

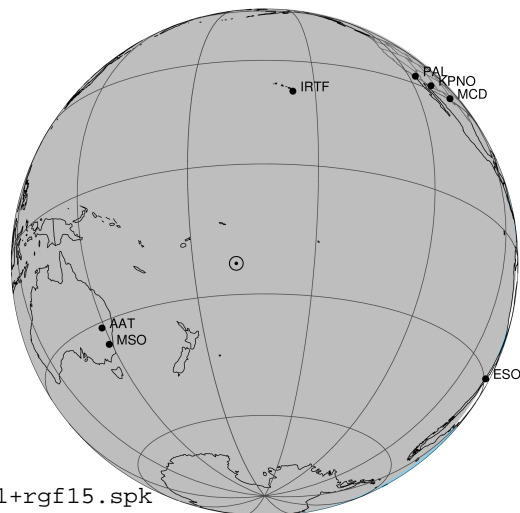
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-09T11:16:11.040
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116787554070788224
 2Mass ID (if available) : 17354535-2250522

Jupiter 2031-06-09T11:16:11 K8.56 G13.72 Pgt

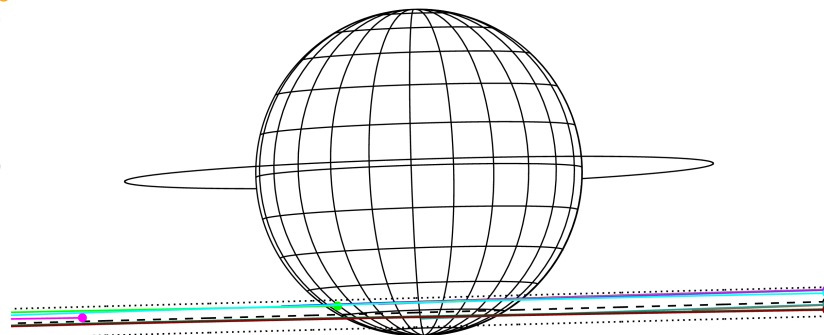
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s

RUWE (>1.4 is poor) : 0.78
 K magnitude : 8.561
 G magnitude : 13.724
 RP magnitude : 12.399
 BP magnitude : 15.763
 DUPflag : 0
 Distance (au) : 4.273
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.26
 Sun-Target sep (deg) : 173.58
 Sun-Moon sep (deg) : 49.34
 B (ring opening deg) : -2.60
 PA of pole (deg) : 1.77
 Pole direction: RA (deg): 268.05692
 Dec (deg): 64.49651
 C/A sky separation (") : 19.785
 C/A sky separation (km) : 61310.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-09T11:16:11 K8.56 G13.72
 Pgt



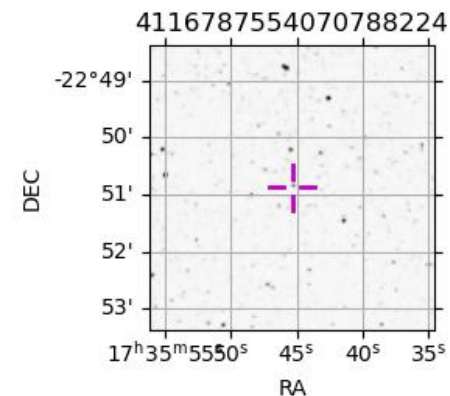
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 RIO
 ESO
 AAT
 MSO



2031-06-09T11:16:11.0400 α: 17 35 45.3456 δ: -22 50 52.576 C/A ***** PA 1.52 deg v_sky -16.26 km/s D 04.27 AU
 Credit: Styled after SORA/Lucky Star

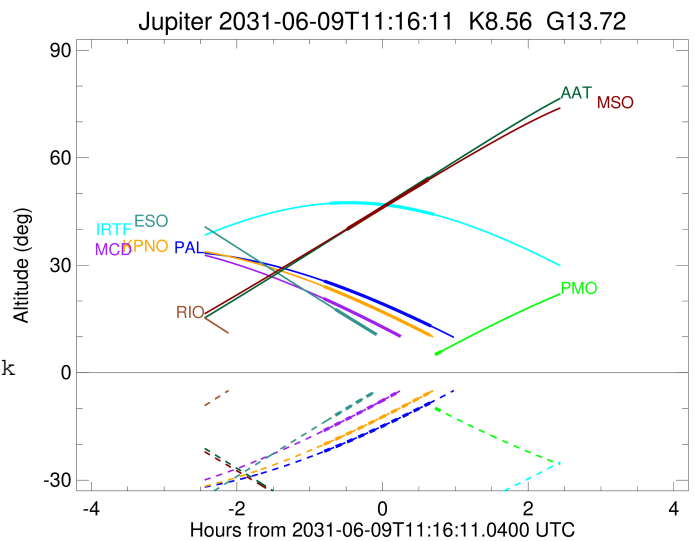
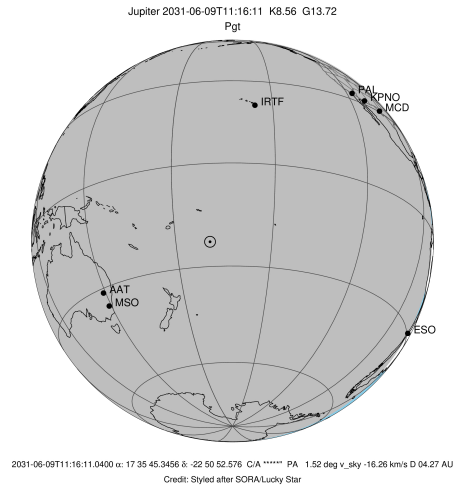
Observable events with sun below -5 deg and altitude above 5 deg

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 09 10:28 - JUN 09 11:56		Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8	+ +	JUN 09 12:04 - JUN 09 12:04		Pne
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUN 09 10:27 - JUN 09 11:55		Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUN 09 10:27 - JUN 09 10:27		Pin
TEN	Teide Obs./Tenerife	28.3	343.5				Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUN 09 10:32 - JUN 09 11:58		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 09 10:37 - JUN 09 10:37		Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	JUN 09 10:46 - JUN 09 11:54		Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8				Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUN 09 10:47 - JUN 09 11:53		Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T11:12:07.530
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       : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.561
G magnitude           : 13.724
RP magnitude         : 12.399
BP magnitude         : 15.763
DUPflag              : 0
Distance (au)        : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.58
Sun-Moon sep (deg)  : 49.17
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 18.243
C/A sky separation (km): 56531.2
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
    
```

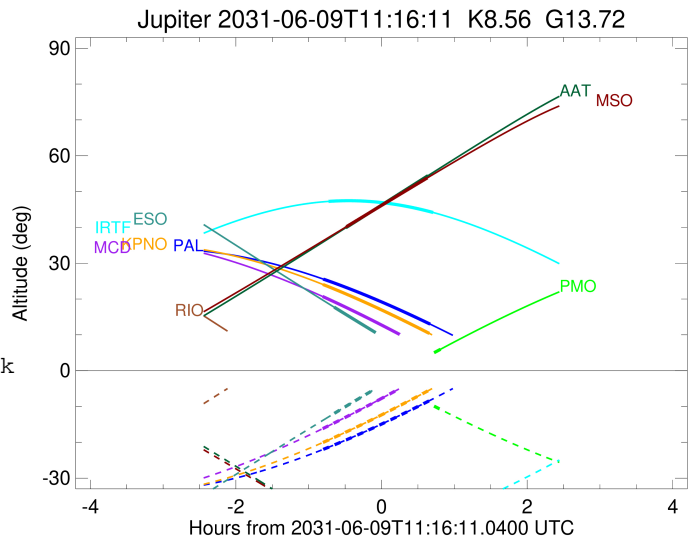
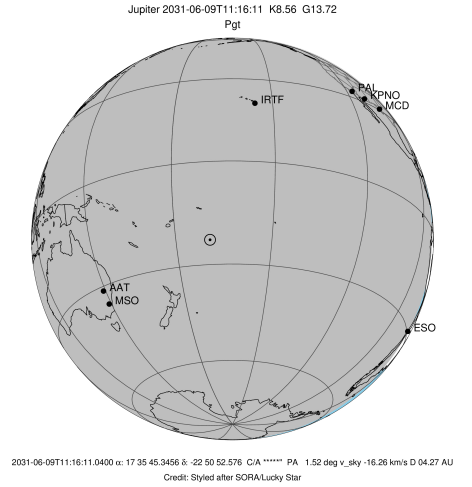


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T10:28:09.057	25.57	-21.97	71486.2	-52.13	-55.64
Jupiter	E	2031-06-09T11:56:14.208	12.99	-8.28	71486.2	-52.31	-55.81

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T11:22:13.660
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      : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor) : 0.78
K magnitude          : 8.561
G magnitude          : 13.724
RP magnitude         : 12.399
BP magnitude         : 15.763
DUPflag             : 0
Distance (au)       : 4.273
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.58
Sun-Moon sep (deg)  : 49.81
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 18.677
C/A sky separation (km) : 57875.5
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
    
```

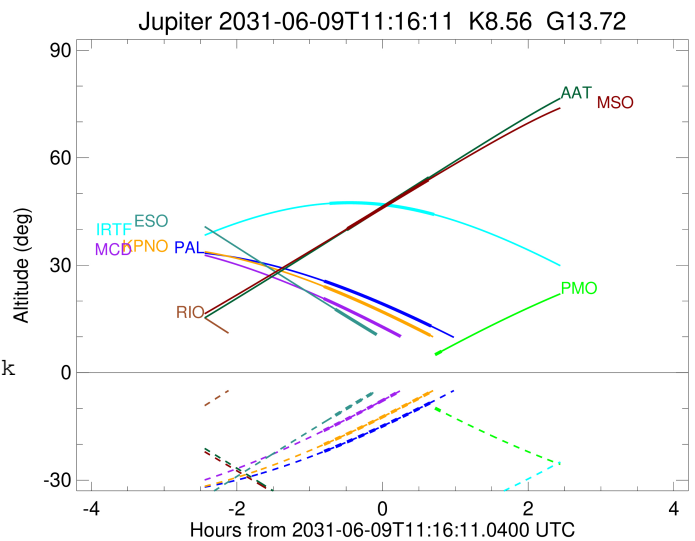
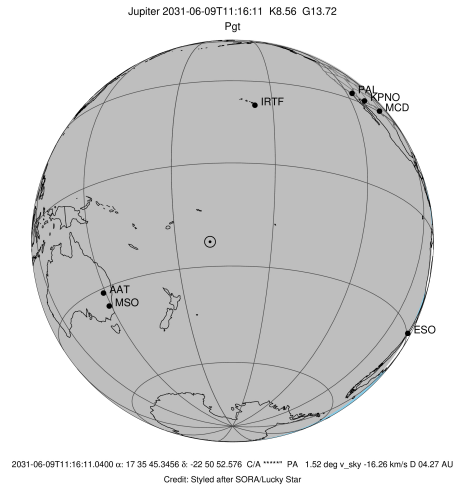


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T10:39:21.503	-10.37x	4.91x	71485.8	-54.76	-58.15
Jupiter	E	2031-06-09T12:04:53.905	5.99	-10.83	71486.0	-53.21	-56.67

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T11:11:40.610
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        : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.561
G magnitude           : 13.724
RP magnitude          : 12.399
BP magnitude          : 15.763
DUPflag              : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg)  : 173.58
Sun-Moon sep (deg)    : 49.11
B (ring opening deg) : -2.60
PA of pole (deg)      : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 18.316
C/A sky separation (km) : 56757.0
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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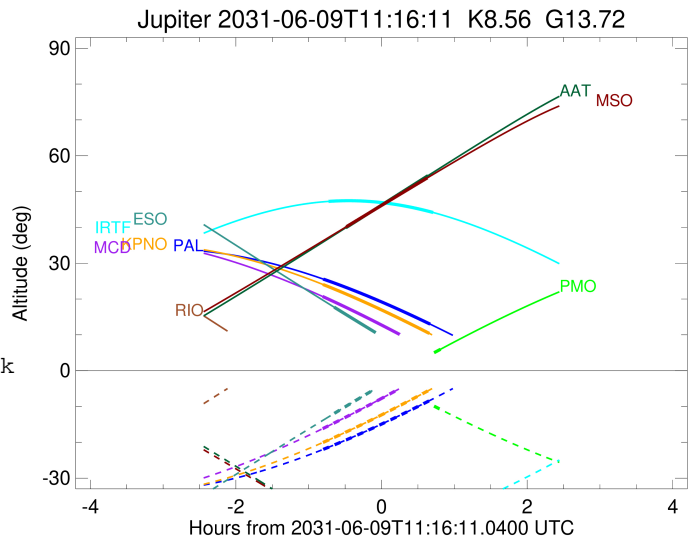
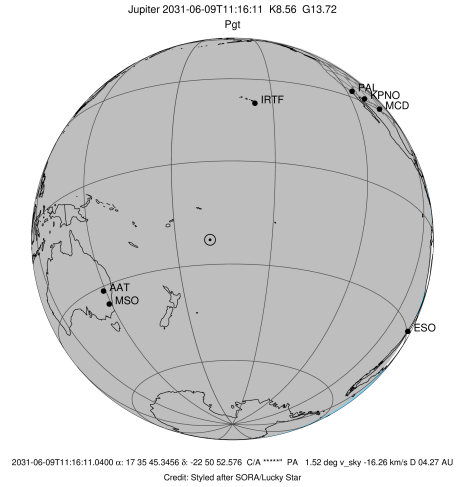


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T10:27:56.781	24.06	-20.04	71486.2	-52.39	-55.88
Jupiter	E	2031-06-09T11:55:33.469	10.40	-5.43	71486.1	-52.65	-56.13

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T11:11:07.200
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       : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.561
G magnitude           : 13.724
RP magnitude          : 12.399
BP magnitude          : 15.763
DUPflag              : 0
Distance (au)        : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.58
Sun-Moon sep (deg)   : 49.00
B (ring opening deg) : -2.60
PA of pole (deg)     : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 18.414
C/A sky separation (km) : 57062.0
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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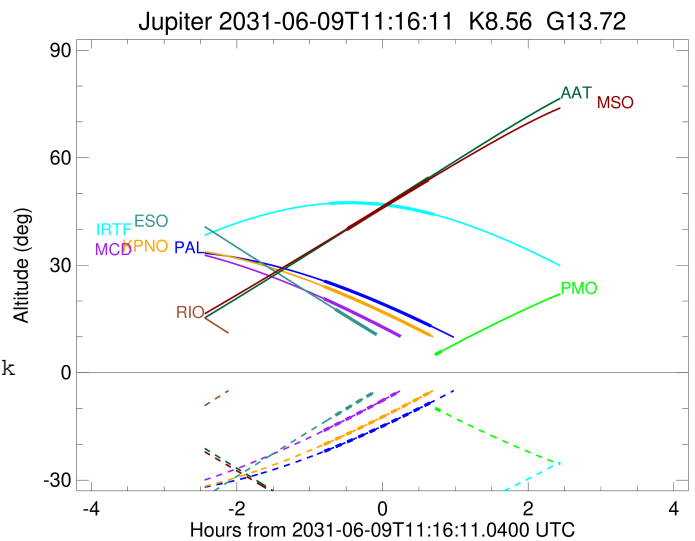
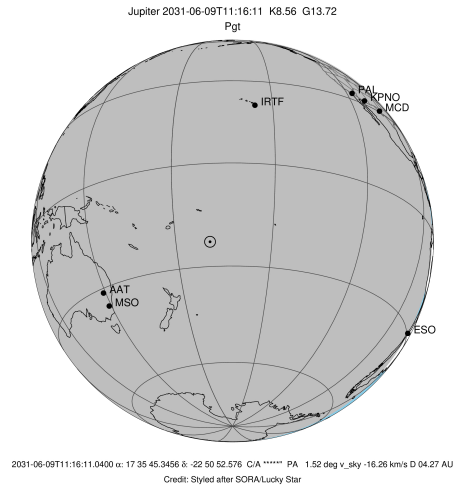


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T10:27:41.970	20.70	-16.19	71486.1	-52.73	-56.21
Jupiter	E	2031-06-09T11:54:42.455	5.82	-0.56x	71486.1	-53.09	-56.56

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T11:15:32.510
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        : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor)  : 0.78
K magnitude           : 8.561
G magnitude           : 13.724
RP magnitude          : 12.399
BP magnitude          : 15.763
DUPflag              : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -16.26
Sun-Target sep (deg)  : 173.58
Sun-Moon sep (deg)    : 49.80
B (ring opening deg)  : -2.60
PA of pole (deg)      : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 18.393
C/A sky separation (km) : 56995.5
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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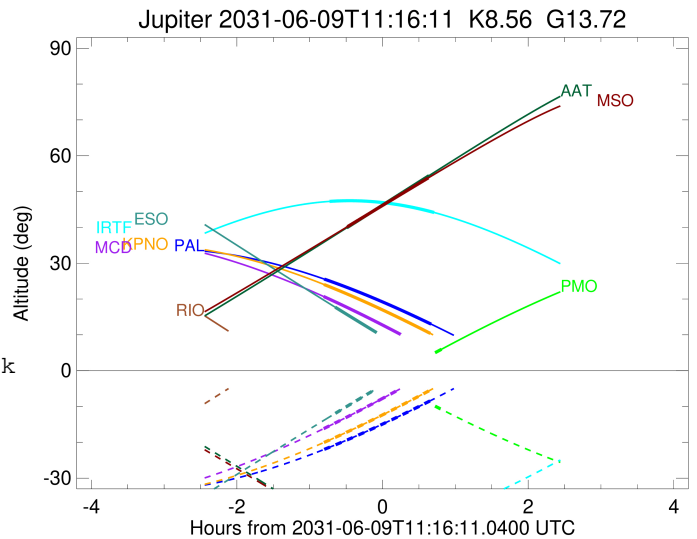
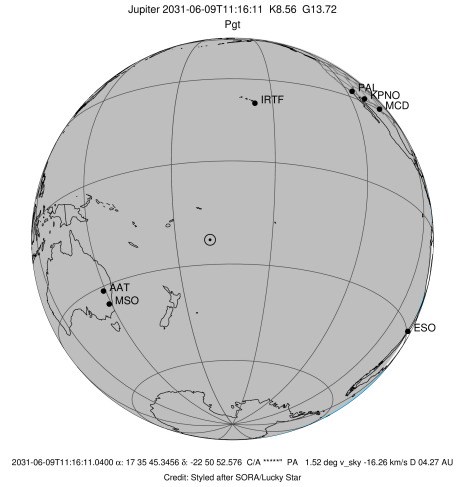


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T10:32:32.206	47.24	-47.28	71486.1	-53.07	-56.53
Jupiter	E	2031-06-09T11:58:33.928	44.16	-41.18	71486.1	-52.63	-56.11

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T11:09:46.350
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       : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.561
G magnitude           : 13.724
RP magnitude          : 12.399
BP magnitude          : 15.763
DUPflag              : 0
Distance (au)        : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.58
Sun-Moon sep (deg)   : 48.92
B (ring opening deg) : -2.60
PA of pole (deg)     : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 20.665
C/A sky separation (km): 64037.6
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
    
```

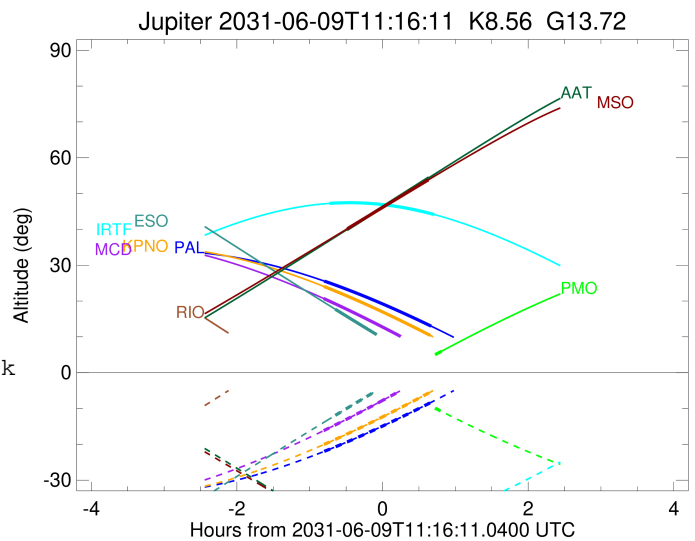
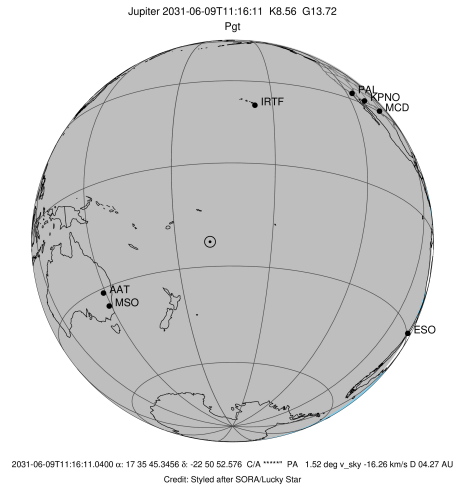


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T10:37:17.424	17.70	-11.92	71484.6	-63.20	-66.02
Jupiter	E	2031-06-09T11:42:22.290	4.32x	1.11x	71484.5	-63.80	-66.57

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T11:20:44.340
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       : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.561
G magnitude           : 13.724
RP magnitude         : 12.399
BP magnitude         : 15.763
DUPflag              : 0
Distance (au)        : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.58
Sun-Moon sep (deg)   : 50.32
B (ring opening deg) : -2.60
PA of pole (deg)     : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 20.333
C/A sky separation (km): 63007.4
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
    
```

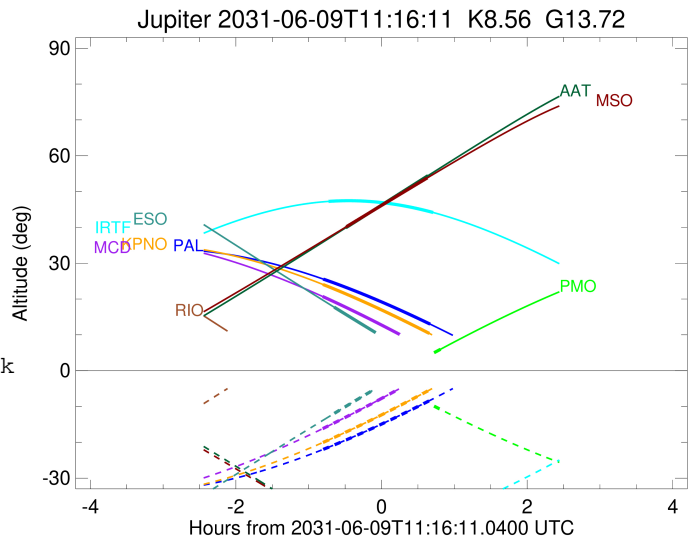
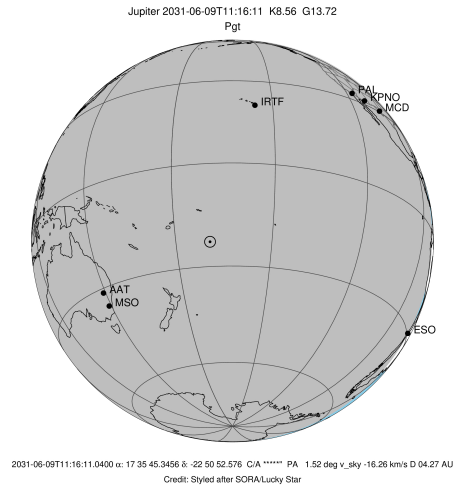


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T10:46:40.492	39.88	-45.88	71484.7	-62.39	-65.28
Jupiter	E	2031-06-09T11:54:42.433	54.47	-60.40	71484.9	-61.06	-64.05


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T11:20:31.950
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      : 4116787554070788224
2Mass ID (if available) : 17354535-2250522
ICRS Star Coord at Epoch: 17h 35m 45.34556s -22:50:52.57582s
RUWE (>1.4 is poor) : 0.78
K magnitude          : 8.561
G magnitude          : 13.724
RP magnitude         : 12.399
BP magnitude         : 15.763
DUPflag             : 0
Distance (au)       : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.58
Sun-Moon sep (deg)  : 50.30
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.77
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 20.465
C/A sky separation (km): 63415.8
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	2031-06-09T10:47:13.522	40.17	-45.92	71484.6	-63.07	-65.91
Jupiter	E	2031-06-09T11:53:45.109	53.77	-59.36	71484.8	-61.78	-64.71