

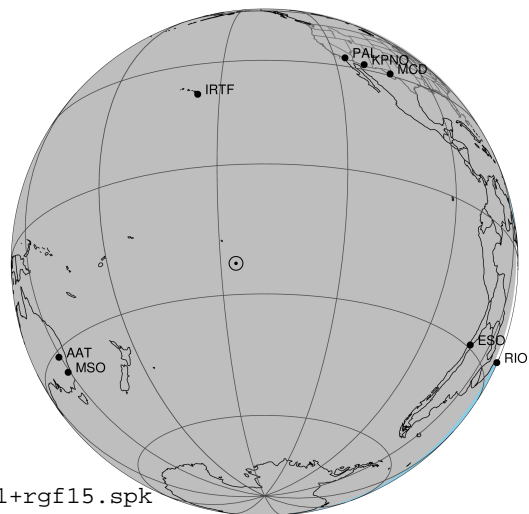
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-09T09:44:03.240  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4116787489733097472  
 2Mass ID (if available) : 17354748-2250357

Jupiter 2031-06-09T09:44:03 K9.59 G14.52 Pgt

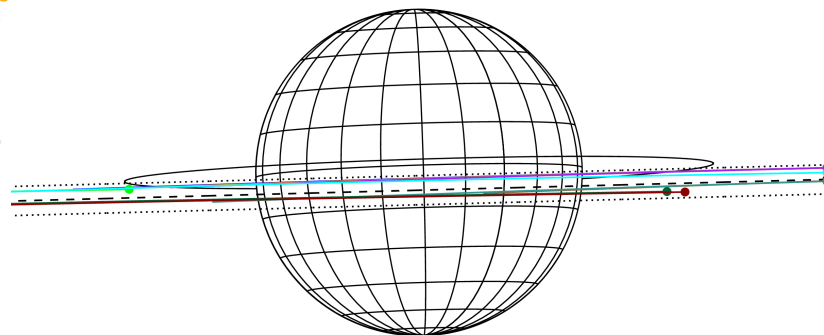
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s

RUWE (>1.4 is poor) : 0.95  
 K magnitude : 9.592  
 G magnitude : 14.521  
 RP magnitude : 13.279  
 BP magnitude : 16.236  
 DUPflag : 0  
 Distance (au) : 4.273  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.26  
 Sun-Target sep (deg) : 173.51  
 Sun-Moon sep (deg) : 48.41  
 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 (") : 2.505  
 C/A sky separation (km) : 7763.2  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-06-09T09:44:03 K9.59 G14.52  
 Pgt



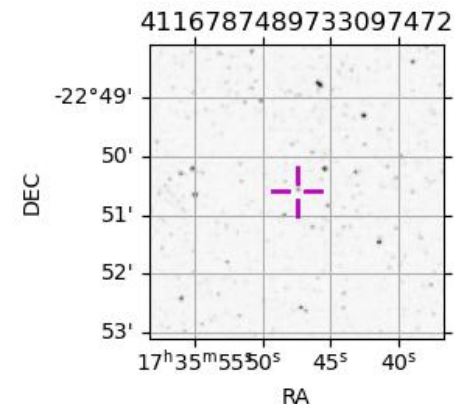
Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 RIO  
 ESO  
 AAT  
 MSO



2031-06-09T09:44:03.2400 a: 17 35 47.4765 s -22 50 36.072 C/A 2.517" PA 1.52 deg v\_sky -16.26 km/s D 04.27 AU  
 Credit: Styled after SORA/Lucky Star

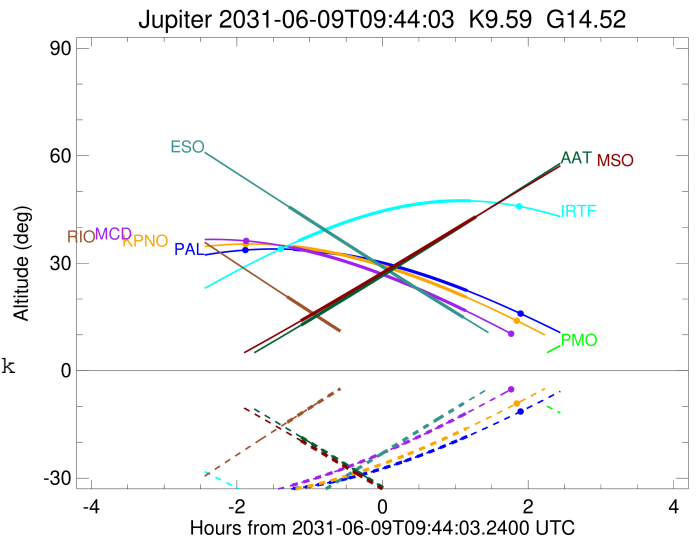
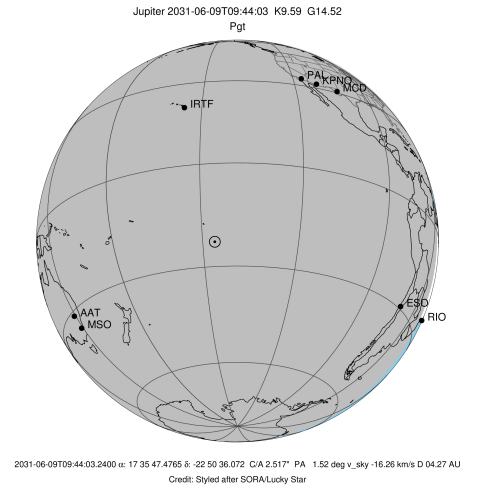
Observable events with sun below -5 deg and altitude above 5 deg

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 08:30 - JUN 09 10:53	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUN 09 08:30 - JUN 09 10:53	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUN 09 08:29 - JUN 09 10:52	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUN 09 08:34 - JUN 09 10:57	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUN 09 08:25 - JUN 09 08:25	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUN 09 08:27 - JUN 09 10:50	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	JUN 09 08:37 - JUN 09 11:01	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUN 09 08:36 - JUN 09 11:00	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T09:42:08.210
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       : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 9.592
G magnitude           : 14.521
RP magnitude         : 13.279
BP magnitude         : 16.236
DUPflag              : 0
Distance (au)        : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)   : 48.54
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 ("): 0.833
C/A sky separation (km): 2580.9
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
    
```

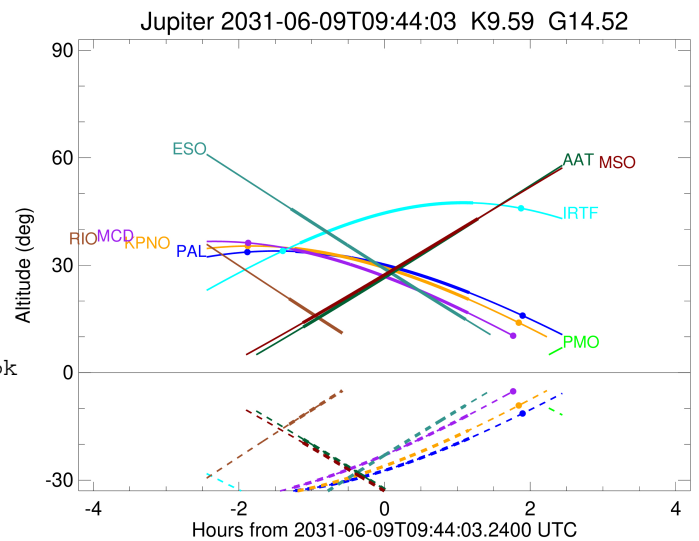
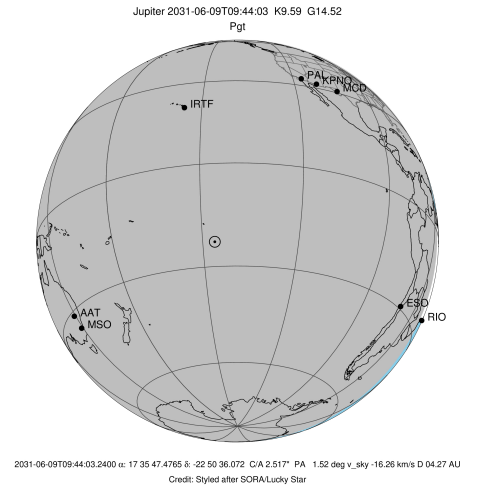


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T08:30:34.091	33.84	-32.93	71492.0	-2.23	-2.55
Jupiter	E	2031-06-09T10:53:52.945	22.32	-18.33	71492.0	-2.06	-2.35

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T09:41:38.680
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       : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 9.592
G magnitude          : 14.521
RP magnitude         : 13.279
BP magnitude         : 16.236
DUPflag             : 0
Distance (au)        : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)   : 48.48
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 ("): 0.883
C/A sky separation (km): 2737.3
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
    
```

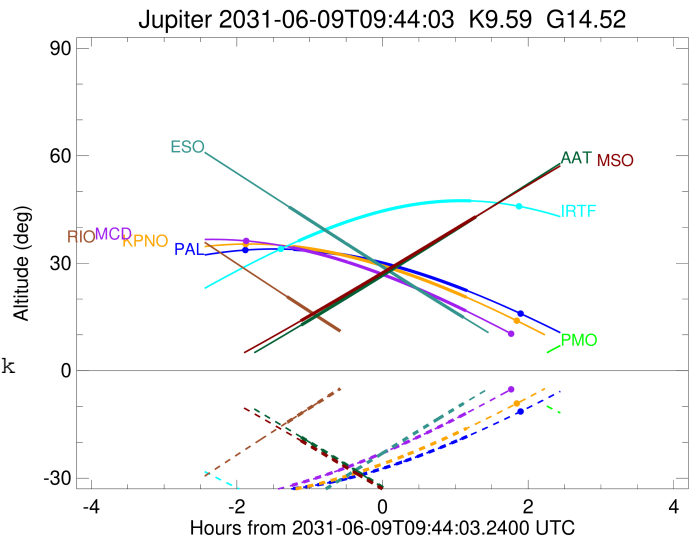
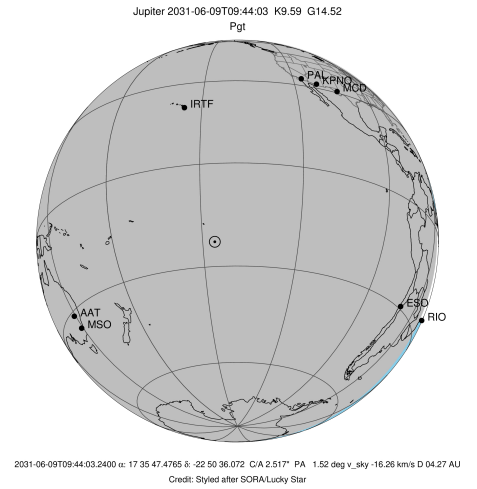


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T08:30:04.116	34.67	-33.16	71492.0	-2.31	-2.64
Jupiter	E	2031-06-09T10:53:26.662	20.46	-16.10	71492.0	-2.23	-2.55

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T09:40:58.480
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      : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 9.592
G magnitude          : 14.521
RP magnitude         : 13.279
BP magnitude         : 16.236
DUPflag             : 0
Distance (au)       : 4.273
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)  : 48.39
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 (" ) : 0.952
C/A sky separation (km) : 2950.0
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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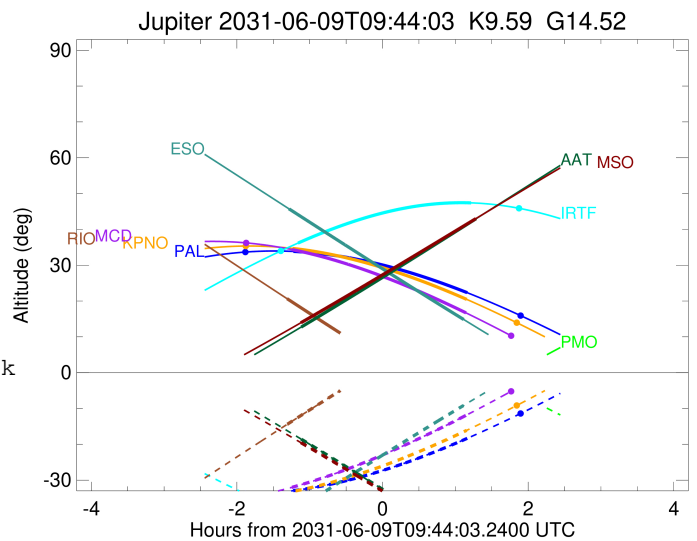
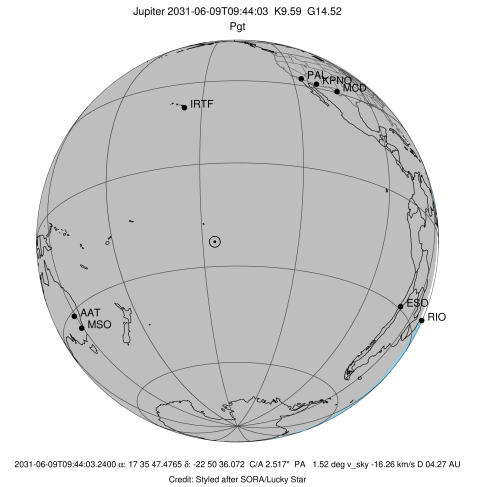


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T08:29:20.972	34.36	-32.01	71492.0	-2.41	-2.76
Jupiter	E	2031-06-09T10:52:53.273	16.69	-11.91	71492.0	-2.46	-2.81

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T09:45:50.920
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        : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 9.592
G magnitude           : 14.521
RP magnitude          : 13.279
BP magnitude          : 16.236
DUPflag               : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg)  : 173.51
Sun-Moon sep (deg)    : 49.08
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 (" ) : 1.154
C/A sky separation (km) : 3575.8
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
    
```

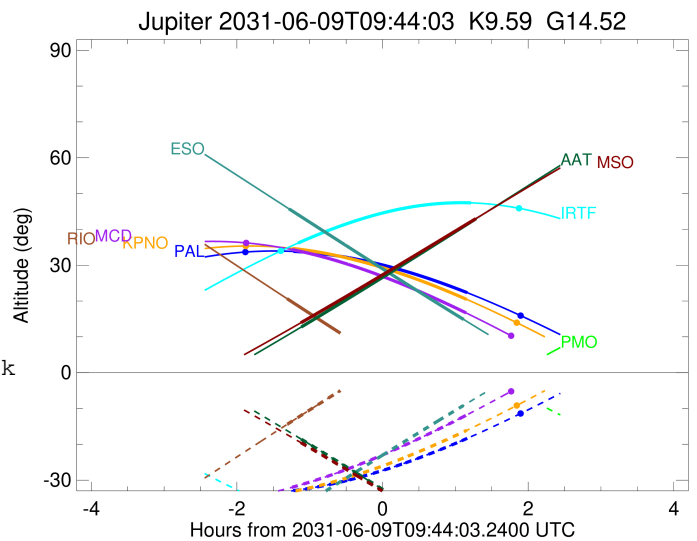
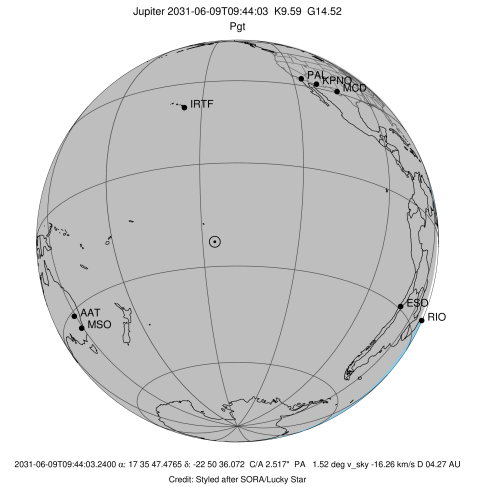


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T08:34:23.634	36.16	-40.05	71492.0	-3.39	-3.88
Jupiter	E	2031-06-09T10:57:07.672	47.39	-46.47	71492.0	-2.51	-2.87

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T09:37:53.000
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       : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 9.592
G magnitude           : 14.521
RP magnitude          : 13.279
BP magnitude          : 16.236
DUPflag              : 0
Distance (au)        : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)   : 47.86
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 (") : 3.251
C/A sky separation (km) : 10074.6
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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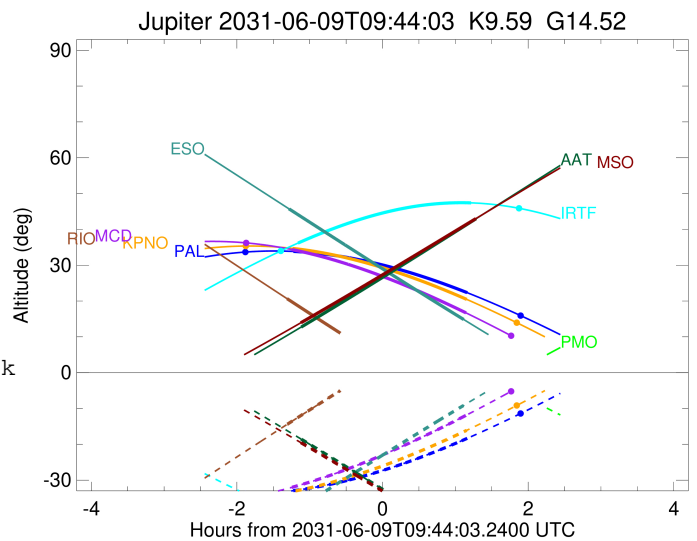
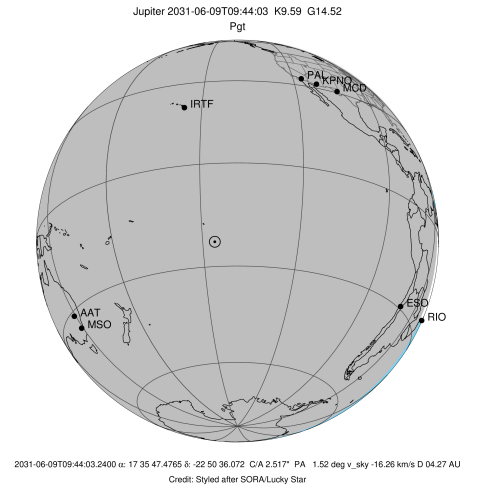


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T08:25:30.366	20.63	-14.42	71491.8	-7.77	-8.86
Jupiter	E	2031-06-09T10:50:51.292	-10.23x	15.65x	71491.8	-8.42	-9.61

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T09:38:39.770
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      : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 9.592
G magnitude          : 14.521
RP magnitude         : 13.279
BP magnitude         : 16.236
DUPflag             : 0
Distance (au)       : 4.273
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)  : 48.25
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 ("): 3.117
C/A sky separation (km): 9658.2
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
    
```



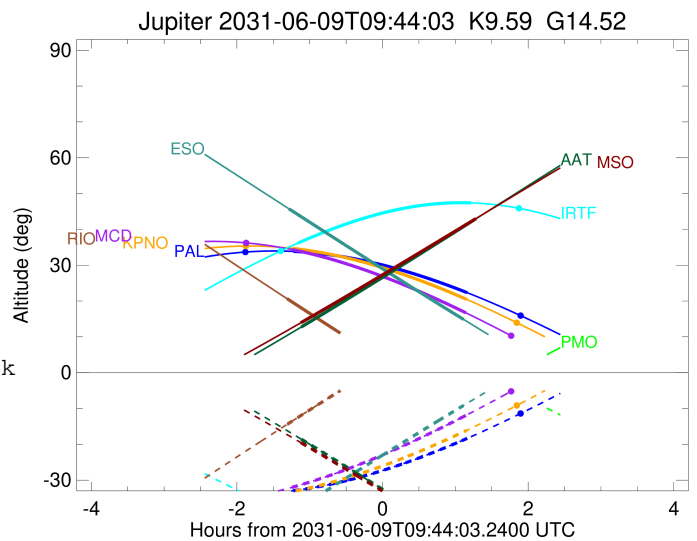
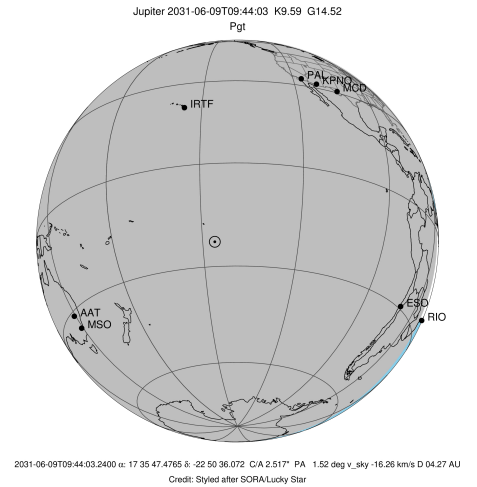
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T08:27:00.875	45.72	-39.56	71491.8	-7.56	-8.63
Jupiter	E	2031-06-09T10:50:48.575	14.87	-9.16	71491.8	-8.03	-9.17



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T09:49:21.780
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        : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor)  : 0.95
K magnitude           : 9.592
G magnitude           : 14.521
RP magnitude          : 13.279
BP magnitude          : 16.236
DUPflag              : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -16.26
Sun-Target sep (deg)  : 173.51
Sun-Moon sep (deg)    : 49.29
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 (") : 3.294
C/A sky separation (km) : 10206.6
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
    
```



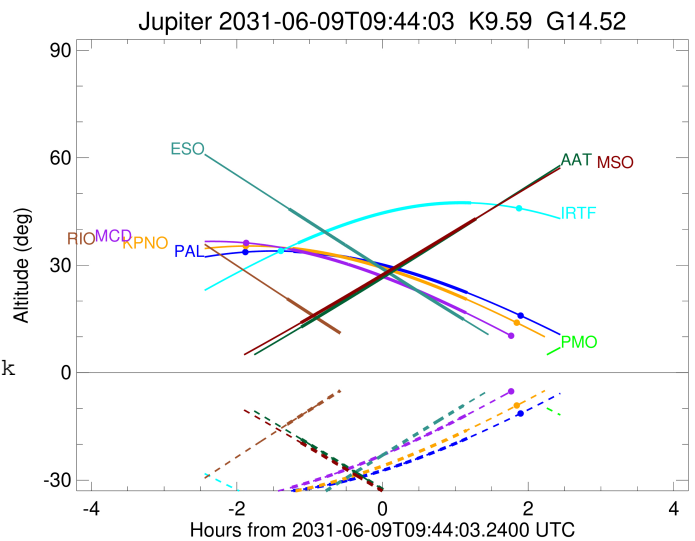
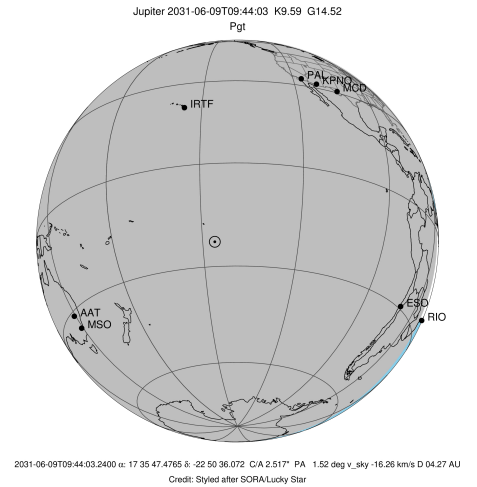
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T08:37:08.472	12.75	-18.57	71491.8	-8.99	-10.25
Jupiter	E	2031-06-09T11:01:03.246	42.96	-48.96	71491.8	-7.46	-8.52



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T09:49:07.130
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      : 4116787489733097472
2Mass ID (if available) : 17354748-2250357
ICRS Star Coord at Epoch: 17h 35m 47.47654s -22:50:36.07154s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 9.592
G magnitude          : 14.521
RP magnitude         : 13.279
BP magnitude         : 16.236
DUPflag             : 0
Distance (au)       : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.26
Sun-Target sep (deg) : 173.51
Sun-Moon sep (deg)  : 49.28
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 ("): 3.415
C/A sky separation (km) : 10582.3
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	2031-06-09T08:36:56.157	13.96	-19.56	71491.8	-9.27	-10.57
Jupiter	E	2031-06-09T11:00:47.640	42.96	-48.69	71491.8	-7.79	-8.89