

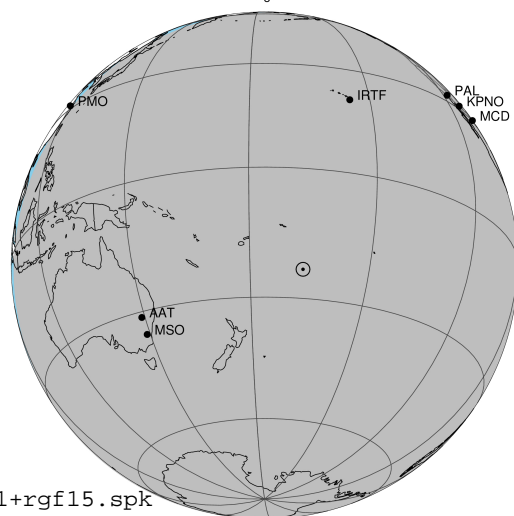
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-23T11:09:46.680  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4111684965463732480  
 2Mass ID (if available) : 17280261-2247102

Jupiter 2031-06-23T11:09:46 K8.97 G14.87 Pgt

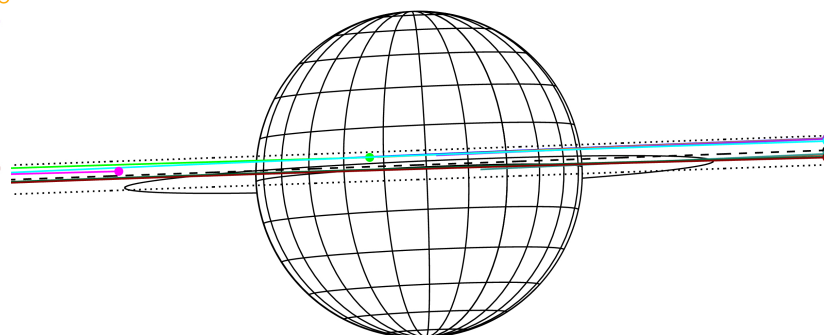
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s

RUWE (>1.4 is poor) : 1.13  
 K magnitude : 8.972  
 G magnitude : 14.873  
 RP magnitude : 13.456  
 BP magnitude : 17.443  
 DUPflag : 0  
 Distance (au) : 4.271  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.15  
 Sun-Target sep (deg) : 171.24  
 Sun-Moon sep (deg) : 132.64  
 B (ring opening deg) : -2.59  
 PA of pole (deg) : 2.60  
 Pole direction: RA (deg): 268.05691  
 Dec (deg): 64.49651  
 C/A sky separation (") : 1.349  
 C/A sky separation (km) : 4179.2  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-06-23T11:09:46 K8.97 G14.87  
 Pgt



Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 KAV  
 RIO  
 ESO  
 AAT  
 MSO

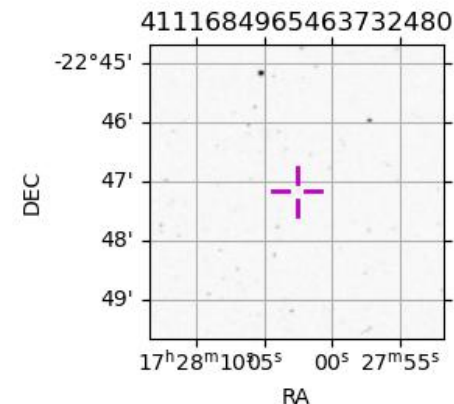


2031-06-23T11:09:46.6800 at: 17 28 02.6013 s: -22 47 10.389 C/A 1.337" PA 182.07 deg v\_sky -16.15 km/s D 04.27 AU

Credit: Styled after SORA/Lucky Star

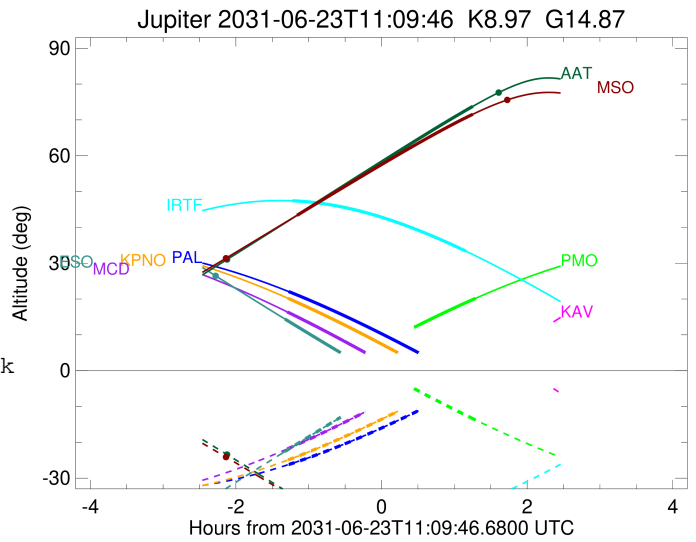
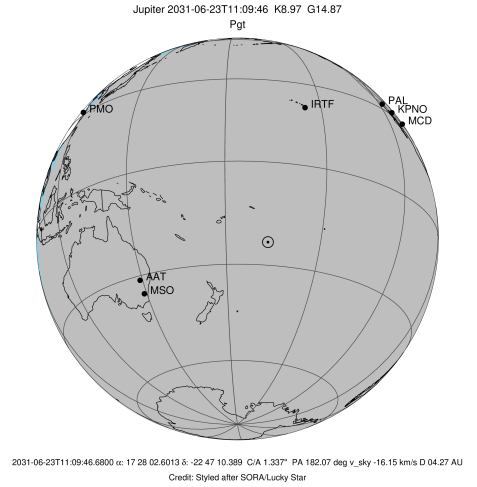
Observable events with sun below -5 deg and altitude above 5 deg

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 23 09:53 - JUN 23 09:53	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8	+	JUN 23 12:27 - JUN 23 12:27	Pne
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 23 09:52 - JUN 23 09:52	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 23 09:52 - JUN 23 09:52	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	JUN 23 09:56 - JUN 23 12:19	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	+	JUN 23 09:50 - JUN 23 09:50	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+	JUN 23 10:00 - JUN 23 12:25	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	JUN 23 10:00 - JUN 23 12:24	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-23T11:05:18.140
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     : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor) : 1.13
K magnitude         : 8.972
G magnitude         : 14.873
RP magnitude        : 13.456
BP magnitude        : 17.443
DUPflag            : 0
Distance (au)      : 4.271
f0 (km)            : 0.00
g0 (km)            : 0.00
skyplane vel. (km/s) : -16.15
Sun-Target sep (deg) : 171.24
Sun-Moon sep (deg)  : 132.29
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (" ) : 2.784
C/A sky separation (km) : 8624.4
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
    
```

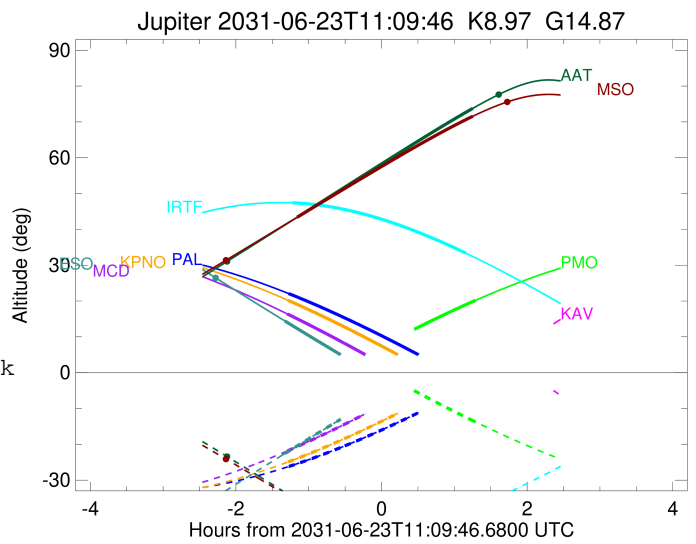
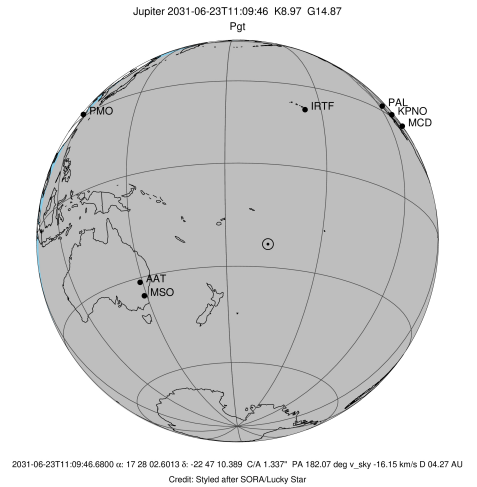


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-23T09:53:11.833	22.09	-26.21	71491.9	6.75	7.71
Jupiter	E	2031-06-23T12:17:52.696	-1.92x	-4.71x	71491.9	6.99	7.98

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-23T11:14:50.250
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : PMO
Location              : Purple Mtn Obs. Nanking
Latitude (deg)        : 32.06667
E. Longitude (deg)    : 118.82089
Altitude (km)         : 0.364
Gaia source ID        : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor)  : 1.13
K magnitude           : 8.972
G magnitude           : 14.873
RP magnitude          : 13.456
BP magnitude          : 17.443
DUPflag              : 0
Distance (au)         : 4.271
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -16.15
Sun-Target sep (deg)  : 171.24
Sun-Moon sep (deg)    : 133.17
B (ring opening deg)  : -2.59
PA of pole (deg)      : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 2.601
C/A sky separation (km) : 8057.9
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
    
```

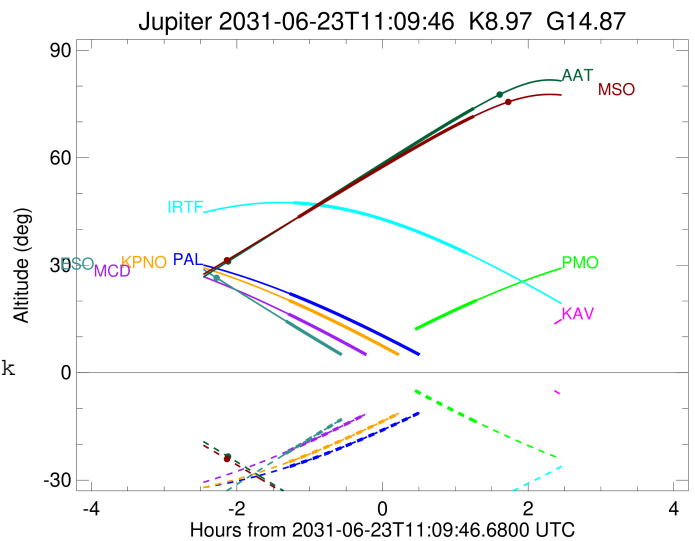
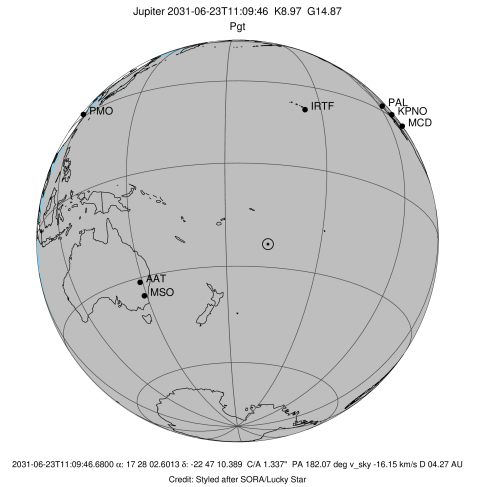


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-23T10:02:01.946	-5.33x	13.10x	71491.9	5.40	6.17
Jupiter	E	2031-06-23T12:27:09.931	20.18	-13.74	71491.8	7.46	8.52

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-23T11:04:58.670
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        : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor) : 1.13
K magnitude           : 8.972
G magnitude           : 14.873
RP magnitude          : 13.456
BP magnitude          : 17.443
DUPflag              : 0
Distance (au)         : 4.271
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.15
Sun-Target sep (deg)  : 171.24
Sun-Moon sep (deg)   : 132.24
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 2.701
C/A sky separation (km) : 8365.8
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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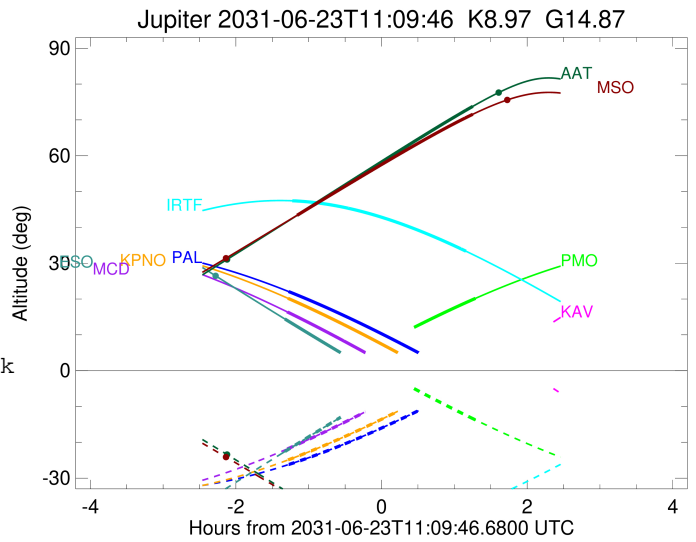
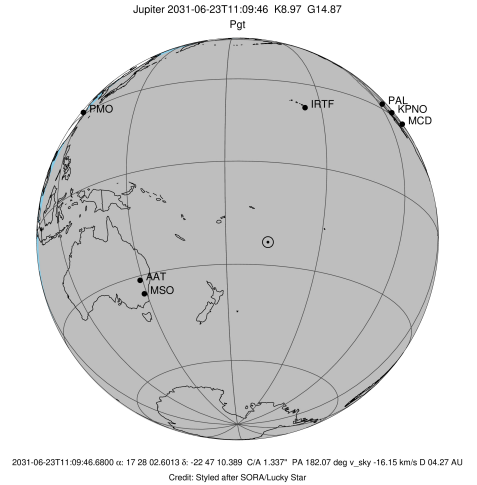


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-23T09:52:44.321	20.19	-24.92	71491.9	6.58	7.52
Jupiter	E	2031-06-23T12:17:43.347	-5.33x	-1.61x	71491.9	6.75	7.71

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-23T11:04:36.900
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       : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor) : 1.13
K magnitude           : 8.972
G magnitude           : 14.873
RP magnitude          : 13.456
BP magnitude          : 17.443
DUPflag              : 0
Distance (au)        : 4.271
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.15
Sun-Target sep (deg) : 171.24
Sun-Moon sep (deg)   : 132.15
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 2.589
C/A sky separation (km) : 8020.7
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
    
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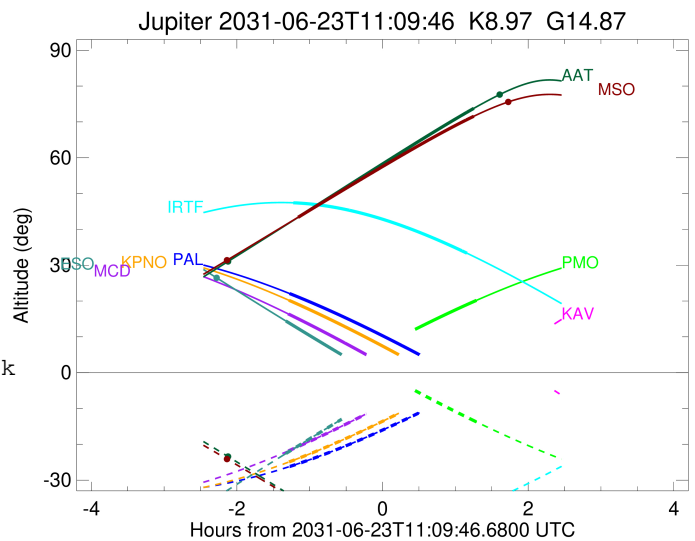
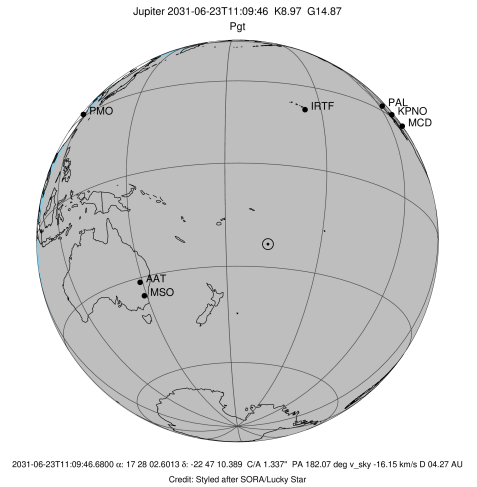


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-23T09:52:09.467	16.40	-21.85	71491.9	6.35	7.25
Jupiter	E	2031-06-23T12:17:37.089	-10.85x	3.56x	71491.9	6.44	7.36

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-23T11:07:46.870
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      : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor) : 1.13
K magnitude          : 8.972
G magnitude          : 14.873
RP magnitude         : 13.456
BP magnitude         : 17.443
DUPflag             : 0
Distance (au)       : 4.271
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.15
Sun-Target sep (deg) : 171.24
Sun-Moon sep (deg)  : 132.86
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 2.715
C/A sky separation (km) : 8410.5
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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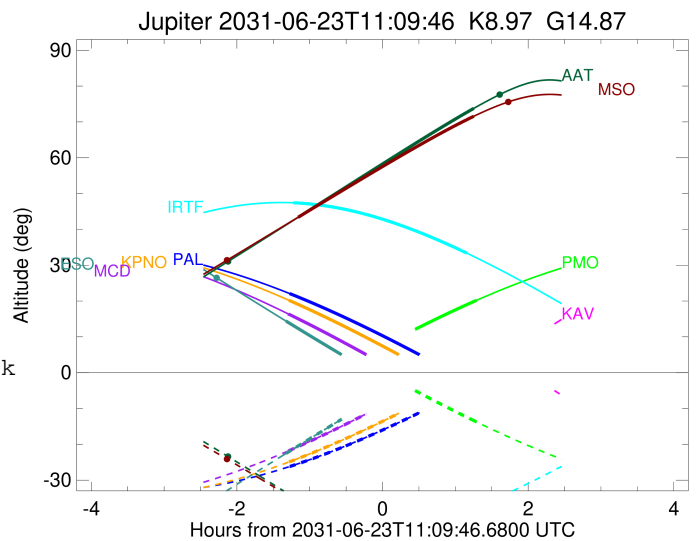
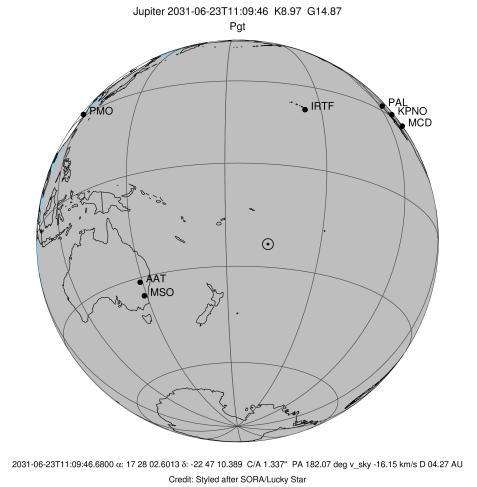


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-23T09:56:23.625	47.42	-46.35	71491.9	6.28	7.17
Jupiter	E	2031-06-23T12:19:22.914	33.34	-38.53	71491.9	7.04	8.04

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-23T11:04:06.190
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       : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor) : 1.13
K magnitude           : 8.972
G magnitude           : 14.873
RP magnitude         : 13.456
BP magnitude         : 17.443
DUPflag              : 0
Distance (au)        : 4.271
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.15
Sun-Target sep (deg) : 171.24
Sun-Moon sep (deg)  : 132.13
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 0.313
C/A sky separation (km) : 968.7
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
    
```

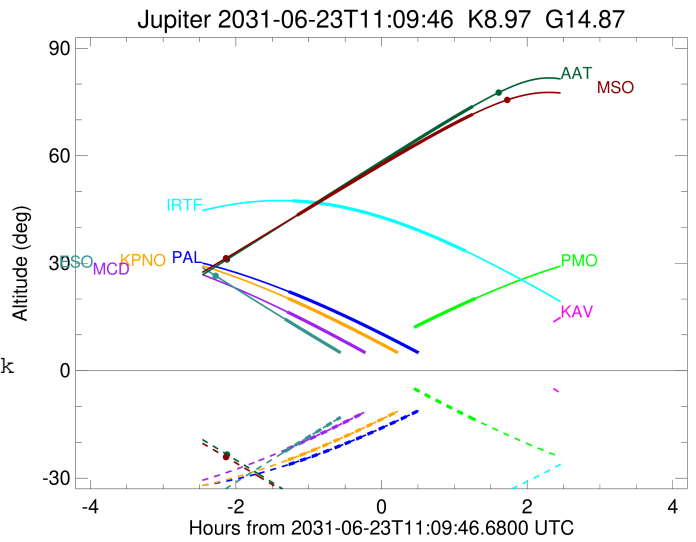
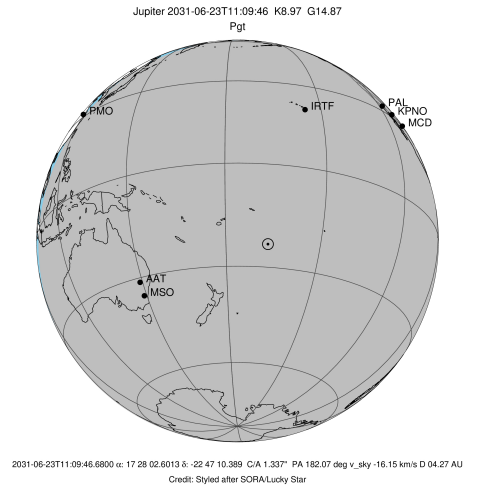


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-23T09:50:11.889	14.41	-22.56	71492.0	0.80	0.91
Jupiter	E	2031-06-23T12:18:36.832	-14.43x	7.16x	71492.0	0.78	0.89

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-23T11:12:50.860
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       : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor) : 1.13
K magnitude           : 8.972
G magnitude           : 14.873
RP magnitude          : 13.456
BP magnitude          : 17.443
DUPflag              : 0
Distance (au)        : 4.271
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.15
Sun-Target sep (deg) : 171.24
Sun-Moon sep (deg)   : 133.50
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 0.905
C/A sky separation (km): 2804.0
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
    
```



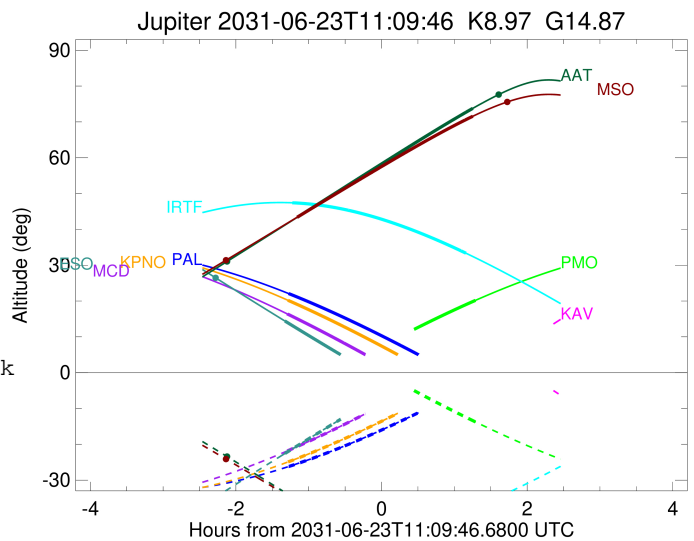
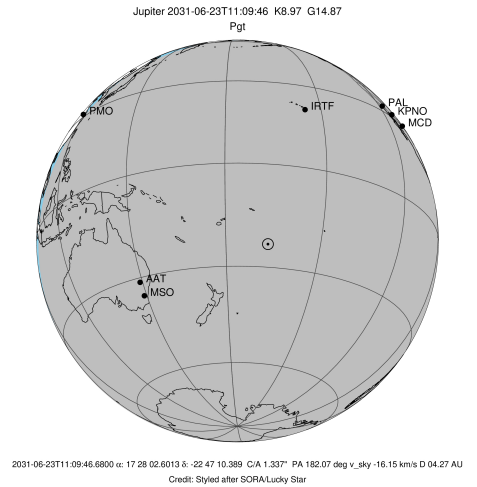
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-23T10:00:24.561	43.38	-35.57	71492.0	1.31	1.50
Jupiter	E	2031-06-23T12:24:59.659	73.77	-66.35	71492.0	3.05	3.48



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-23T11:12:42.150
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      : 4111684965463732480
2Mass ID (if available) : 17280261-2247102
ICRS Star Coord at Epoch: 17h 28m 02.60135s -22:47:10.38947s
RUWE (>1.4 is poor) : 1.13
K magnitude         : 8.972
G magnitude         : 14.873
RP magnitude        : 13.456
BP magnitude        : 17.443
DUPflag            : 0
Distance (au)       : 4.271
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.15
Sun-Target sep (deg) : 171.24
Sun-Moon sep (deg)  : 133.49
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.60
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (" ) : 0.769
C/A sky separation (km) : 2382.0
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	2031-06-23T10:00:11.387	43.37	-35.94	71492.0	0.99	1.13
Jupiter	E	2031-06-23T12:24:56.140	71.55	-65.11	71492.0	2.70	3.08