

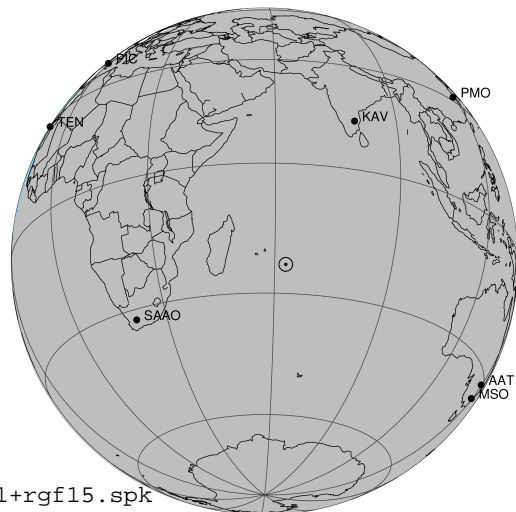
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-19T19:50:29.510  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4117492654622920192  
 2Mass ID (if available) : 17300209-2248009

Jupiter 2031-06-19T19:50:29 K8.91 G14.67 Pgt

ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s

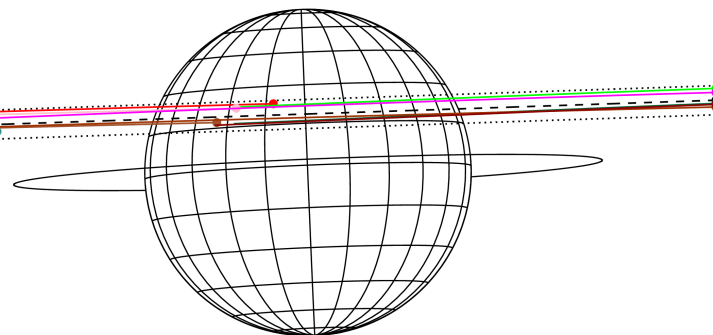
RUWE (>1.4 is poor) : 0.94  
 K magnitude : 8.909  
 G magnitude : 14.675  
 RP magnitude : 13.236  
 BP magnitude : 17.389  
 DUPflag : 0  
 Distance (au) : 4.266  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.38  
 Sun-Target sep (deg) : 175.16  
 Sun-Moon sep (deg) : 175.79  
 B (ring opening deg) : -2.60  
 PA of pole (deg) : 2.39  
 Pole direction: RA (deg): 268.05692  
 Dec (deg): 64.49651  
 C/A sky separation (") : 8.283  
 C/A sky separation (km) : 25625.5  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-06-19T19:50:29 K8.91 G14.67  
 Pgt



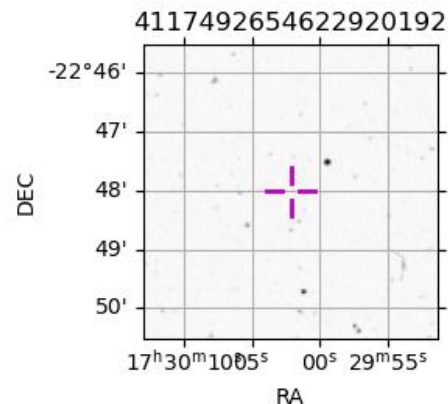
2031-06-19T19:50:29.5100 at: 17 30 02.0857 s: -22 48 01.119 C/A 8.271" PA 181.93 deg v\_sky -16.38 km/s D 04.27 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PIC  
 PMO  
 TEN  
 KAV  
 RIO  
 ESO  
 AAT  
 SAAO  
 MSO



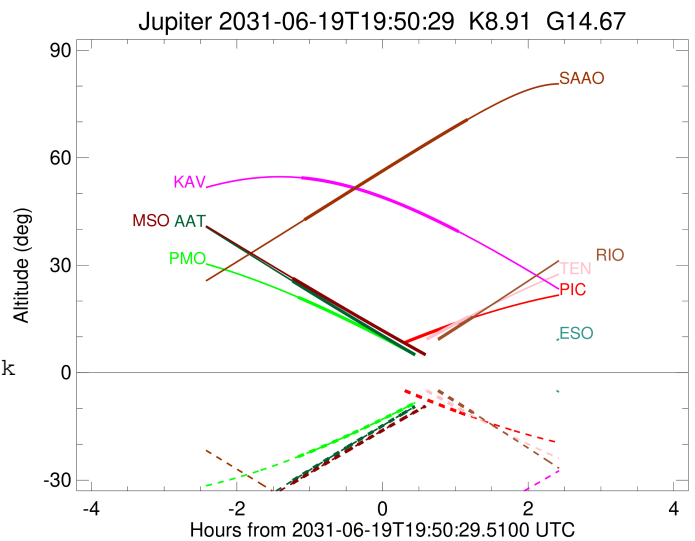
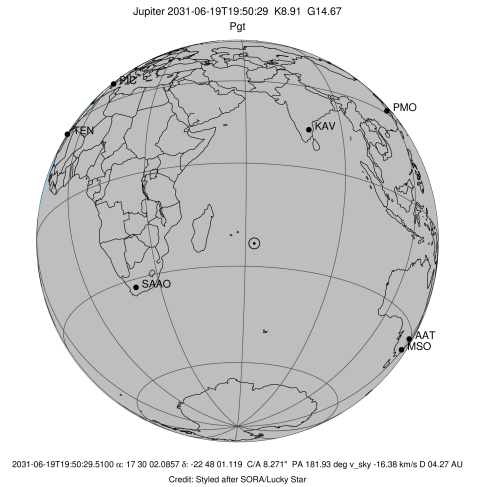
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 19 20:59 - JUN 19 20:59	Pne
PAL	Palomar Mt (200")	33.4	243.1			Pnn
PMO	Purple Mtn Obs. Nanking	32.1	118.8	+	JUN 19 18:40 - JUN 19 18:40	Pin
KPNO	Kitt Peak Natl Obs	32.0	248.4			Pnn
MCD	McDonald Obs. 2.7m	30.7	256.0			Pnn
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 19 21:01 - JUN 19 21:01	Pne
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8	+ +	JUN 19 18:43 - JUN 19 20:53	Pie
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUN 19 21:05 - JUN 19 21:05	Pne
ESO	European Southern Obs. (3.6m)	-29.3	289.3			Pnn
AAT	Siding Spring (AAT)	-31.3	149.1	+	JUN 19 18:36 - JUN 19 18:36	Pin
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	JUN 19 18:46 - JUN 19 21:00	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	JUN 19 18:36 - JUN 19 18:36	Pin



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-19T19:54:23.480
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : PIC
Location             : Pic du Midi
Latitude (deg)       : 42.93656
E. Longitude (deg)   : 0.14231
Altitude (km)        : 2.890
Gaia source ID       : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 8.909
G magnitude           : 14.675
RP magnitude          : 13.236
BP magnitude          : 17.389
DUPflag              : 0
Distance (au)        : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.38
Sun-Target sep (deg) : 175.16
Sun-Moon sep (deg)   : 175.88
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 9.857
C/A sky separation (km): 30495.7
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
    
```

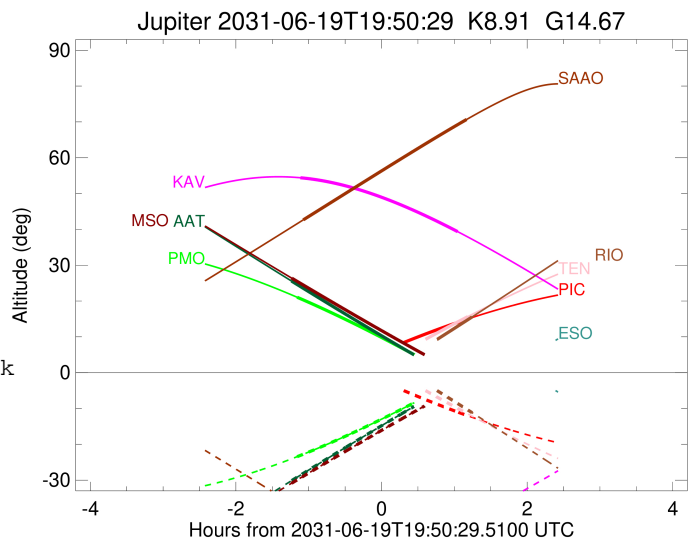
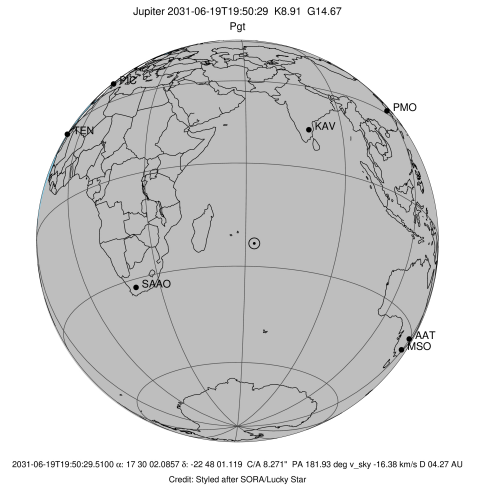


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T18:49:10.443	-3.59x	7.40x	71490.4	24.34	27.31
Jupiter	E	2031-06-19T20:59:18.258	14.74	-11.74	71490.2	26.04	29.15

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T19:46:04.740
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       : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 8.909
G magnitude           : 14.675
RP magnitude          : 13.236
BP magnitude          : 17.389
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.38
Sun-Target sep (deg)  : 175.16
Sun-Moon sep (deg)   : 174.94
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 9.669
C/A sky separation (km) : 29913.4
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
    
```

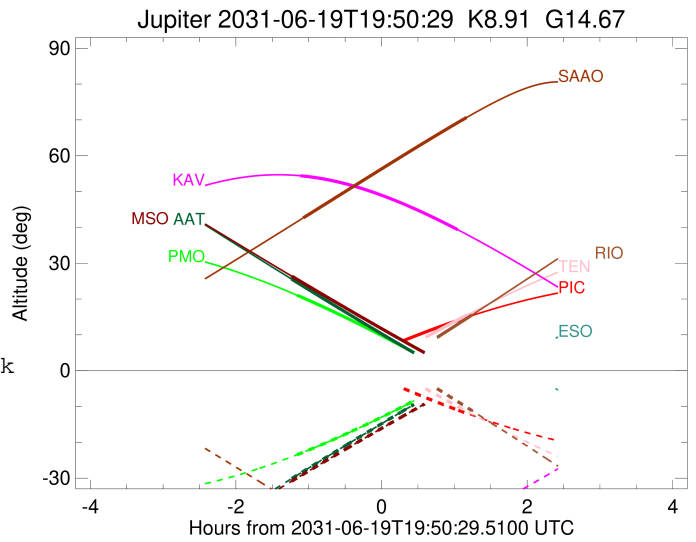
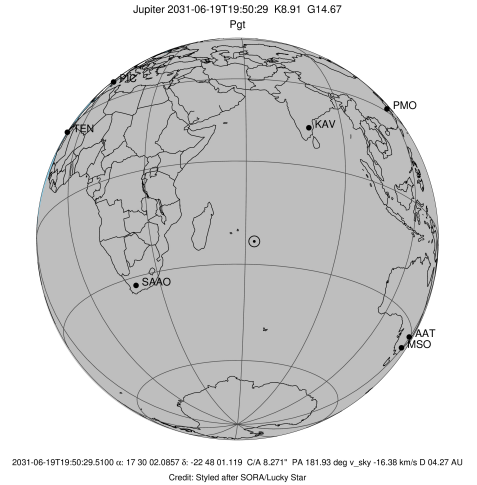


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T18:40:59.011	21.05	-23.45	71490.4	24.64	27.64
Jupiter	E	2031-06-19T20:51:33.330	-1.37x	-2.24x	71490.4	24.69	27.69

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T19:55:46.710
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : TEN
Location            : Teide Obs./Tenerife
Latitude (deg)      : 28.30050
E. Longitude (deg)  : 343.48909
Altitude (km)       : 2.395
Gaia source ID      : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 8.909
G magnitude          : 14.675
RP magnitude         : 13.236
BP magnitude         : 17.389
DUPflag             : 0
Distance (au)       : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.38
Sun-Target sep (deg) : 175.16
Sun-Moon sep (deg)  : 176.18
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 9.335
C/A sky separation (km) : 28881.9
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
    
```

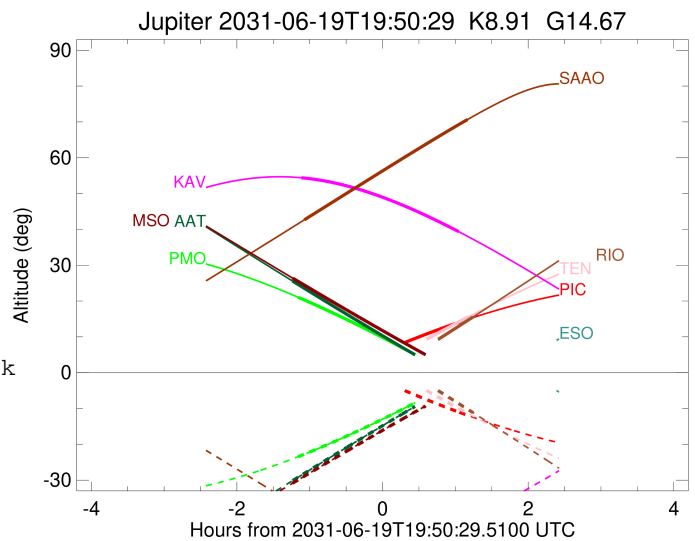
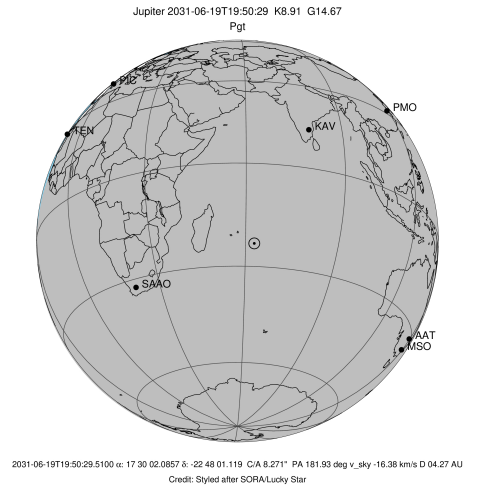


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T18:49:29.654	-9.97x	14.51x	71490.6	22.79	25.63
Jupiter	E	2031-06-19T21:01:37.632	15.64	-11.50	71490.4	24.77	27.78

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T19:48:26.420
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : KAV
Location            : Kavalur Observatory
Latitude (deg)      : 12.57556
E. Longitude (deg)  : 78.83167
Altitude (km)       : 0.722
Gaia source ID      : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 8.909
G magnitude          : 14.675
RP magnitude         : 13.236
BP magnitude         : 17.389
DUPflag             : 0
Distance (au)       : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.38
Sun-Target sep (deg) : 175.16
Sun-Moon sep (deg)  : 175.33
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 9.445
C/A sky separation (km) : 29220.7
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
    
```

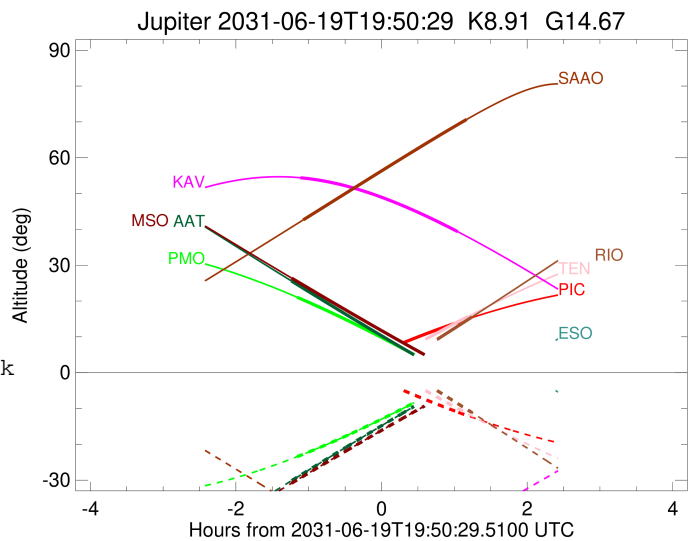
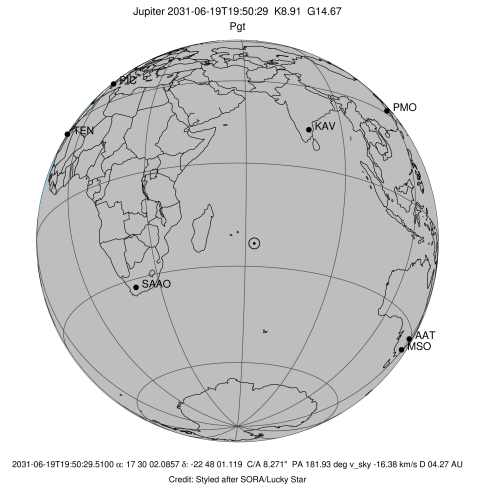


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T18:43:46.612	54.40	-54.08	71490.5	23.73	26.65
Jupiter	E	2031-06-19T20:53:16.701	39.36	-42.49	71490.4	24.31	27.28

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T19:56:04.670
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      : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 8.909
G magnitude          : 14.675
RP magnitude         : 13.236
BP magnitude         : 17.389
DUPflag             : 0
Distance (au)        : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.38
Sun-Target sep (deg) : 175.16
Sun-Moon sep (deg)  : 176.69
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 7.372
C/A sky separation (km): 22808.7
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
    
```

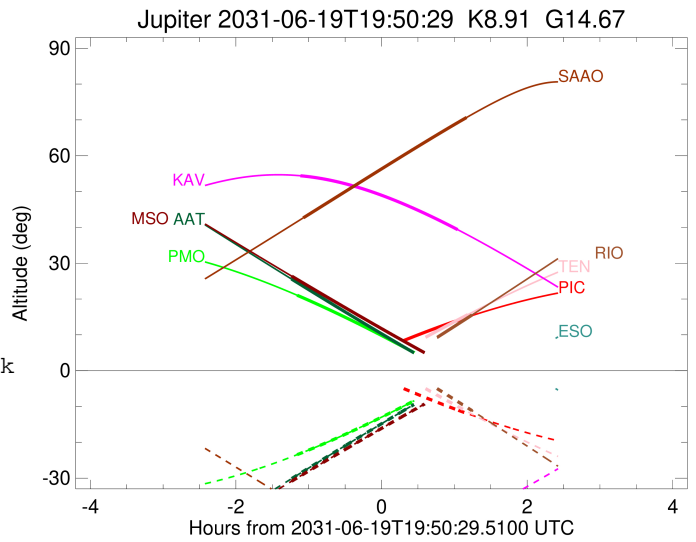
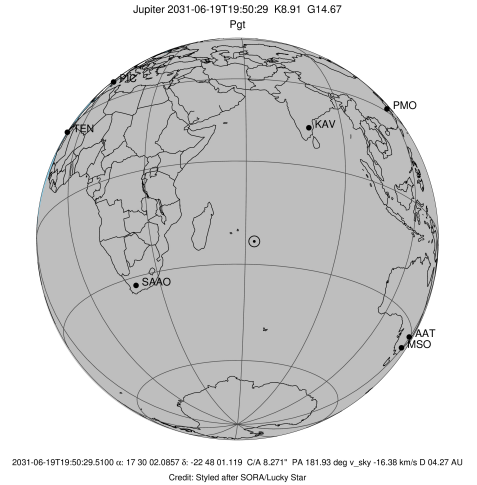


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T18:46:35.520	-13.46x	17.08x	71491.2	17.59	19.91
Jupiter	E	2031-06-19T21:05:02.463	15.53	-11.15	71491.0	19.62	22.15

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-19T19:45:04.030
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        : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 8.909
G magnitude           : 14.675
RP magnitude          : 13.236
BP magnitude          : 17.389
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.38
Sun-Target sep (deg)  : 175.16
Sun-Moon sep (deg)   : 175.26
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 7.354
C/A sky separation (km) : 22751.7
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
    
```



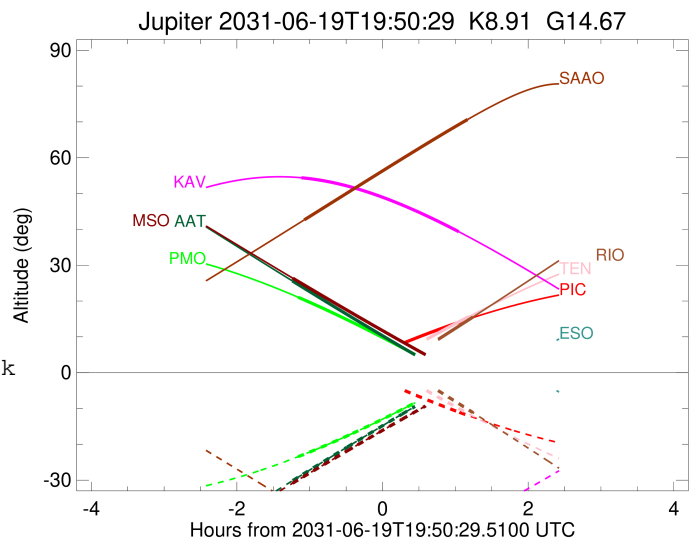
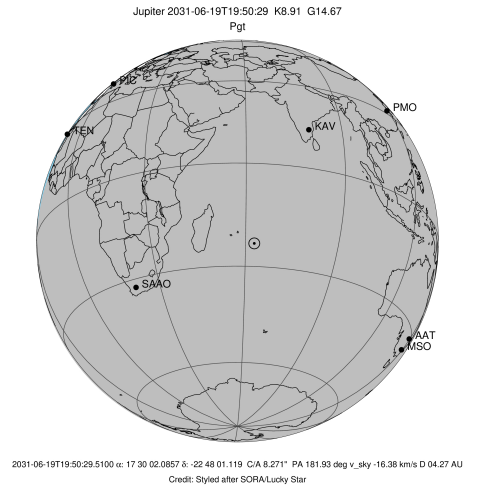
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T18:36:23.349	25.57	-30.14	71491.1	18.60	21.03
Jupiter	E	2031-06-19T20:54:14.900	-2.15x	-2.21x	71491.1	18.45	20.87



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T19:53:31.250
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : SAAO
Location            : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)      : -32.37953
E. Longitude (deg)  : 20.81070
Altitude (km)       : 1.768
Gaia source ID      : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 8.909
G magnitude          : 14.675
RP magnitude         : 13.236
BP magnitude         : 17.389
DUPflag             : 0
Distance (au)       : 4.266
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.38
Sun-Target sep (deg) : 175.16
Sun-Moon sep (deg)  : 176.34
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 7.787
C/A sky separation (km) : 24092.8
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
    
```



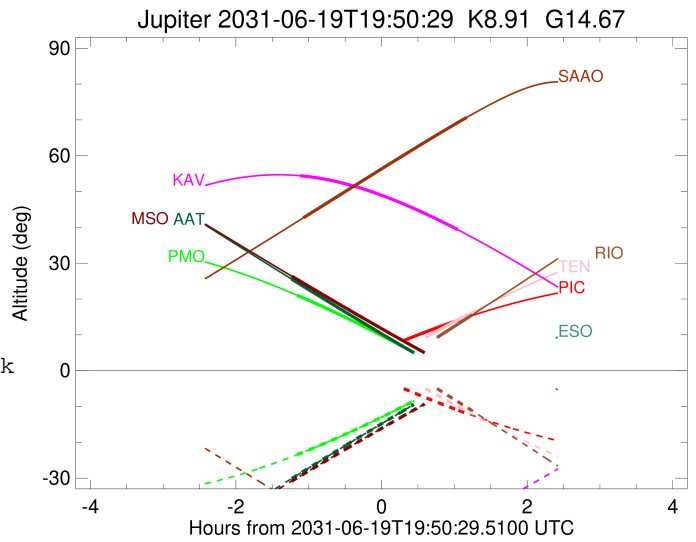
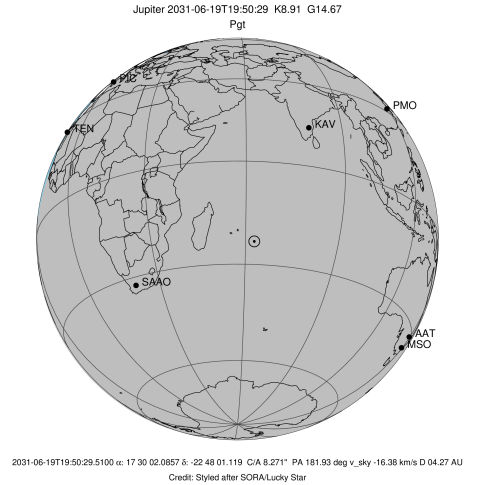
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T18:46:10.275	42.68	-38.56	71491.0	18.82	21.28
Jupiter	E	2031-06-19T21:00:36.451	70.66	-66.77	71490.9	20.40	23.02



```

target                : Jupiter
target radius (km)    : 71492.00
C/A epoch              : 2031-06-19T19:45:17.650
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        : 4117492654622920192
2Mass ID (if available) : 17300209-2248009
ICRS Star Coord at Epoch: 17h 30m 02.08568s -22:48:01.11935s
RUWE (>1.4 is poor)  : 0.94
K magnitude           : 8.909
G magnitude           : 14.675
RP magnitude          : 13.236
BP magnitude          : 17.389
DUPflag              : 0
Distance (au)         : 4.266
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -16.38
Sun-Target sep (deg)  : 175.16
Sun-Moon sep (deg)    : 175.31
B (ring opening deg)  : -2.60
PA of pole (deg)      : 2.39
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 7.240
C/A sky separation (km) : 22399.4
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	2031-06-19T18:36:29.158	26.39	-30.84	71491.1	18.28	20.68
Jupiter	E	2031-06-19T20:54:35.086	-0.24x	-3.96x	71491.1	18.18	20.57