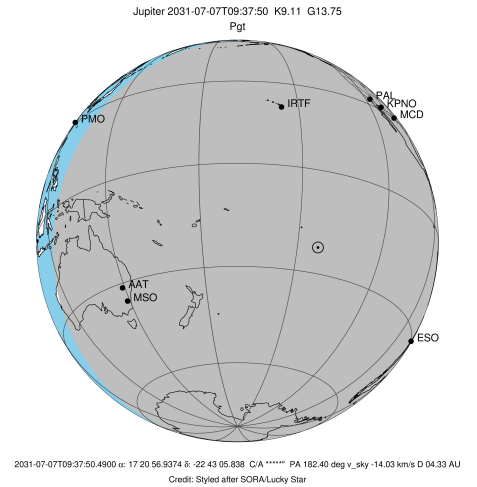


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:21:43.394	19.91	-41.84	71489.2	34.02	37.58
Jupiter	E	2031-07-07T10:42:16.231	-8.28x	-11.91	71489.1	34.67	38.26

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-07T09:41:38.490
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      : 4114658491600968064
2Mass ID (if available) : 17205694-2243056
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 9.111
G magnitude          : 13.750
RP magnitude         : 12.539
BP magnitude         : 15.340
DUPflag             : 0
Distance (au)       : 4.326
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg) : 156.32
Sun-Moon sep (deg)  : 61.75
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 ("): 13.286
C/A sky separation (km): 41686.3
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
    
```

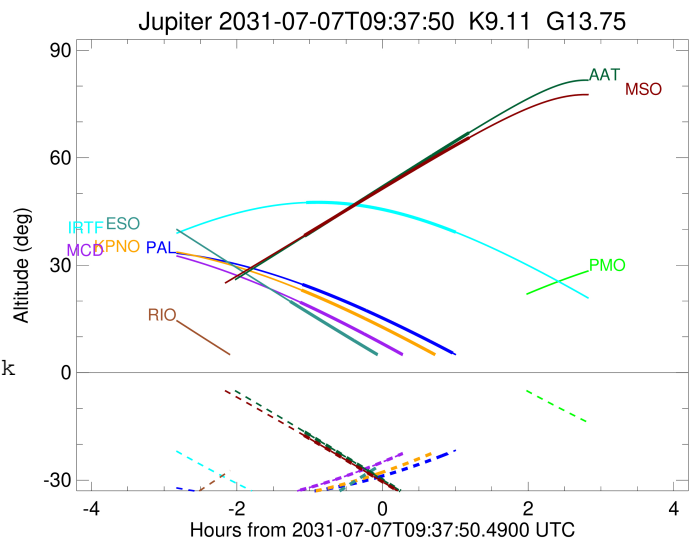
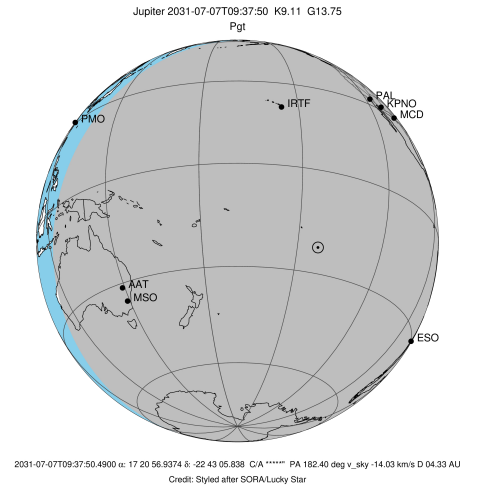


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-07T08:33:50.839	38.13	-16.57	71489.2	34.16	37.73
Jupiter	E	2031-07-07T10:49:07.284	66.97	-45.05	71488.7	36.97	40.62


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-07T09:41:27.530
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        : 4114658491600968064
2Mass ID (if available) : 17205694-2243056
ICRS Star Coord at Epoch: 17h 20m 56.93738s -22:43:05.83755s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 9.111
G magnitude           : 13.750
RP magnitude          : 12.539
BP magnitude          : 15.340
DUPflag              : 0
Distance (au)         : 4.326
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.03
Sun-Target sep (deg)  : 156.32
Sun-Moon sep (deg)    : 61.73
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 (") : 13.155
C/A sky separation (km) : 41272.8
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	2031-07-07T08:33:15.914	38.26	-17.53	71489.2	33.78	37.33
Jupiter	E	2031-07-07T10:49:20.974	65.61	-45.03	71488.8	36.55	40.19