

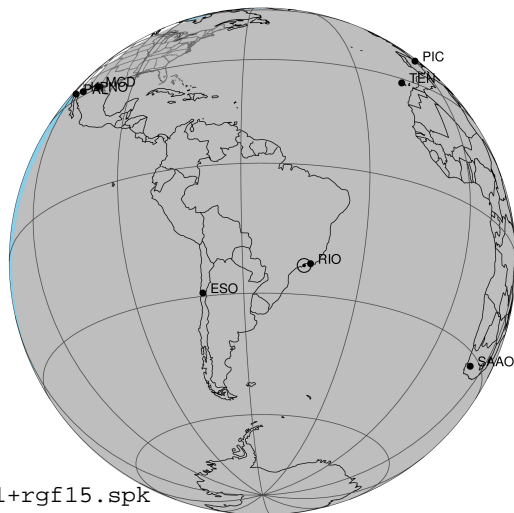
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-24T03:01:30.110
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4111687920401294464
 2Mass ID (if available) : 17274117-2246489

Jupiter 2031-06-24T03:01:30 K9.17 G14.52 Pgt

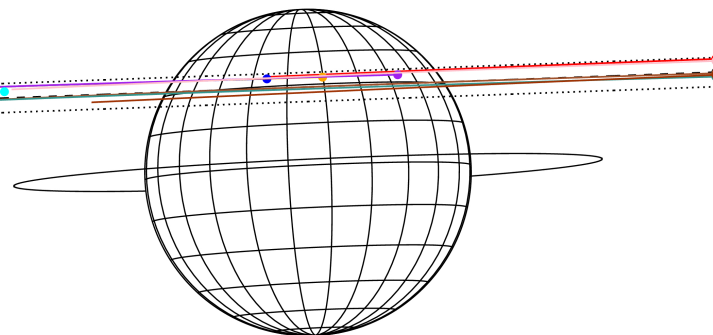
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.168
 G magnitude : 14.522
 RP magnitude : 13.187
 BP magnitude : 16.604
 DUPflag : 0
 Distance (au) : 4.272
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.09
 Sun-Target sep (deg) : 170.53
 Sun-Moon sep (deg) : 124.70
 B (ring opening deg) : -2.59
 PA of pole (deg) : 2.64
 Pole direction: RA (deg): 268.05691
 Dec (deg): 64.49651
 C/A sky separation (") : 12.080
 C/A sky separation (km) : 37431.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-24T03:01:30 K9.17 G14.52
 Pgt



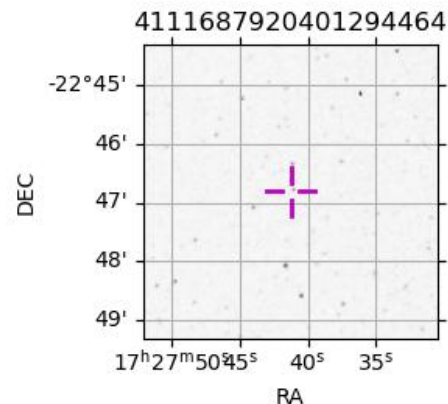
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 SAAO



2031-06-24T03:01:30.1100 a: 17 27 41.1599 s: -22 46 48.905 C/A ***** PA 182.09 deg v_sky -16.09 km/s D 04.27 AU
 Credit: Styled after SORA/Lucky Star

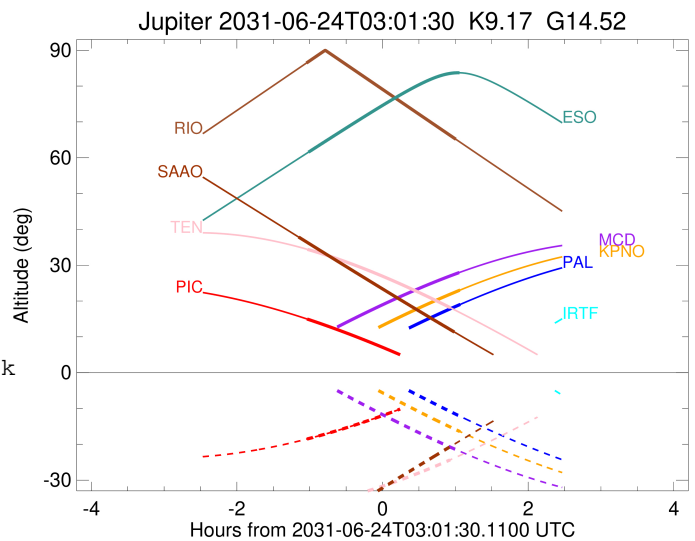
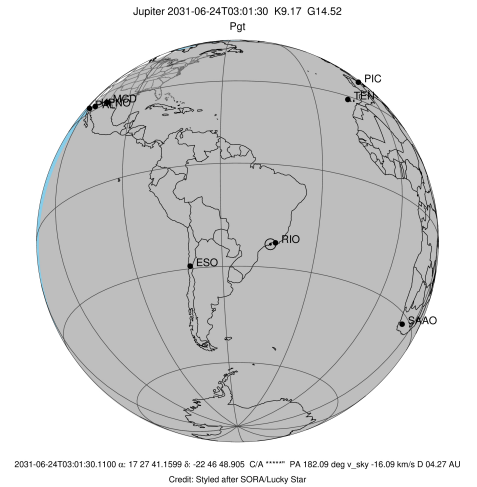
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 24 01:59 - JUN 24 01:59	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 24 04:05 - JUN 24 04:05	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 24 04:05 - JUN 24 04:05	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 24 04:04 - JUN 24 04:04	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 24 01:59 - JUN 24 03:57	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUN 24 01:58 - JUN 24 04:01	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 24 02:00 - JUN 24 04:04	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUN 24 01:52 - JUN 24 04:00	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-24T02:58:00.760
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       : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.168
G magnitude           : 14.522
RP magnitude          : 13.187
BP magnitude          : 16.604
DUPflag              : 0
Distance (au)        : 4.272
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 170.53
Sun-Moon sep (deg)   : 124.46
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 13.748
C/A sky separation (km) : 42598.6
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
    
```

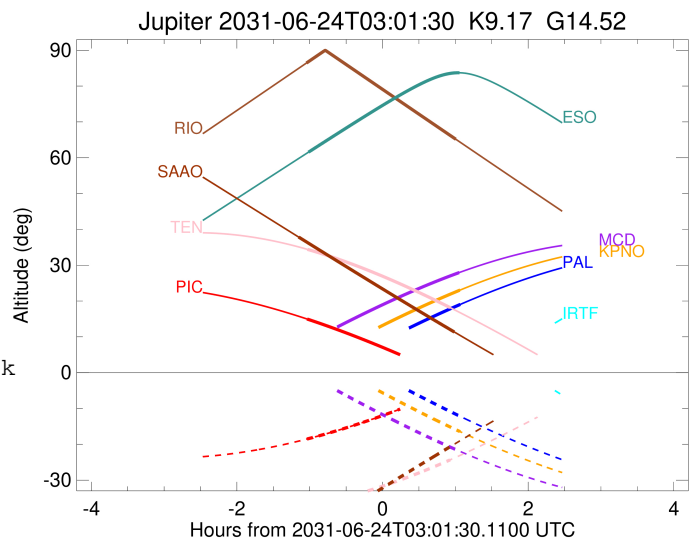
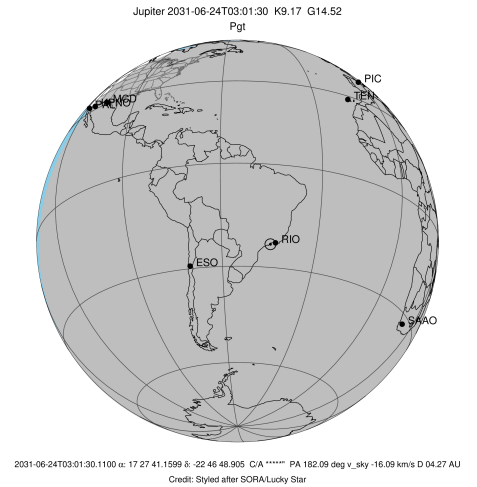


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-24T01:59:22.613	14.97	-18.51	71488.8	36.29	39.93
Jupiter	E	2031-06-24T03:56:54.437	-1.24x	-4.57x	71488.7	36.69	40.34

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-24T03:06:05.800
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       : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 9.168
G magnitude          : 14.522
RP magnitude         : 13.187
BP magnitude         : 16.604
DUPflag             : 0
Distance (au)        : 4.272
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 170.53
Sun-Moon sep (deg)   : 125.18
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 13.395
C/A sky separation (km): 41505.1
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
    
```

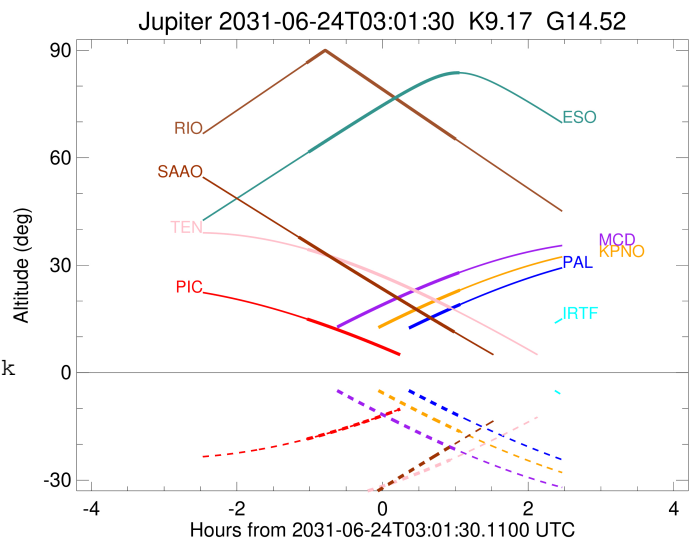
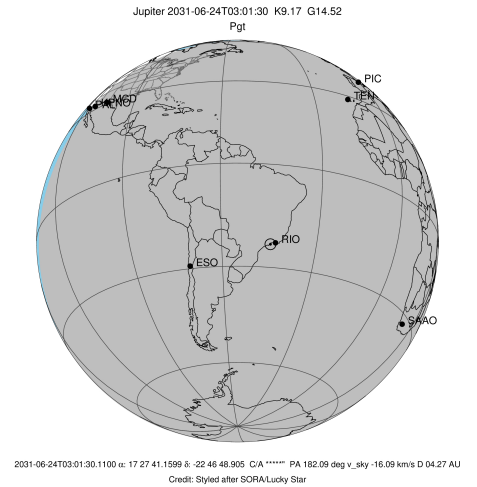


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-24T02:06:18.805	-1.19x	9.33x	71489.1	34.39	37.96
Jupiter	E	2031-06-24T04:05:34.527	19.05	-12.20	71488.8	36.45	40.09

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-24T03:05:54.910
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       : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.168
G magnitude           : 14.522
RP magnitude         : 13.187
BP magnitude         : 16.604
DUPflag              : 0
Distance (au)        : 4.272
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 170.53
Sun-Moon sep (deg)   : 125.22
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 13.416
C/A sky separation (km) : 41569.6
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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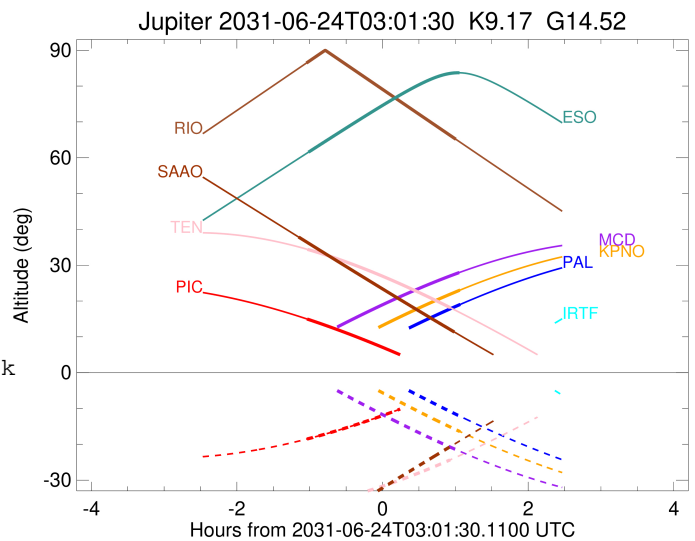
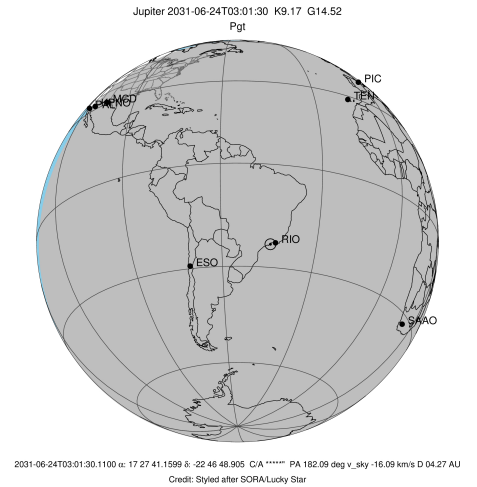


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-24T02:06:18.221	3.38x	4.71x	71489.1	34.46	38.04
Jupiter	E	2031-06-24T04:05:14.211	23.02	-16.43	71488.8	36.49	40.14

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-24T03:05:32.830
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       : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.168
G magnitude           : 14.522
RP magnitude          : 13.187
BP magnitude          : 16.604
DUPflag              : 0
Distance (au)        : 4.272
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 170.53
Sun-Moon sep (deg)   : 125.26
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 13.459
C/A sky separation (km) : 41703.6
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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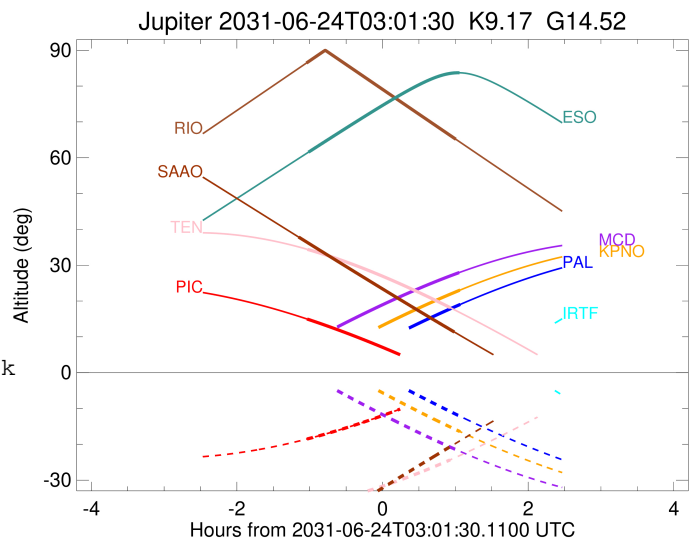
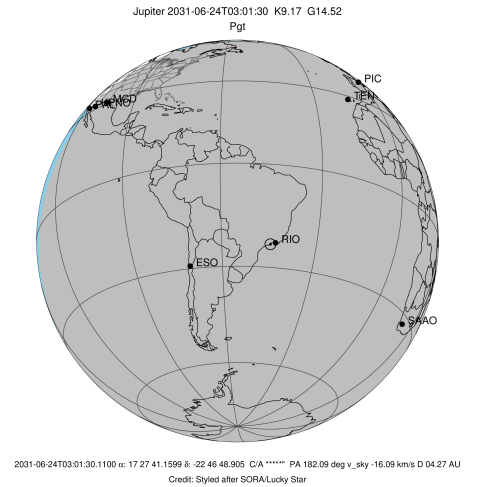


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-24T02:06:12.102	9.55	-1.65x	71489.0	34.62	38.20
Jupiter	E	2031-06-24T04:04:37.860	27.93	-21.86	71488.7	36.58	40.23

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-24T02:58:19.230
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      : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 9.168
G magnitude          : 14.522
RP magnitude         : 13.187
BP magnitude         : 16.604
DUPflag             : 0
Distance (au)       : 4.272
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 170.53
Sun-Moon sep (deg)  : 124.73
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 13.567
C/A sky separation (km) : 42036.9
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
    
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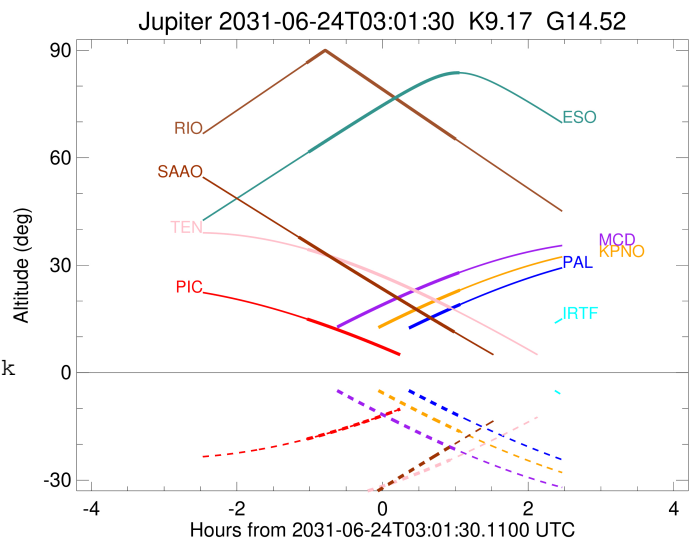
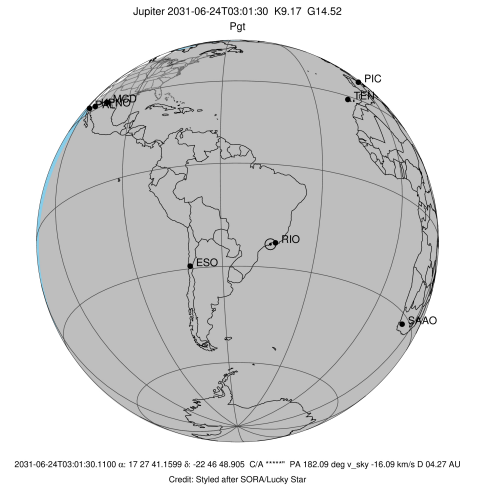


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-24T01:59:40.734	34.42	-36.99	71488.9	35.66	39.28
Jupiter	E	2031-06-24T03:57:11.672	18.16	-24.34	71488.8	36.17	39.80

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-24T03:00:19.690
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       : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.168
G magnitude           : 14.522
RP magnitude         : 13.187
BP magnitude         : 16.604
DUPflag              : 0
Distance (au)        : 4.272
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 170.53
Sun-Moon sep (deg)   : 125.32
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 12.079
C/A sky separation (km) : 37429.0
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
    
```

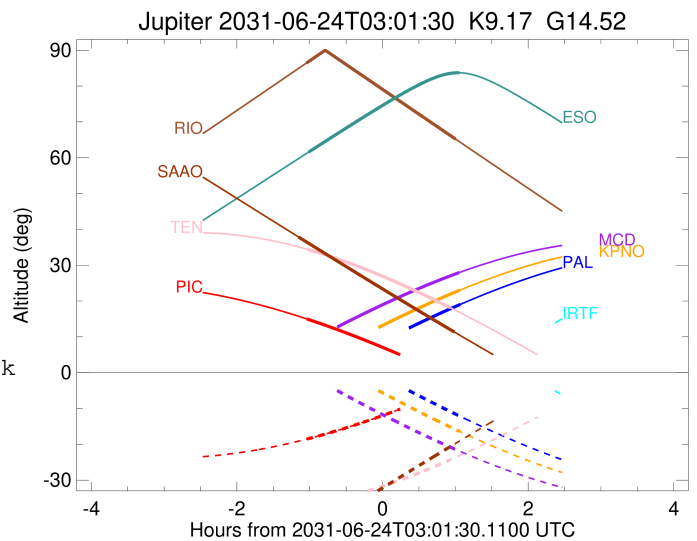
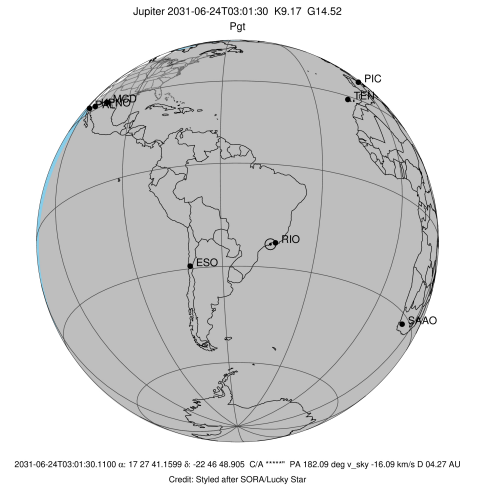


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-24T01:58:49.378	86.42	-77.01	71489.6	30.97	34.39
Jupiter	E	2031-06-24T04:01:55.495	65.15	-74.67	71489.4	31.94	35.42

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-24T03:02:52.460
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        : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.168
G magnitude           : 14.522
RP magnitude          : 13.187
BP magnitude          : 16.604
DUPflag              : 0
Distance (au)         : 4.272
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg)  : 170.53
Sun-Moon sep (deg)    : 125.54
B (ring opening deg) : -2.59
PA of pole (deg)      : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 11.814
C/A sky separation (km) : 36607.2
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
    
```

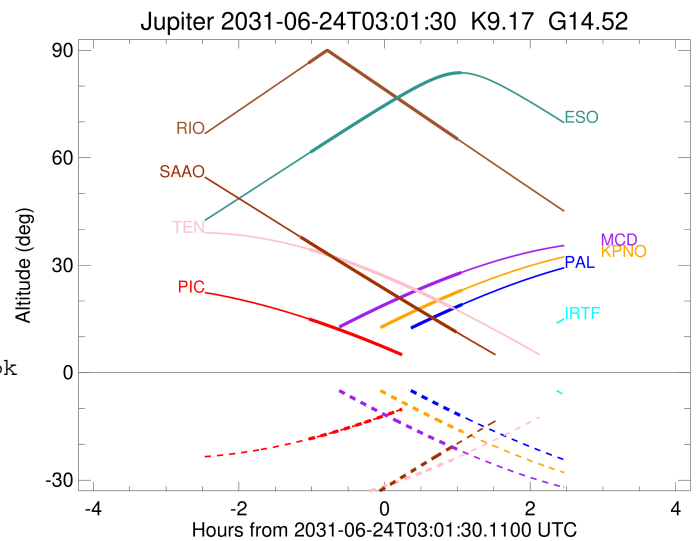
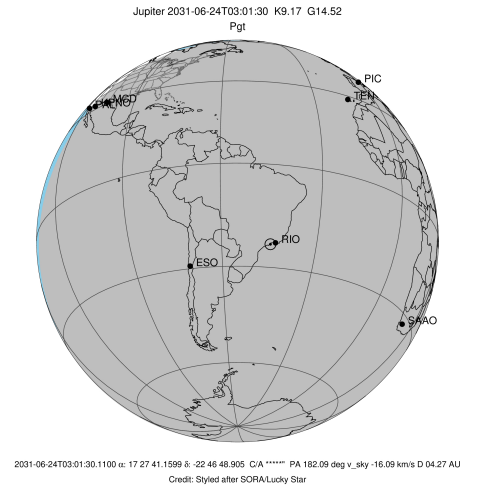


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-24T02:00:39.754	61.58	-52.84	71489.7	29.96	33.32
Jupiter	E	2031-06-24T04:04:59.241	83.70	-79.33	71489.5	31.44	34.88


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-24T02:56:21.160
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      : 4111687920401294464
2Mass ID (if available) : 17274117-2246489
ICRS Star Coord at Epoch: 17h 27m 41.15991s -22:46:48.90531s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 9.168
G magnitude          : 14.522
RP magnitude         : 13.187
BP magnitude         : 16.604
DUPflag             : 0
Distance (au)       : 4.272
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 170.53
Sun-Moon sep (deg)  : 124.58
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.64
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 11.305
C/A sky separation (km) : 35030.0
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	2031-06-24T01:52:25.644	37.85	-46.72	71489.8	29.23	32.55
Jupiter	E	2031-06-24T04:00:42.010	11.35	-19.96	71489.8	29.33	32.66