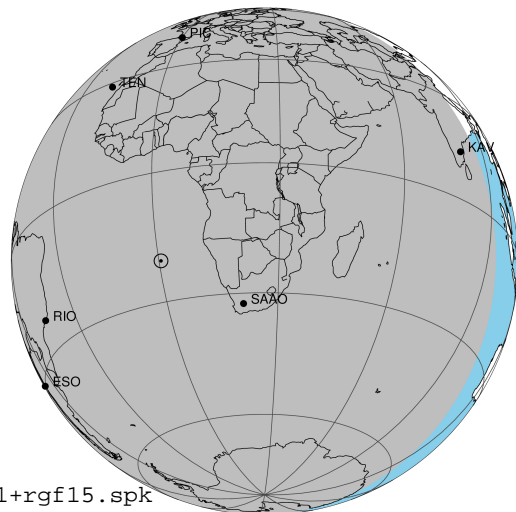


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-23T23:54:35.110
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116892694870245248
 2Mass ID (if available) : 17440987-2252569

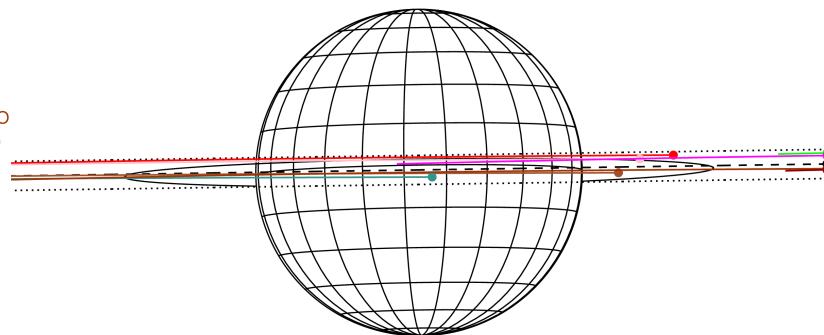
Jupiter 2031-05-23T23:54:35 K7.98 G14.68 Pgt

ICRS Star Coord at Epoch: 17h 44m 09.86672s -22:52:57.23648s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 7.980
 G magnitude : 14.680
 RP magnitude : 13.117
 BP magnitude : 18.468
 DUPflag : 0
 Distance (au) : 4.348
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -13.88
 Sun-Target sep (deg) : 155.87
 Sun-Moon sep (deg) : 173.93
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.87
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 0.355
 C/A sky separation (km) : 1120.9
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



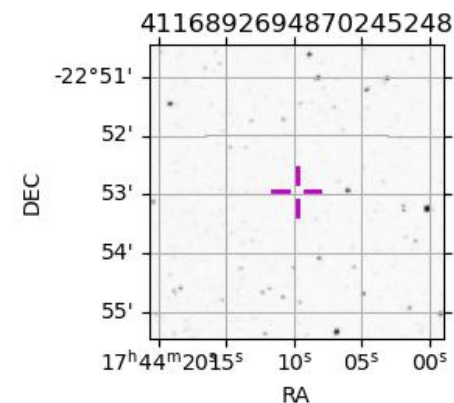
2031-05-23T23:54:35.1100 at: 17.44 09.8667 8: -22 52 57.236 C/A 0.343" PA 180.83 deg v_sky -13.88 km/s D 04.35 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PMO
 TEN
 KAV
 RIO
 ESO
 AAT
 SAAO
 MSO



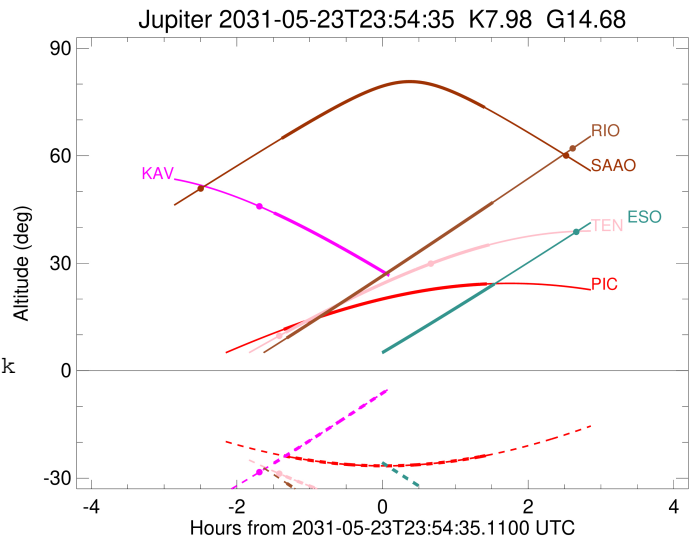
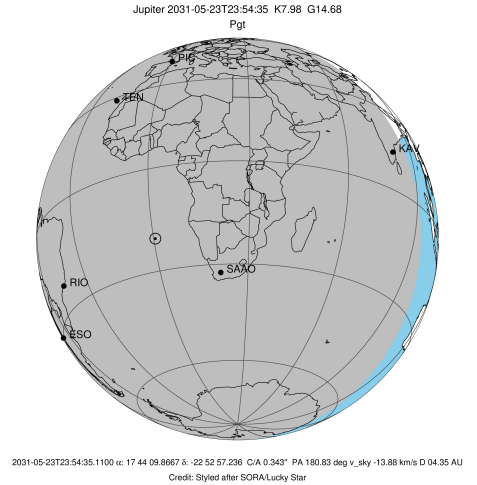
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+ +	MAY 23 22:33 - MAY 24 01:20	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	+ +	MAY 23 22:34 - MAY 24 01:22	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8	+	MAY 23 22:25 - MAY 23 22:25	Pin
RIO	Rio de Janeiro	-22.9	316.8	+ +	MAY 23 22:35 - MAY 24 01:25	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	MAY 24 01:26 - MAY 24 01:26	Pne
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	MAY 23 22:31 - MAY 24 01:18	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-23T23:57:03.830
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        : 4116892694870245248
2Mass ID (if available) : 17440987-2252569
ICRS Star Coord at Epoch: 17h 44m 09.86672s -22:52:57.23648s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 7.980
G magnitude           : 14.680
RP magnitude          : 13.117
BP magnitude          : 18.468
DUPflag              : 0
Distance (au)         : 4.348
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.88
Sun-Target sep (deg) : 155.87
Sun-Moon sep (deg)   : 173.86
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.87
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 2.132
C/A sky separation (km): 6721.3
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
    
```

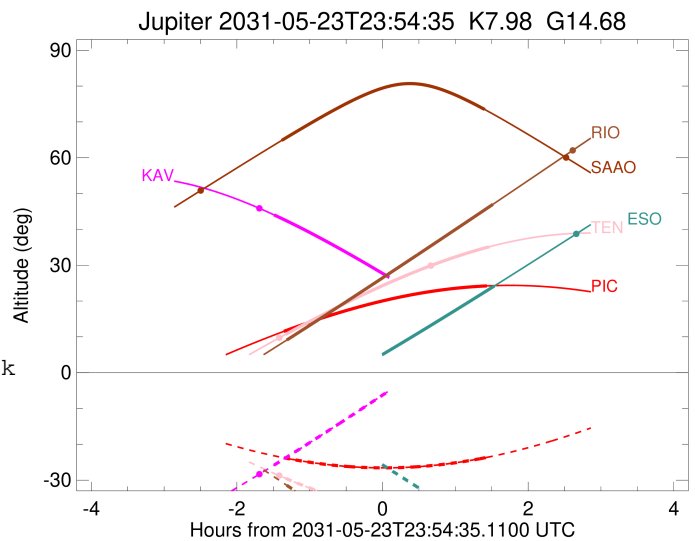
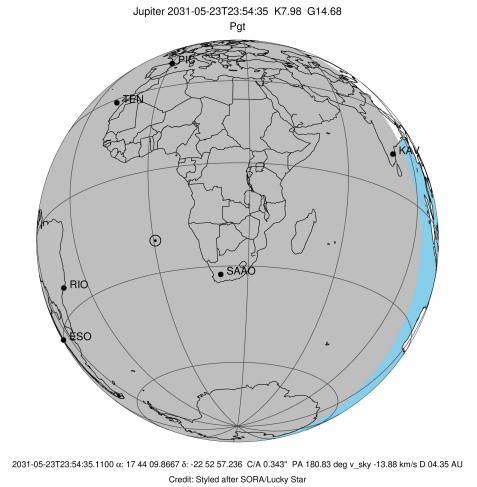


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-23T22:33:11.959	11.52	-23.76	71491.9	5.03	5.75
Jupiter	E	2031-05-24T01:20:32.570	24.21	-23.65	71491.9	5.57	6.36

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-23T23:59:05.830
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      : 4116892694870245248
2Mass ID (if available) : 17440987-2252569
ICRS Star Coord at Epoch: 17h 44m 09.86672s -22:52:57.23648s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 7.980
G magnitude          : 14.680
RP magnitude         : 13.117
BP magnitude         : 18.468
DUPflag             : 0
Distance (au)       : 4.348
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.88
Sun-Target sep (deg) : 155.87
Sun-Moon sep (deg)  : 174.17
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.87
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 1.737
C/A sky separation (km) : 5477.3
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
    
```

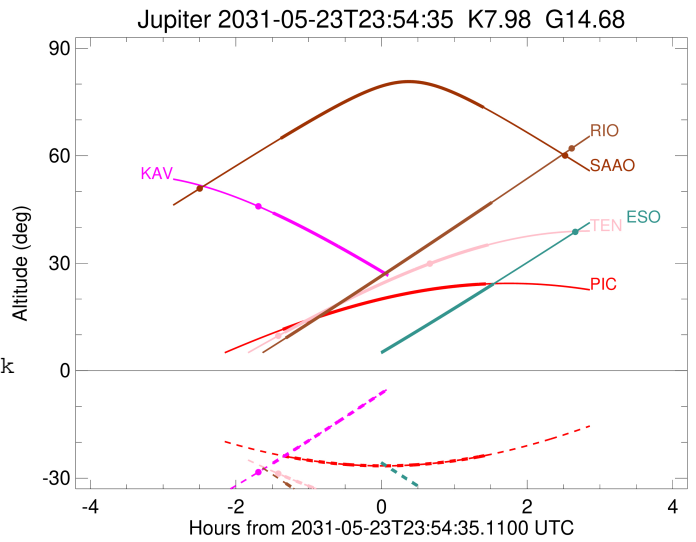
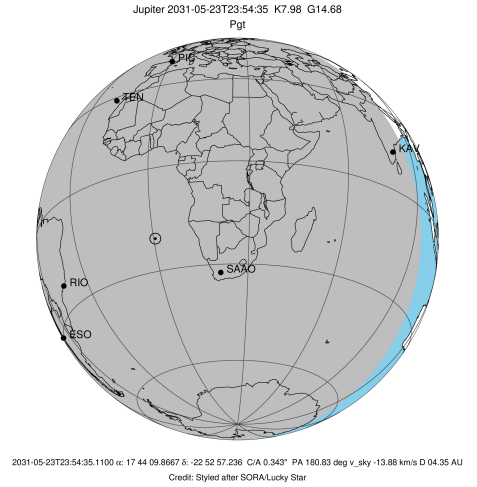


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-23T22:34:57.736	10.73	-29.53	71492.0	3.84	4.39
Jupiter	E	2031-05-24T01:22:34.648	35.14	-40.94	71491.9	4.76	5.44

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-23T23:48:51.810
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       : 4116892694870245248
2Mass ID (if available) : 17440987-2252569
ICRS Star Coord at Epoch: 17h 44m 09.86672s -22:52:57.23648s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 7.980
G magnitude          : 14.680
RP magnitude         : 13.117
BP magnitude         : 18.468
DUPflag             : 0
Distance (au)        : 4.348
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.88
Sun-Target sep (deg) : 155.87
Sun-Moon sep (deg)  : 173.19
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.87
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 1.260
C/A sky separation (km) : 3973.5
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
    
```

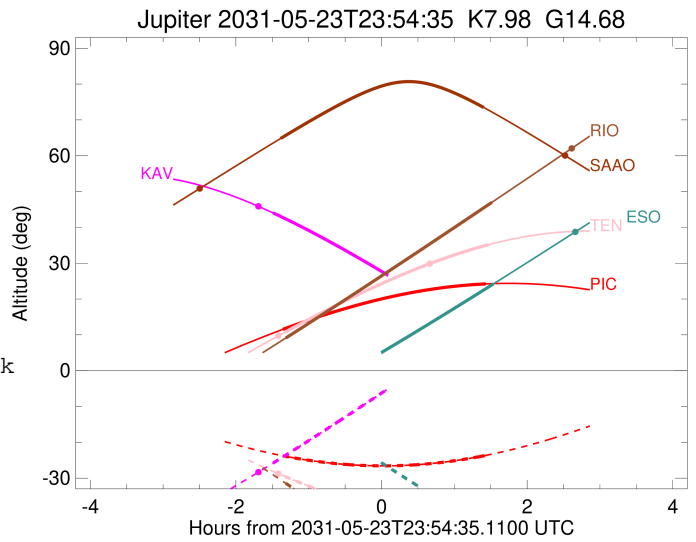
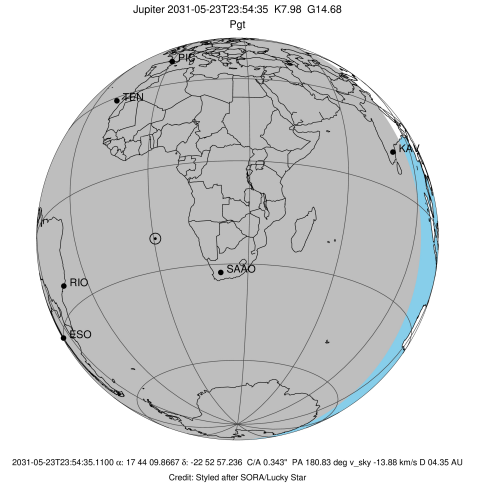


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-23T22:25:10.834	44.04	-25.81	71492.0	3.60	4.11
Jupiter	E	2031-05-24T01:13:13.879	11.10	11.68x	71492.0	2.59	2.96

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-24T00:01:07.080
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      : 4116892694870245248
2Mass ID (if available) : 17440987-2252569
ICRS Star Coord at Epoch: 17h 44m 09.86672s -22:52:57.23648s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 7.980
G magnitude          : 14.680
RP magnitude         : 13.117
BP magnitude         : 18.468
DUPflag             : 0
Distance (au)        : 4.348
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.88
Sun-Target sep (deg) : 155.87
Sun-Moon sep (deg)  : 174.76
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.87
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 0.114
C/A sky separation (km) : 358.1
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
    
```

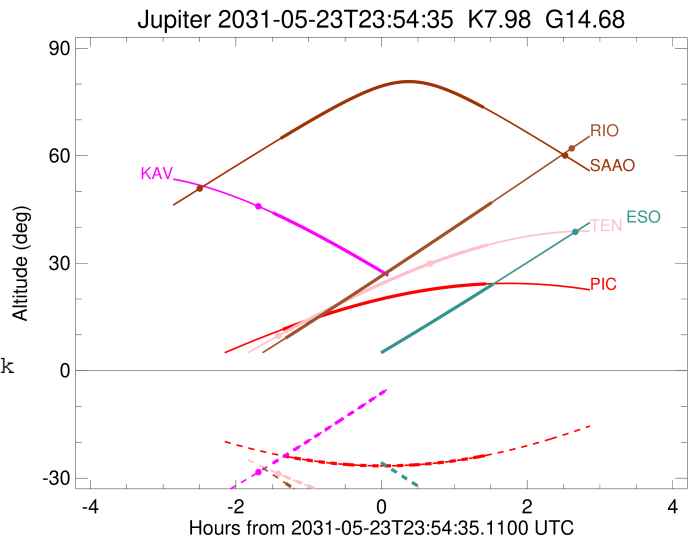
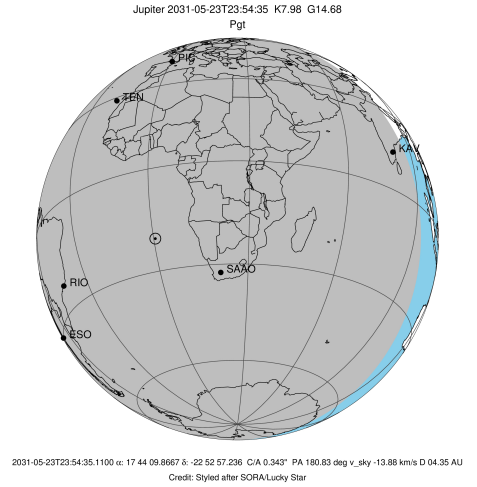


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-23T22:35:44.645	9.12	-31.45	71492.0	-0.99	-1.13
Jupiter	E	2031-05-24T01:25:32.195	46.98	-70.36	71492.0	0.32	0.36

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T00:01:13.720
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       : 4116892694870245248
2Mass ID (if available) : 17440987-2252569
ICRS Star Coord at Epoch: 17h 44m 09.86672s -22:52:57.23648s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 7.980
G magnitude           : 14.680
RP magnitude         : 13.117
BP magnitude         : 18.468
DUPflag              : 0
Distance (au)        : 4.348
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.88
Sun-Target sep (deg) : 155.87
Sun-Moon sep (deg)   : 174.82
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.87
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 0.637
C/A sky separation (km): 2007.2
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
    
```

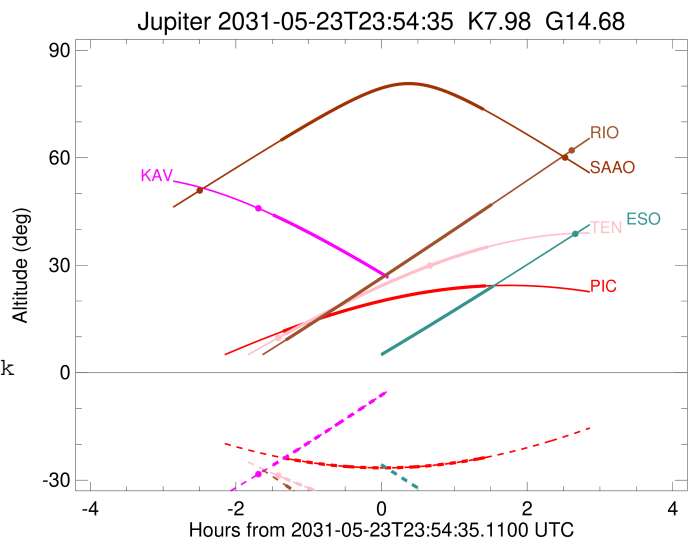
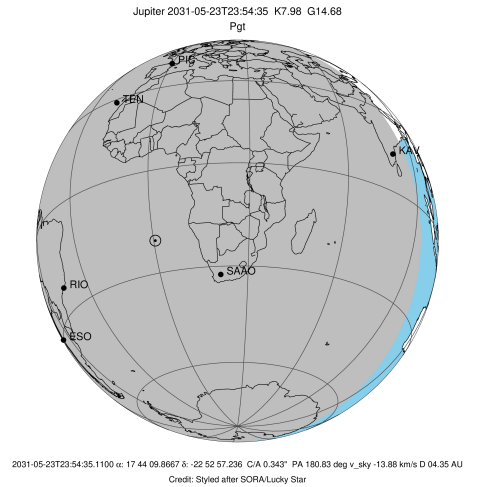


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-23T22:34:39.813	-10.33x	-8.84	71492.0	-2.26	-2.58
Jupiter	E	2031-05-24T01:26:46.960	24.20	-45.75	71492.0	-0.94	-1.07

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-23T23:55:11.550
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        : 4116892694870245248
2Mass ID (if available) : 17440987-2252569
ICRS Star Coord at Epoch: 17h 44m 09.86672s -22:52:57.23648s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 7.980
G magnitude           : 14.680
RP magnitude          : 13.117
BP magnitude          : 18.468
DUPflag              : 0
Distance (au)         : 4.348
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.88
Sun-Target sep (deg)  : 155.87
Sun-Moon sep (deg)    : 174.14
B (ring opening deg)  : -2.61
PA of pole (deg)      : 0.87
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 0.025
C/A sky separation (km) : 79.4
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	2031-05-23T22:31:34.230	64.83	-78.46	71492.0	-0.16	-0.18
Jupiter	E	2031-05-24T01:18:39.791	73.48	-51.56	71492.0	0.05	0.06