

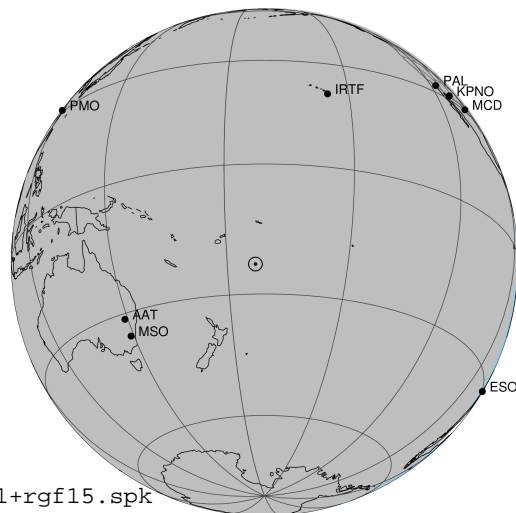
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-13T11:32:08.530
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4117454579672553984
 2Mass ID (if available) : 17333288-2249576

Jupiter 2031-06-13T11:32:08 K9.74 G14.37 Pgt

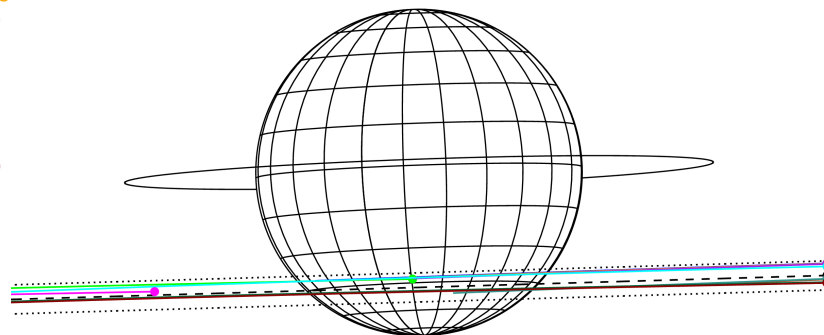
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s

RUWE (>1.4 is poor) : 1.30
 K magnitude : 9.742
 G magnitude : 14.370
 RP magnitude : 13.147
 BP magnitude : 15.869
 DUPflag : 0
 Distance (au) : 4.266
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.45
 Sun-Target sep (deg) : 177.89
 Sun-Moon sep (deg) : 104.87
 B (ring opening deg) : -2.60
 PA of pole (deg) : 2.01
 Pole direction: RA (deg): 268.05692
 Dec (deg): 64.49651
 C/A sky separation (") : 16.263
 C/A sky separation (km) : 50321.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-13T11:32:08 K9.74 G14.37
 Pgt



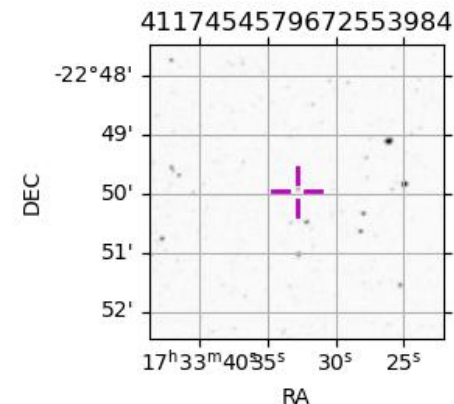
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 RIO
 ESO
 AAT
 MSO



2031-06-13T11:32:08.5300 α: 17 33 32.8531 δ: -22 49 57.766 C/A ***** PA 1.68 deg v_sky -16.45 km/s D 04.27 AU
 Credit: Styled after SORA/Lucky Star

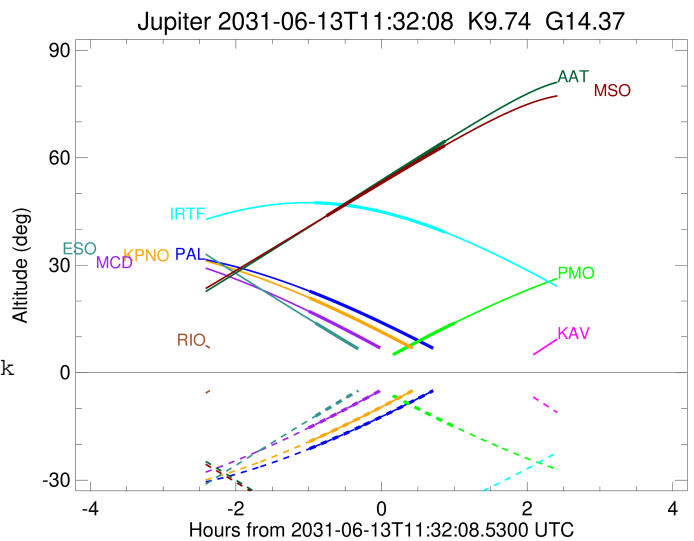
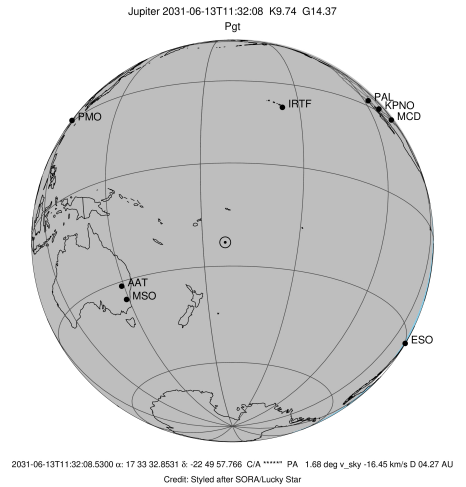
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 13 10:32 - JUN 13 10:32	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8	+	JUN 13 12:32 - JUN 13 12:32	Pne
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 13 10:32 - JUN 13 10:32	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 13 10:32 - JUN 13 10:32	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	JUN 13 10:36 - JUN 13 12:24	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 13 10:37 - JUN 13 10:37	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+	JUN 13 10:46 - JUN 13 12:24	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	JUN 13 10:47 - JUN 13 12:24	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-13T11:27:38.440
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        : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude           : 9.742
G magnitude           : 14.370
RP magnitude          : 13.147
BP magnitude          : 15.869
DUPflag               : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg)  : 177.89
Sun-Moon sep (deg)    : 105.27
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 14.785
C/A sky separation (km) : 45745.4
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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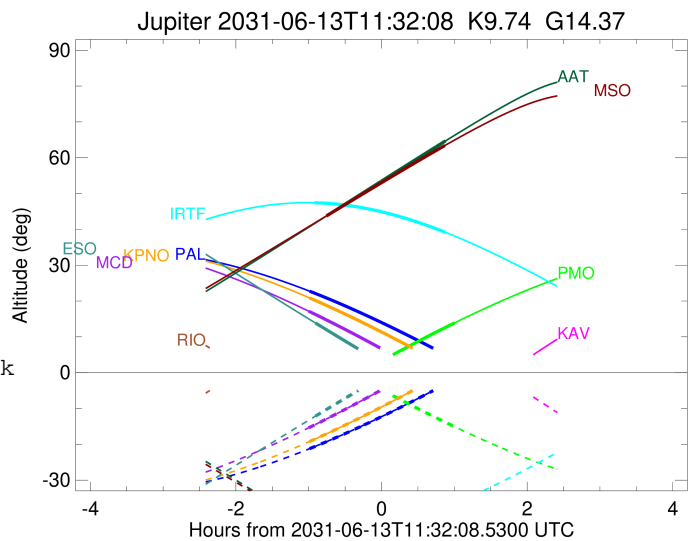
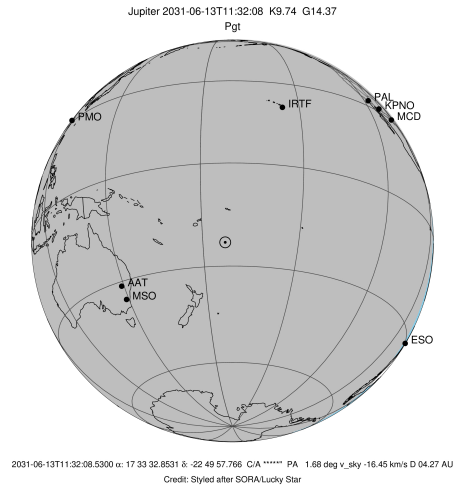


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-13T10:32:54.955	22.74	-21.21	71488.2	-39.72	-43.42
Jupiter	E	2031-06-13T12:22:36.528	5.41	-3.60x	71488.2	-39.84	-43.54

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-13T11:37:46.700
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      : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude         : 9.742
G magnitude         : 14.370
RP magnitude        : 13.147
BP magnitude        : 15.869
DUPflag            : 0
Distance (au)       : 4.266
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg) : 177.89
Sun-Moon sep (deg)  : 104.74
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 15.061
C/A sky separation (km) : 46600.2
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
    
```

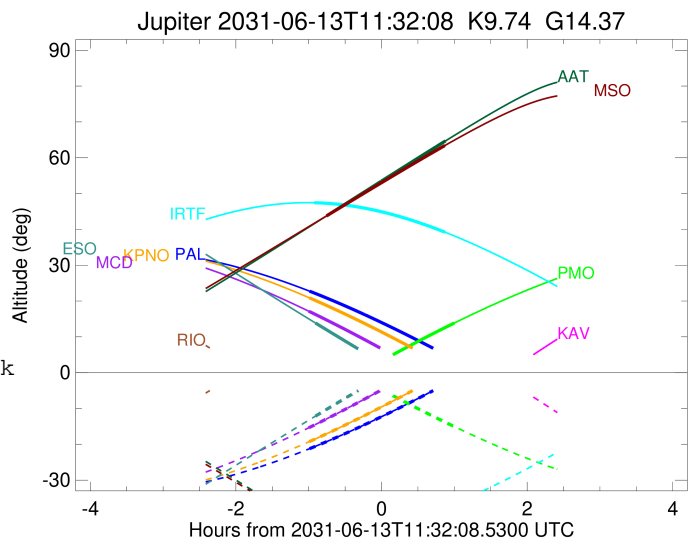
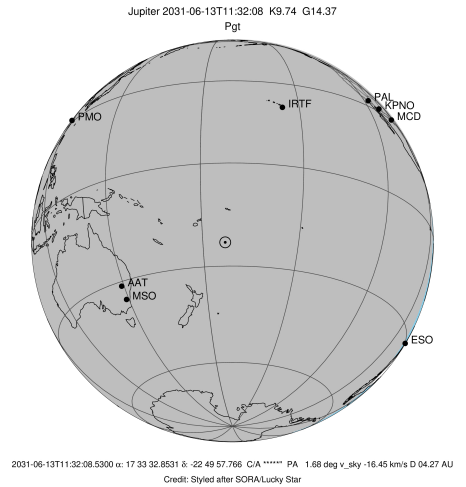


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-13T10:43:09.837	-6.07x	4.48x	71487.9	-41.48	-45.20
Jupiter	E	2031-06-13T12:32:05.711	13.85	-15.04	71488.2	-39.82	-43.53

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-13T11:27:15.220
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      : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude         : 9.742
G magnitude         : 14.370
RP magnitude        : 13.147
BP magnitude        : 15.869
DUPflag            : 0
Distance (au)       : 4.266
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg) : 177.89
Sun-Moon sep (deg)  : 105.24
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 14.865
C/A sky separation (km) : 45992.6
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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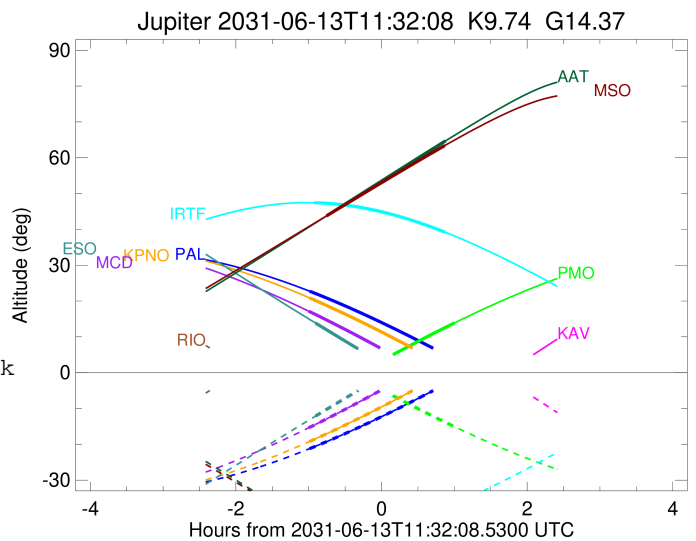
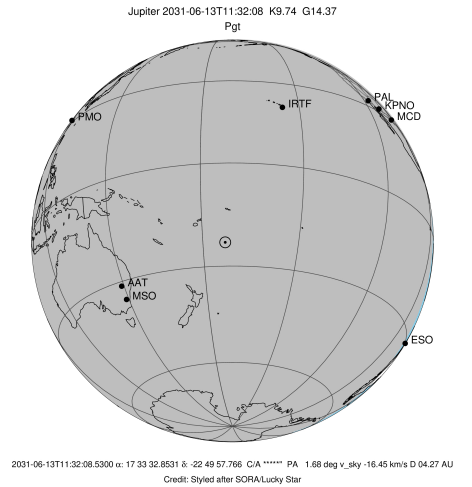


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-13T10:32:39.632	20.89	-19.25	71488.2	-39.93	-43.64
Jupiter	E	2031-06-13T12:22:06.604	2.38x	-0.51x	71488.2	-40.13	-43.84

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-13T11:26:47.900
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        : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude           : 9.742
G magnitude           : 14.370
RP magnitude          : 13.147
BP magnitude          : 15.869
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg)  : 177.89
Sun-Moon sep (deg)    : 105.18
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 14.972
C/A sky separation (km) : 46324.1
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
    
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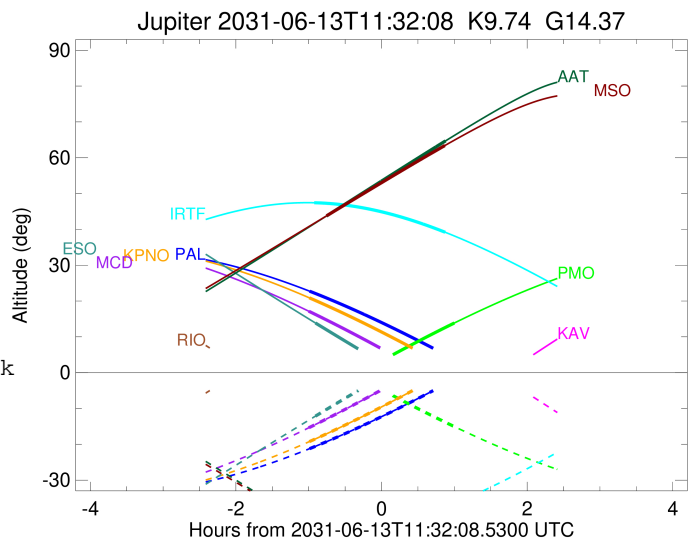
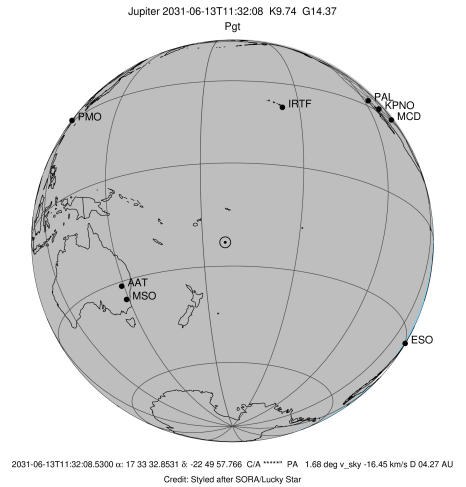


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-13T10:32:21.245	17.13	-15.36	71488.1	-40.23	-43.94
Jupiter	E	2031-06-13T12:21:31.743	-2.71x	4.64x	71488.1	-40.51	-44.23

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-13T11:30:35.920
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       : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude           : 9.742
G magnitude           : 14.370
RP magnitude          : 13.147
BP magnitude          : 15.869
DUPflag              : 0
Distance (au)        : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg) : 177.89
Sun-Moon sep (deg)   : 105.59
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 14.882
C/A sky separation (km) : 46046.0
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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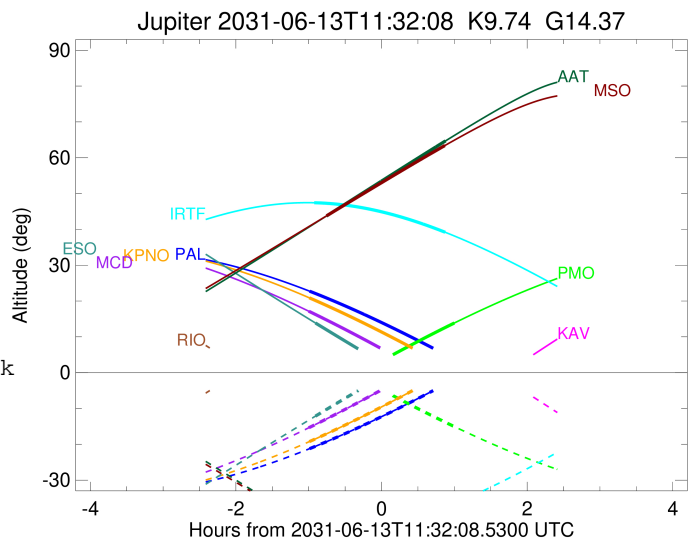
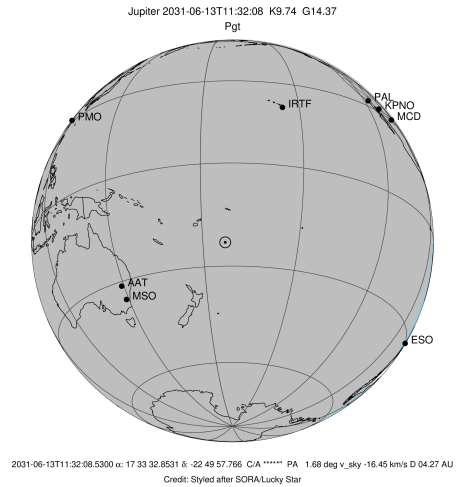


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-13T10:36:39.588	47.43	-46.94	71488.1	-40.33	-44.04
Jupiter	E	2031-06-13T12:24:37.059	39.19	-37.69	71488.2	-39.90	-43.61

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-13T11:25:57.420
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        : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude           : 9.742
G magnitude           : 14.370
RP magnitude          : 13.147
BP magnitude          : 15.869
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg) : 177.89
Sun-Moon sep (deg)   : 105.13
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 17.244
C/A sky separation (km) : 53354.8
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
    
```

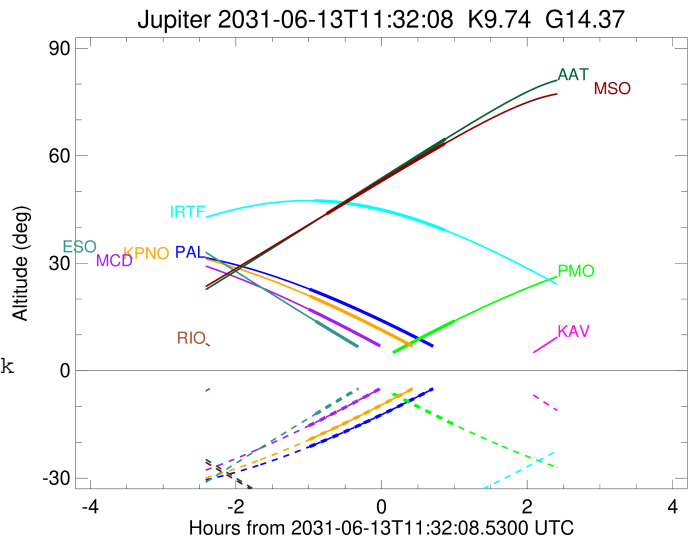
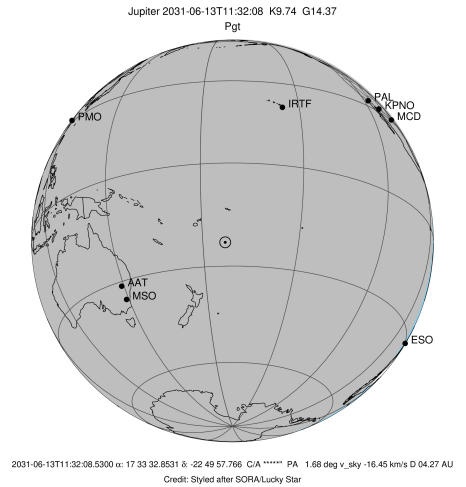


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-13T10:37:42.500	13.86	-12.13	71486.9	-47.99	-51.63
Jupiter	E	2031-06-13T12:14:27.698	-5.46x	6.91x	71486.8	-48.43	-52.06

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-13T11:35:55.930
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        : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude           : 9.742
G magnitude           : 14.370
RP magnitude          : 13.147
BP magnitude          : 15.869
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg)  : 177.89
Sun-Moon sep (deg)    : 105.47
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 16.743
C/A sky separation (km) : 51804.0
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
    
```

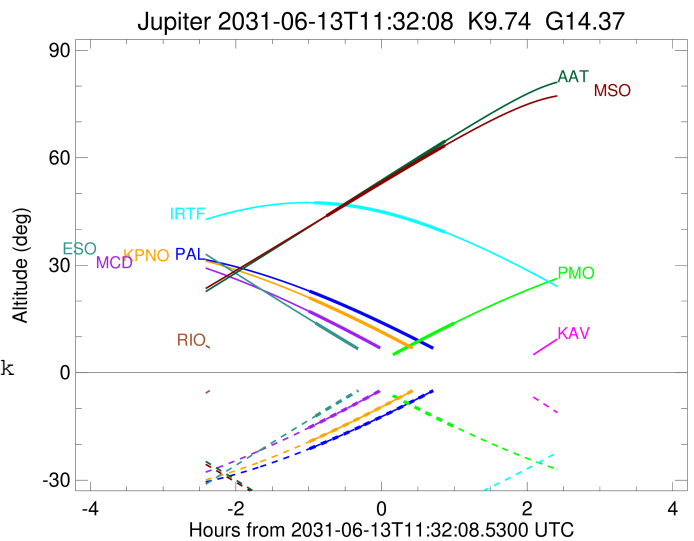
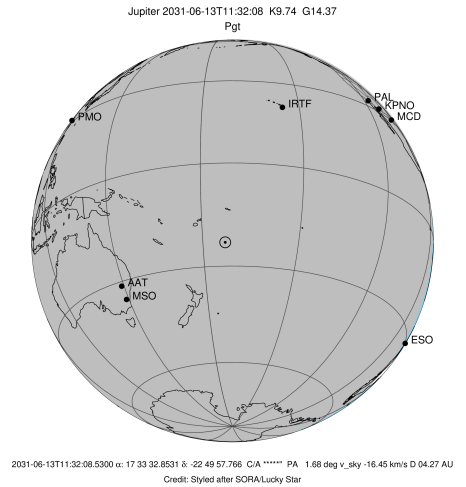


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-13T10:46:52.396	43.75	-45.85	71487.0	-47.11	-50.77
Jupiter	E	2031-06-13T12:24:49.555	64.67	-66.68	71487.3	-45.74	-49.43


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-13T11:35:45.530
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        : 4117454579672553984
2Mass ID (if available) : 17333288-2249576
ICRS Star Coord at Epoch: 17h 33m 32.85309s -22:49:57.76642s
RUWE (>1.4 is poor) : 1.30
K magnitude           : 9.742
G magnitude           : 14.370
RP magnitude          : 13.147
BP magnitude          : 15.869
DUPflag               : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg)  : 177.89
Sun-Moon sep (deg)    : 105.47
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.01
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 16.878
C/A sky separation (km) : 52221.5
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	2031-06-13T10:47:06.157	43.82	-45.86	71487.0	-47.57	-51.23
Jupiter	E	2031-06-13T12:24:15.557	63.38	-65.27	71487.2	-46.24	-49.92