

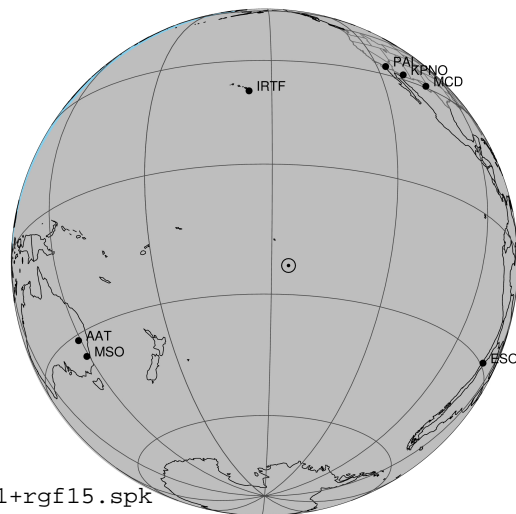
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-20T09:44:49.180
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4117504195133384576
 2Mass ID (if available) : 17294293-2248012

Jupiter 2031-06-20T09:44:49 K8.97 G13.85 Pgt

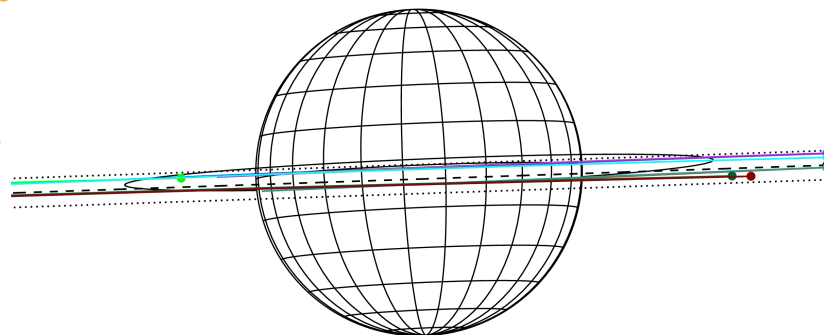
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s

RUWE (>1.4 is poor) : 0.92
 K magnitude : 8.972
 G magnitude : 13.848
 RP magnitude : 12.629
 BP magnitude : 15.485
 DUPflag : 0
 Distance (au) : 4.266
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.36
 Sun-Target sep (deg) : 174.54
 Sun-Moon sep (deg) : 169.10
 B (ring opening deg) : -2.59
 PA of pole (deg) : 2.42
 Pole direction: RA (deg): 268.05691
 Dec (deg): 64.49651
 C/A sky separation (") : 0.932
 C/A sky separation (km) : 2884.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-20T09:44:49 K8.97 G13.85
 Pgt



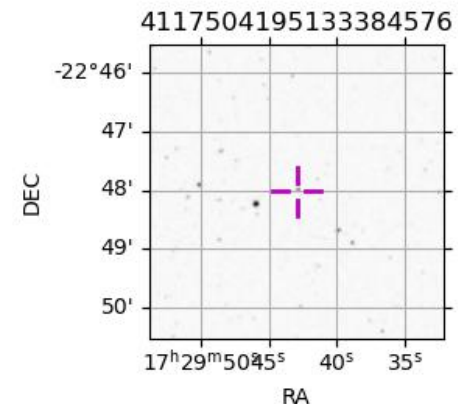
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 RIO
 ESO
 AAT
 MSO



2031-06-20T09:44:49.1800 a: 17 29 42.92011 s: -22 48 01.348 C/A 0.944" PA 1.96 deg v_sky -16.36 km/s D 04.27 AU
 Credit: Styled after SORA/Lucky Star

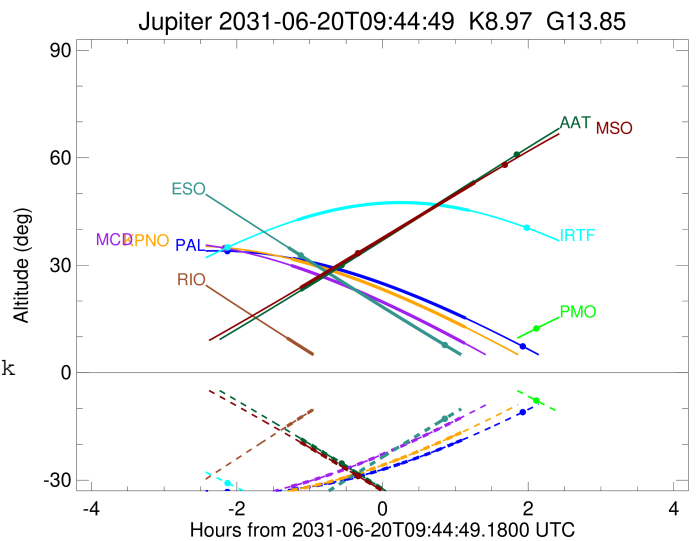
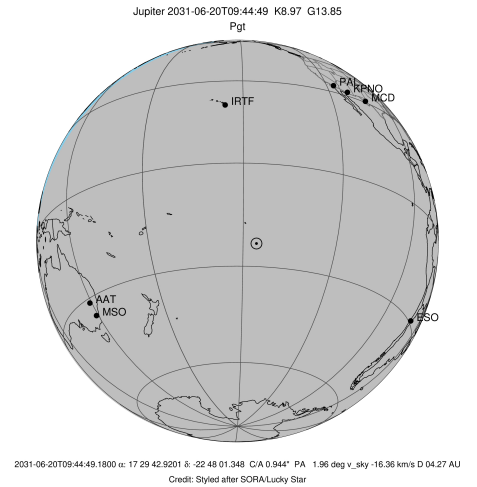
Observable events with sun below -5 deg and altitude above 5 deg

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 20 08:30 - JUN 20 10:53	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUN 20 08:30 - JUN 20 10:53	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUN 20 08:29 - JUN 20 10:52	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUN 20 08:34 - JUN 20 10:56	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUN 20 08:26 - JUN 20 08:26	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 20 08:27 - JUN 20 08:27	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	JUN 20 08:37 - JUN 20 11:01	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUN 20 08:37 - JUN 20 11:00	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-20T09:41:56.130
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        : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.972
G magnitude           : 13.848
RP magnitude          : 12.629
BP magnitude          : 15.485
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg) : 174.54
Sun-Moon sep (deg)   : 168.61
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 0.689
C/A sky separation (km): 2133.0
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
    
```

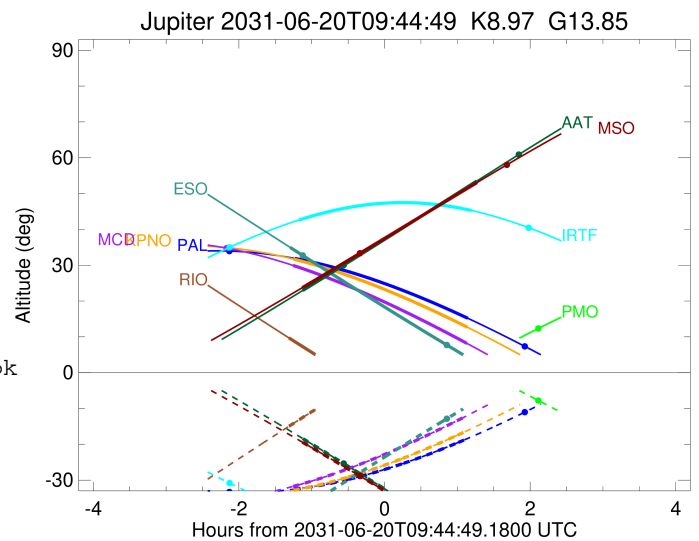
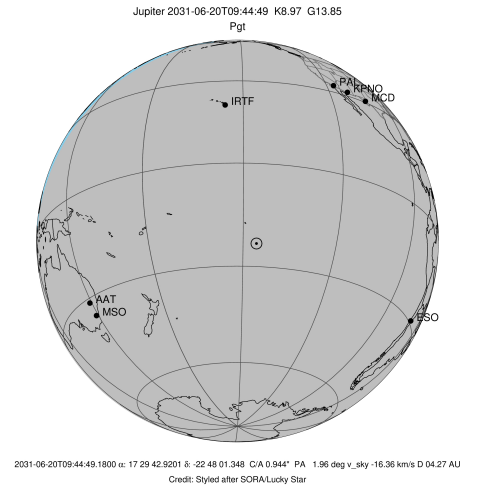


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T08:30:39.285	31.89	-32.53	71492.0	1.42	1.62
Jupiter	E	2031-06-20T10:53:30.585	15.18	-18.34	71492.0	1.85	2.12

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-20T09:41:29.060
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        : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.972
G magnitude           : 13.848
RP magnitude          : 12.629
BP magnitude          : 15.485
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg) : 174.54
Sun-Moon sep (deg)   : 168.55
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 0.627
C/A sky separation (km): 1941.0
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
    
```

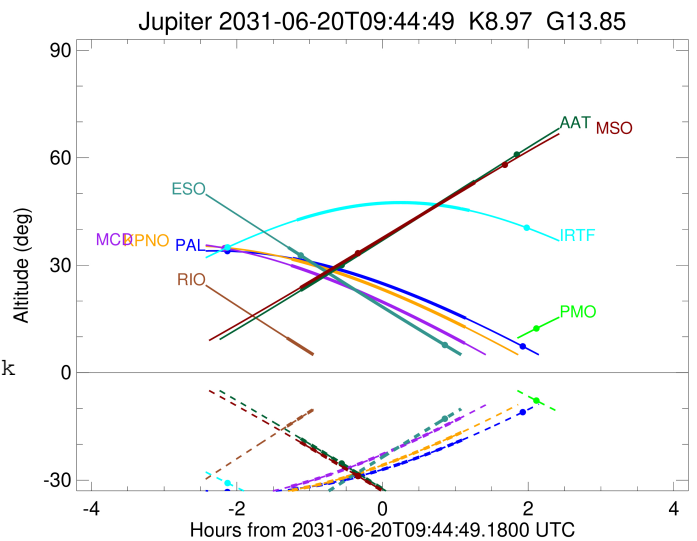
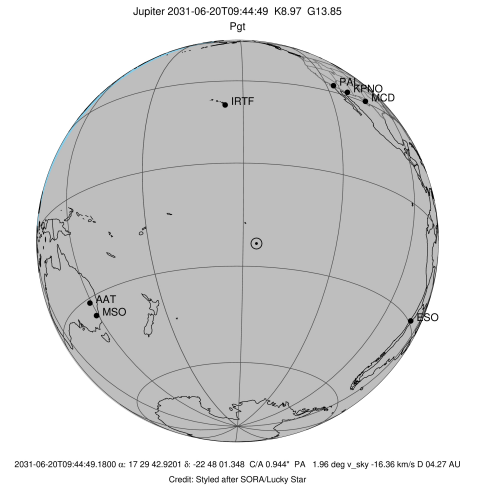


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T08:30:09.218	31.68	-32.81	71492.0	1.31	1.50
Jupiter	E	2031-06-20T10:53:09.112	12.68	-16.15	71492.0	1.66	1.89

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-20T09:40:53.860
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        : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.972
G magnitude           : 13.848
RP magnitude          : 12.629
BP magnitude          : 15.485
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg)  : 174.54
Sun-Moon sep (deg)    : 168.48
B (ring opening deg) : -2.59
PA of pole (deg)      : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (" ) : 0.543
C/A sky separation (km) : 1679.8
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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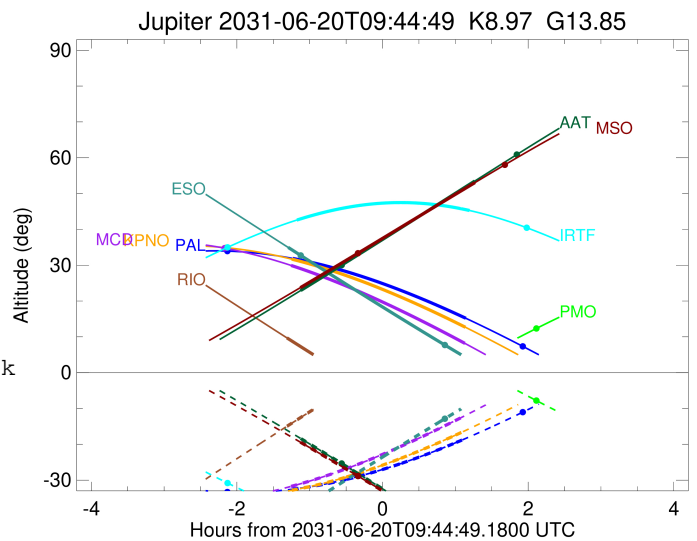
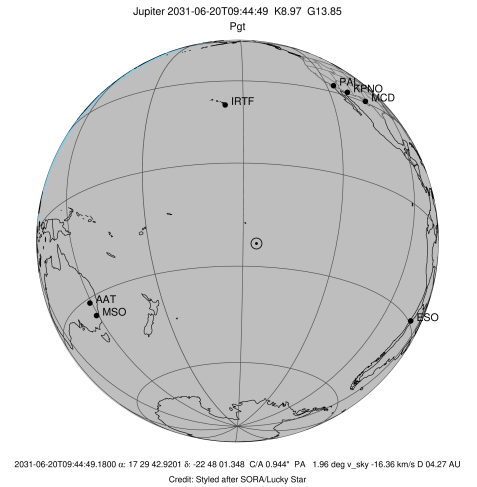


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T08:29:27.596	29.94	-31.75	71492.0	1.17	1.33
Jupiter	E	2031-06-20T10:52:43.793	8.17	-12.01	71492.0	1.39	1.60

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-20T09:45:20.370
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        : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.972
G magnitude           : 13.848
RP magnitude          : 12.629
BP magnitude          : 15.485
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg)  : 174.54
Sun-Moon sep (deg)   : 169.14
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 0.456
C/A sky separation (km) : 1409.7
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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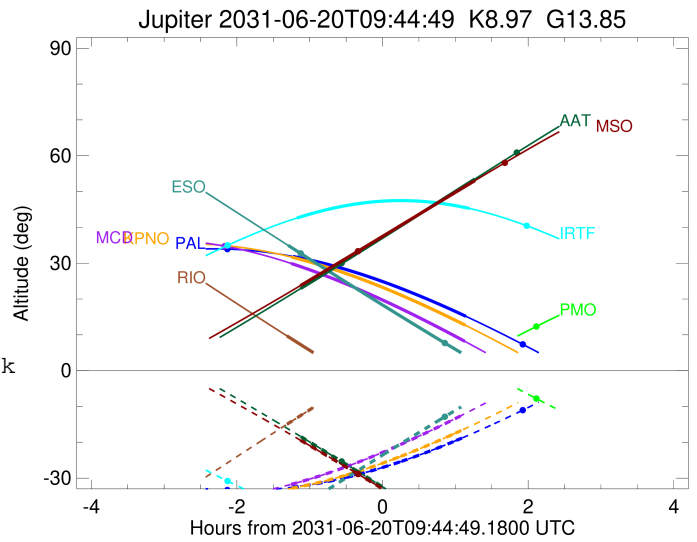
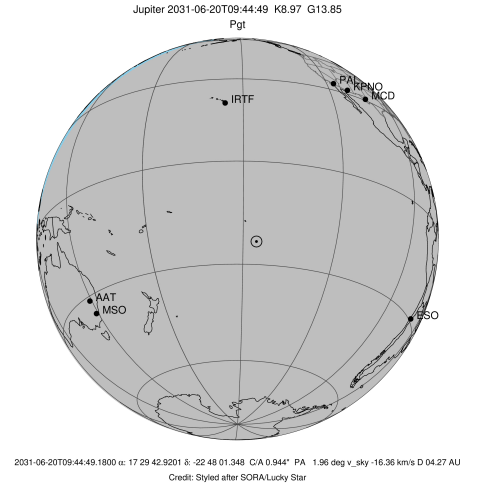


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T08:34:20.852	42.61	-39.33	71492.0	0.49	0.56
Jupiter	E	2031-06-20T10:56:17.912	45.28	-46.13	71492.0	1.59	1.82

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-20T09:38:56.660
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : RIO
Location             : Rio de Janeiro
Latitude (deg)       : -22.89506
E. Longitude (deg)   : 316.77708
Altitude (km)        : 0.033
Gaia source ID       : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 8.972
G magnitude           : 13.848
RP magnitude         : 12.629
BP magnitude         : 15.485
DUPflag             : 0
Distance (au)        : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg) : 174.54
Sun-Moon sep (deg)   : 168.39
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 1.826
C/A sky separation (km) : 5650.7
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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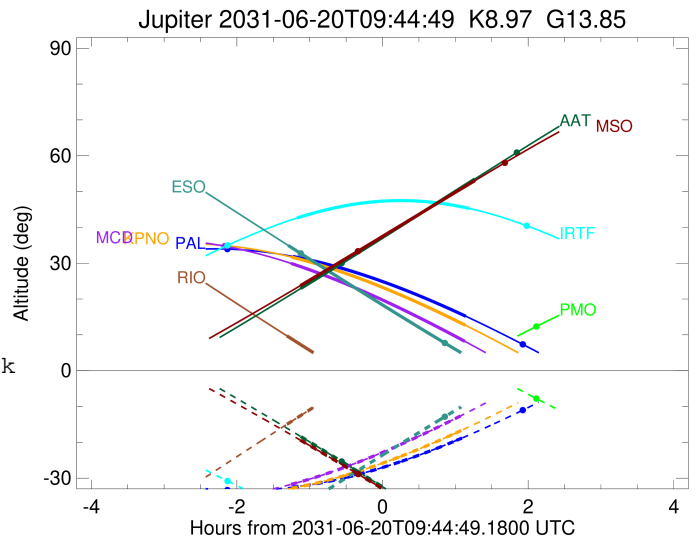
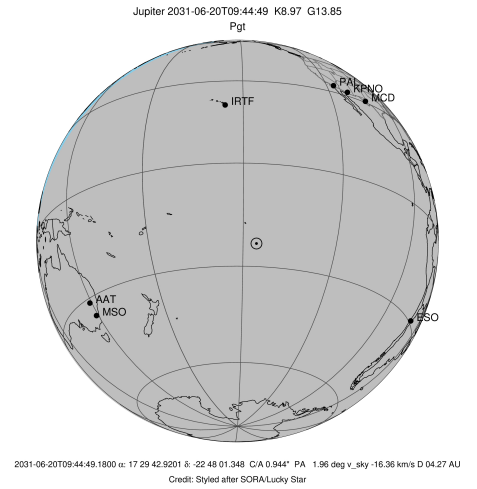


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T08:26:05.479	9.70	-14.97	71491.9	-4.42	-5.05
Jupiter	E	2031-06-20T10:52:23.888	-20.05x	15.22x	71491.9	-4.61	-5.26

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-20T09:39:06.800
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       : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 8.972
G magnitude          : 13.848
RP magnitude         : 12.629
BP magnitude         : 15.485
DUPflag             : 0
Distance (au)        : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg) : 174.54
Sun-Moon sep (deg)   : 168.47
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 1.674
C/A sky separation (km): 5180.8
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
    
```

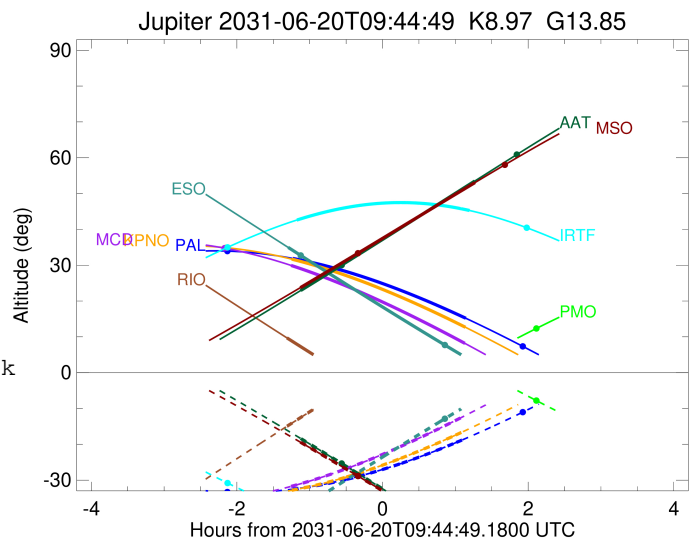
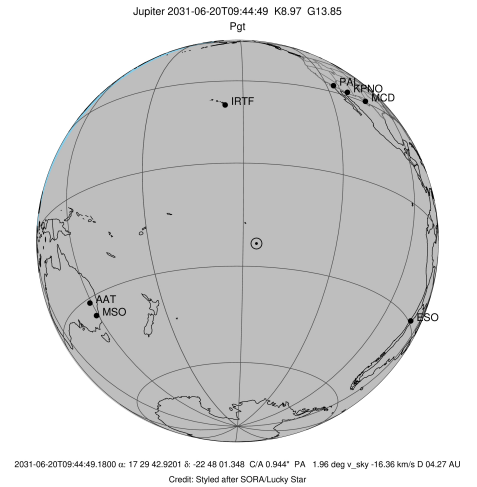


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T08:27:04.721	34.96	-40.22	71492.0	-4.12	-4.71
Jupiter	E	2031-06-20T10:51:42.556	4.58x	-9.68	71492.0	-4.23	-4.84

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-20T09:49:31.030
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        : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.972
G magnitude           : 13.848
RP magnitude          : 12.629
BP magnitude          : 15.485
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg) : 174.54
Sun-Moon sep (deg)   : 169.88
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 1.597
C/A sky separation (km): 4940.7
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
    
```

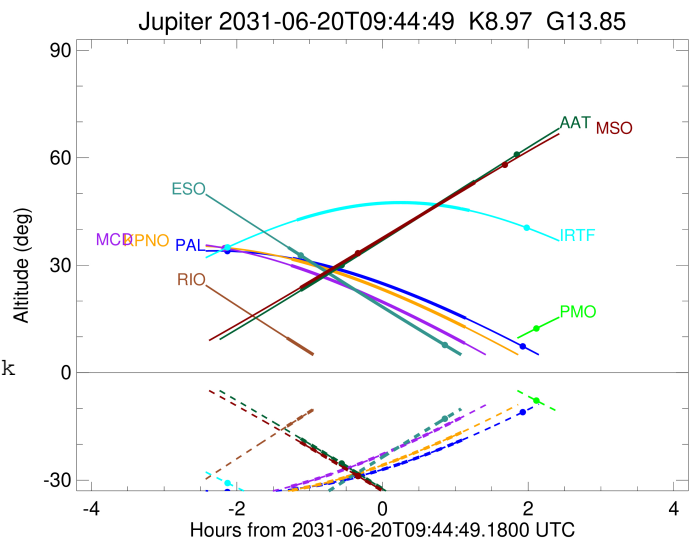
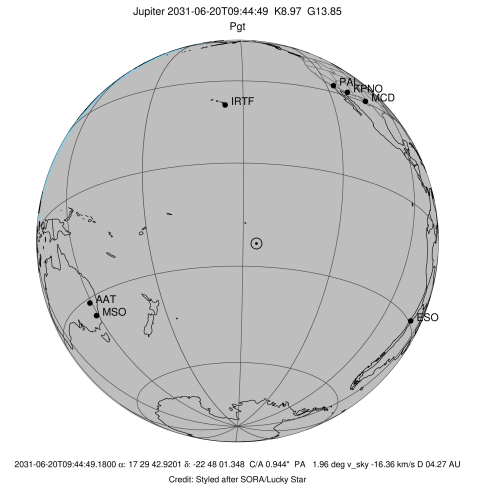


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T08:37:30.615	22.96	-18.39	71491.9	-4.93	-5.64
Jupiter	E	2031-06-20T11:01:04.461	53.52	-48.64	71492.0	-3.06	-3.50


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-20T09:49:17.910
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       : 4117504195133384576
2Mass ID (if available) : 17294293-2248012
ICRS Star Coord at Epoch: 17h 29m 42.92011s -22:48:01.34840s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.972
G magnitude           : 13.848
RP magnitude          : 12.629
BP magnitude          : 15.485
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.36
Sun-Target sep (deg)  : 174.54
Sun-Moon sep (deg)   : 169.87
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.42
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 1.724
C/A sky separation (km) : 5333.5
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	2031-06-20T08:37:17.247	23.76	-19.43	71491.9	-5.23	-5.97
Jupiter	E	2031-06-20T11:00:52.771	53.03	-48.47	71492.0	-3.40	-3.88