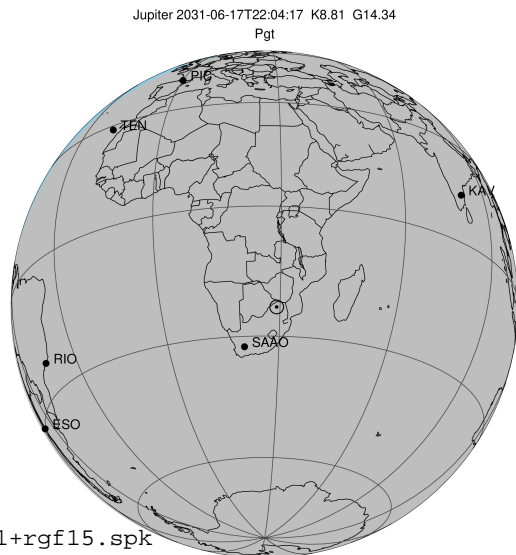


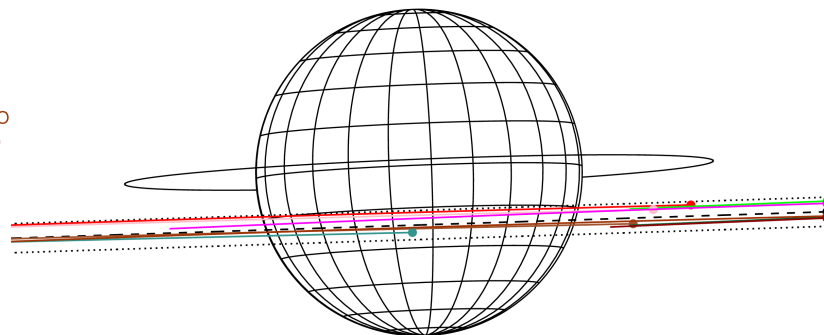
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-17T22:04:17.490
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4117489321727834496
 2Mass ID (if available) : 17310528-2248455

Jupiter 2031-06-17T22:04:17 K8.81 G14.34 Pgt

ICRS Star Coord at Epoch: 17h 31m 05.27143s -22:48:45.77040s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 8.813
 G magnitude : 14.338
 RP magnitude : 12.946
 BP magnitude : 16.713
 DUPflag : 0
 Distance (au) : 4.265
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.45
 Sun-Target sep (deg) : 177.21
 Sun-Moon sep (deg) : 160.66
 B (ring opening deg) : -2.59
 PA of pole (deg) : 2.28
 Pole direction: RA (deg): 268.05692
 Dec (deg): 64.49651
 C/A sky separation (") : 7.432
 C/A sky separation (km) : 22987.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLv1.spk
 naif0012.tls
 nep097.bsp
 nep101.bsp
 sat4401.bsp



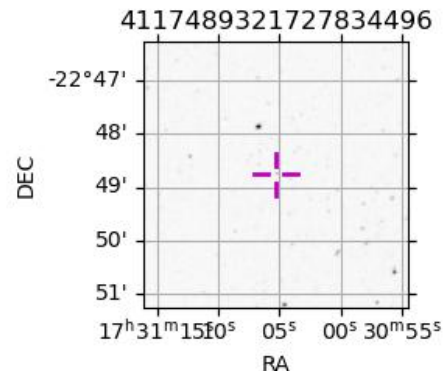
Earth
 PIC
 PMO
 TEN
 KAV
 RIO
 ESO
 AAT
 SAAO
 MSO



2031-06-17T22:04:17.4900 a: 17 31 05.2714 s -22 48 45.770 C/A 7.444" PA 1.86 deg v_sky -16.45 km/s D 04.26 AU
 Credit: Styled after SORA/Lucky Star

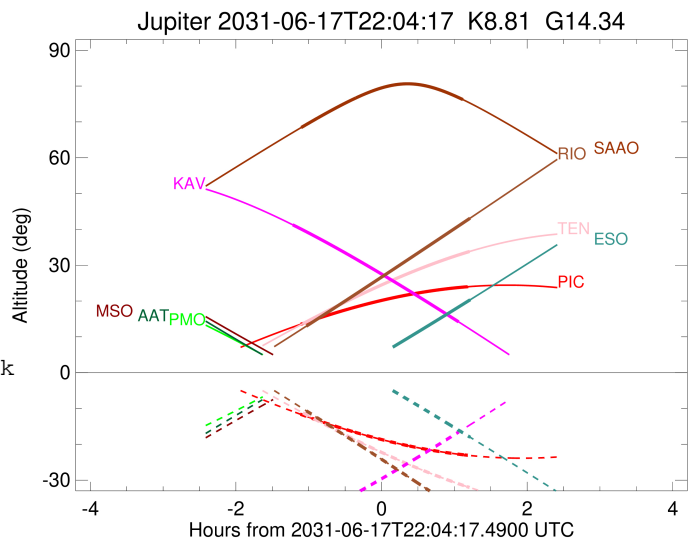
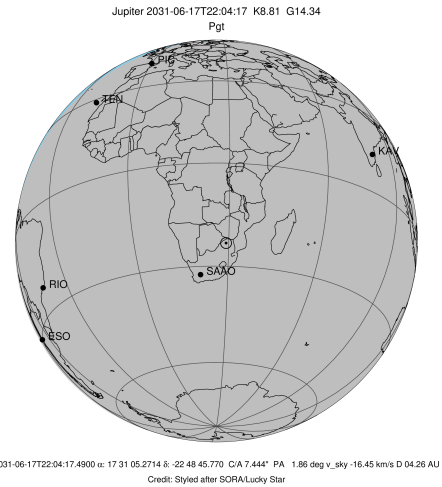
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+ +	JUN 17 20:57 - JUN 17 23:15	Pie
PAL	Palomar Mt (200")	33.4	243.1			Pnn
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
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 17 20:59 - JUN 17 23:16	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8	+ +	JUN 17 20:51 - JUN 17 23:07	Pie
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUN 17 21:02 - JUN 17 23:17	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3		JUN 17 23:17 - JUN 17 23:17	Pne
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	JUN 17 20:58 - JUN 17 23:11	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-17T22:06:34.000
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        : 4117489321727834496
2Mass ID (if available) : 17310528-2248455
ICRS Star Coord at Epoch: 17h 31m 05.27143s -22:48:45.77040s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 8.813
G magnitude           : 14.338
RP magnitude          : 12.946
BP magnitude          : 16.713
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg)  : 177.21
Sun-Moon sep (deg)    : 160.43
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.28
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 5.634
C/A sky separation (km) : 17424.5
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
    
```

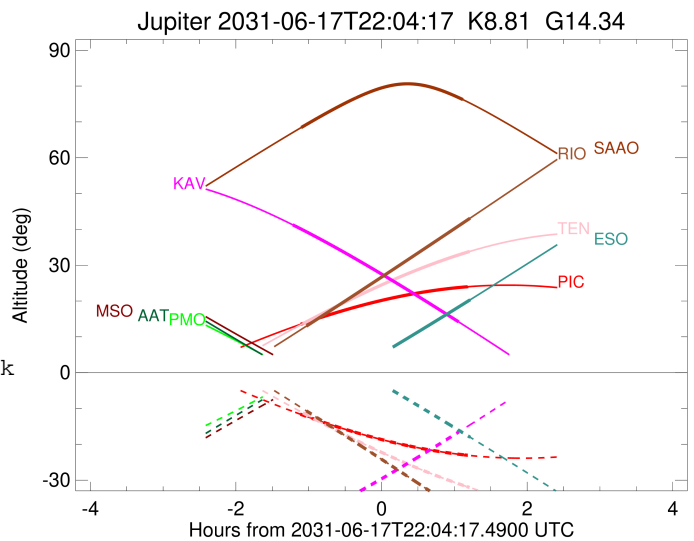
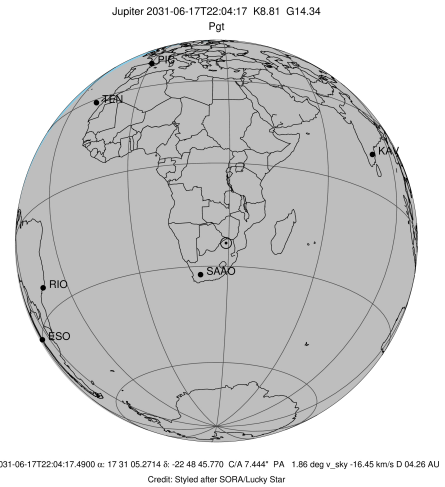


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-17T20:57:30.617	13.48	-11.60	71491.4	-14.79	-16.79
Jupiter	E	2031-06-17T23:15:26.484	23.99	-23.06	71491.5	-13.52	-15.36

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-17T22:08:20.310
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        : 4117489321727834496
2Mass ID (if available) : 17310528-2248455
ICRS Star Coord at Epoch: 17h 31m 05.27143s -22:48:45.77040s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 8.813
G magnitude           : 14.338
RP magnitude          : 12.946
BP magnitude          : 16.713
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg) : 177.21
Sun-Moon sep (deg)   : 160.24
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.28
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 6.046
C/A sky separation (km) : 18699.0
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
    
```

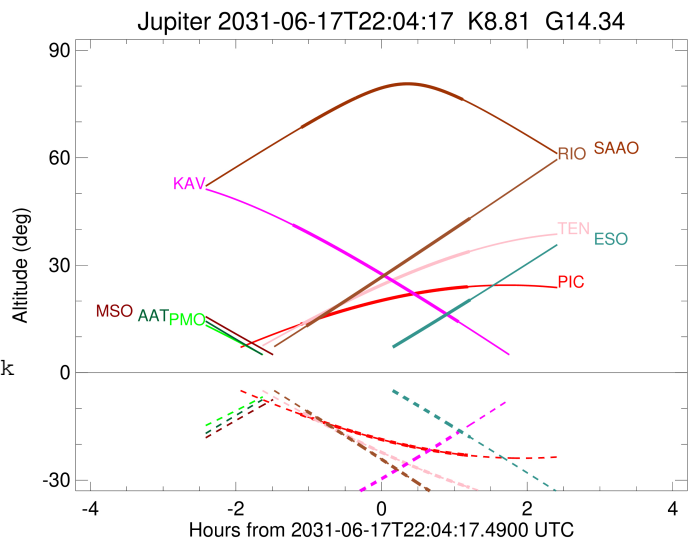
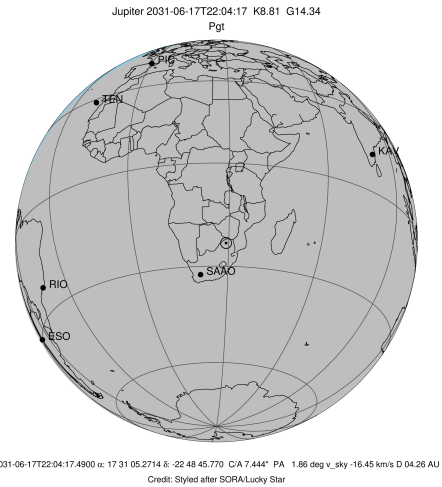


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-17T20:59:31.489	13.67	-11.22	71491.3	-16.01	-18.15
Jupiter	E	2031-06-17T23:16:49.020	33.82	-32.04	71491.4	-14.40	-16.36

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-17T21:59:17.420
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        : 4117489321727834496
2Mass ID (if available) : 17310528-2248455
ICRS Star Coord at Epoch: 17h 31m 05.27143s -22:48:45.77040s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 8.813
G magnitude           : 14.338
RP magnitude          : 12.946
BP magnitude          : 16.713
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg)  : 177.21
Sun-Moon sep (deg)    : 161.44
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.28
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 6.488
C/A sky separation (km) : 20067.6
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
    
```

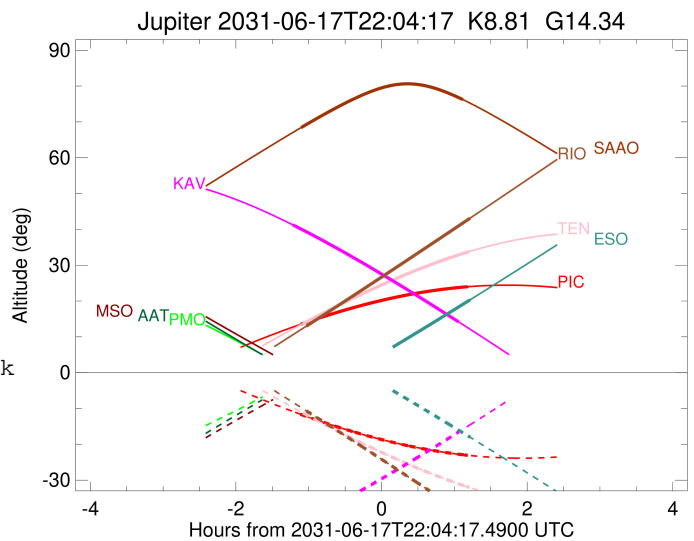
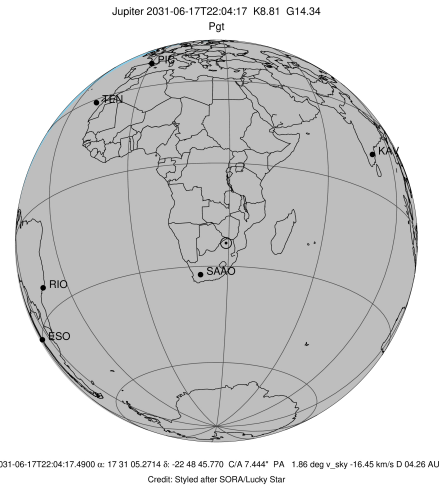


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-17T20:51:11.162	41.26	-42.78	71491.3	-16.33	-18.51
Jupiter	E	2031-06-17T23:07:49.700	14.18	-16.58	71491.3	-16.37	-18.55

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-17T22:10:00.470
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       : 4117489321727834496
2Mass ID (if available) : 17310528-2248455
ICRS Star Coord at Epoch: 17h 31m 05.27143s -22:48:45.77040s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 8.813
G magnitude           : 14.338
RP magnitude          : 12.946
BP magnitude          : 16.713
DUPflag              : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg) : 177.21
Sun-Moon sep (deg)   : 160.07
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.28
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 7.942
C/A sky separation (km) : 24565.1
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
    
```

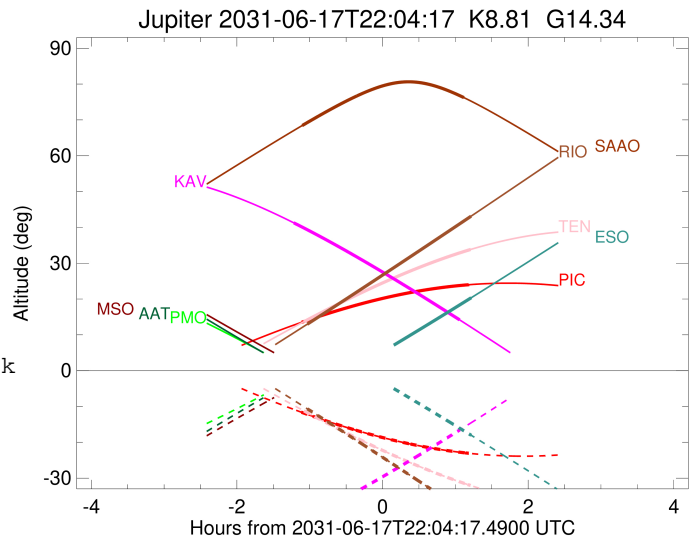
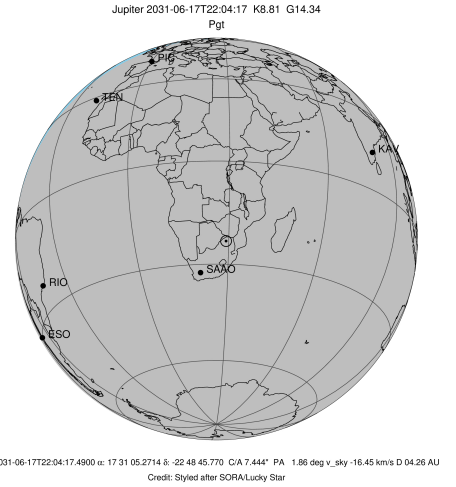


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-17T21:02:23.487	12.99	-10.66	71490.8	-21.06	-23.74
Jupiter	E	2031-06-17T23:17:08.948	43.09	-40.45	71491.0	-19.15	-21.64

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-17T22:10:04.150
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       : 4117489321727834496
2Mass ID (if available) : 17310528-2248455
ICRS Star Coord at Epoch: 17h 31m 05.27143s -22:48:45.77040s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 8.813
G magnitude           : 14.338
RP magnitude         : 12.946
BP magnitude         : 16.713
DUPflag              : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg) : 177.21
Sun-Moon sep (deg)   : 159.97
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.28
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 8.475
C/A sky separation (km): 26213.3
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
    
```

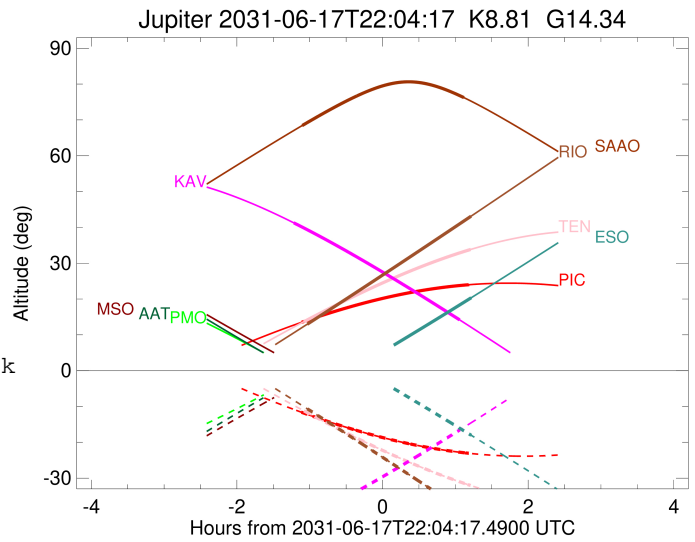
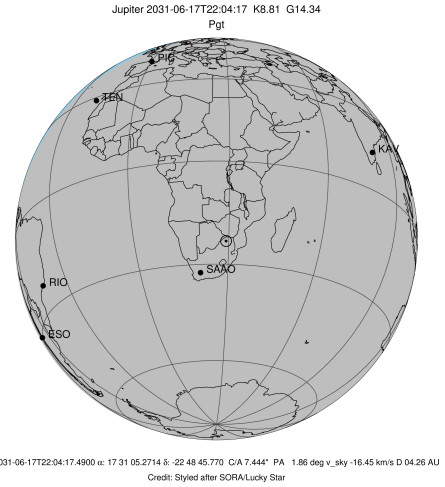


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-17T21:02:15.381	-6.86x	8.69x	71490.7	-22.43	-25.23
Jupiter	E	2031-06-17T23:17:23.483	20.35	-18.04	71490.9	-20.53	-23.15

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-17T22:04:47.960
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        : 4117489321727834496
2Mass ID (if available) : 17310528-2248455
ICRS Star Coord at Epoch: 17h 31m 05.27143s -22:48:45.77040s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 8.813
G magnitude           : 14.338
RP magnitude          : 12.946
BP magnitude          : 16.713
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.45
Sun-Target sep (deg)  : 177.21
Sun-Moon sep (deg)    : 160.89
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.28
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 7.775
C/A sky separation (km) : 24048.5
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	2031-06-17T20:58:09.611	68.43	-66.35	71490.9	-20.21	-22.81
Jupiter	E	2031-06-17T23:11:23.761	76.21	-78.48	71491.0	-19.21	-21.70