

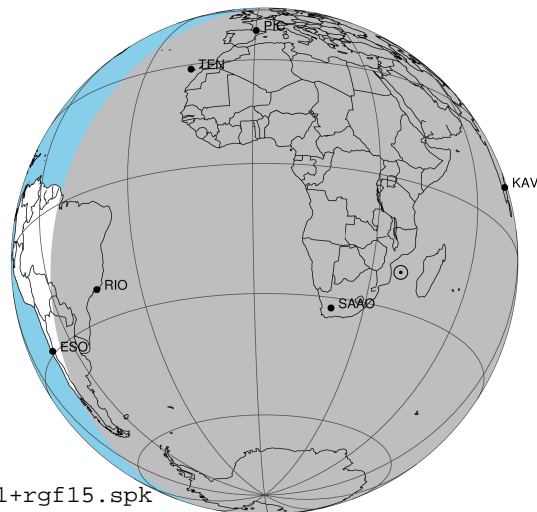
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-07-15T21:34:02.100
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4114507858485617920
 2Mass ID (if available) : 17171838-2240531

Jupiter 2031-07-15T21:34:02 K9.52 G14.02 Pgt

ICRS Star Coord at Epoch: 17h 17m 18.37575s -22:40:53.13842s

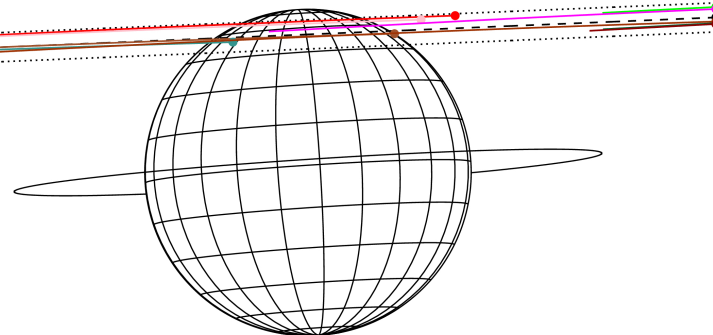
RUWE (>1.4 is poor) : 1.02
 K magnitude : 9.515
 G magnitude : 14.017
 RP magnitude : 12.822
 BP magnitude : 15.541
 DUPflag : 0
 Distance (au) : 4.385
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -11.90
 Sun-Target sep (deg) : 147.38
 Sun-Moon sep (deg) : 172.58
 B (ring opening deg) : -2.56
 PA of pole (deg) : 3.75
 Pole direction: RA (deg): 268.05689
 Dec (deg): 64.49652
 C/A sky separation (") : 19.003
 C/A sky separation (km) : 60438.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-07-15T21:34:02 K9.52 G14.02
 Pgt



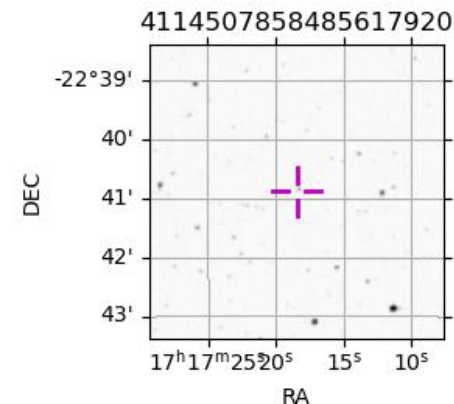
2031-07-15T21:34:02:1000 a: 17 17 18.3757 8 -22 40 53.138 C/A ***** PA 182.38 deg v_sky -11.90 km/s D 04.39 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PMO
 TEN
 KAV
 RIO
 ESO
 AAT
 SAAO
 MSO



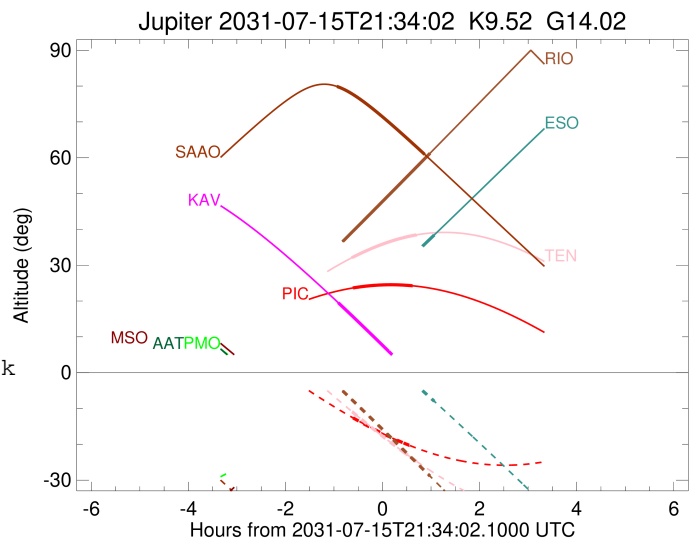
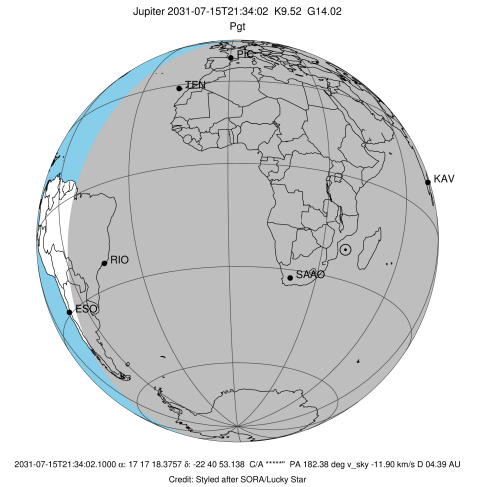
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+ +	JUL 15 20:57 - JUL 15 22:11	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	+ +	JUL 15 20:56 - JUL 15 22:16	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8	+	JUL 15 20:39 - JUL 15 20:39	Pin
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUL 15 20:44 - JUL 15 22:32	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUL 15 22:37 - JUL 15 22:37	Pne
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	JUL 15 20:37 - JUL 15 22:26	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T21:34:29.280
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      : 4114507858485617920
2Mass ID (if available) : 17171838-2240531
ICRS Star Coord at Epoch: 17h 17m 18.37575s -22:40:53.13842s
RUWE (>1.4 is poor) : 1.02
K magnitude         : 9.515
G magnitude         : 14.017
RP magnitude        : 12.822
BP magnitude        : 15.541
DUPflag            : 0
Distance (au)       : 4.385
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -11.90
Sun-Target sep (deg) : 147.38
Sun-Moon sep (deg)  : 172.39
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.75
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (" ) : 20.821
C/A sky separation (km) : 66220.7
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
    
```

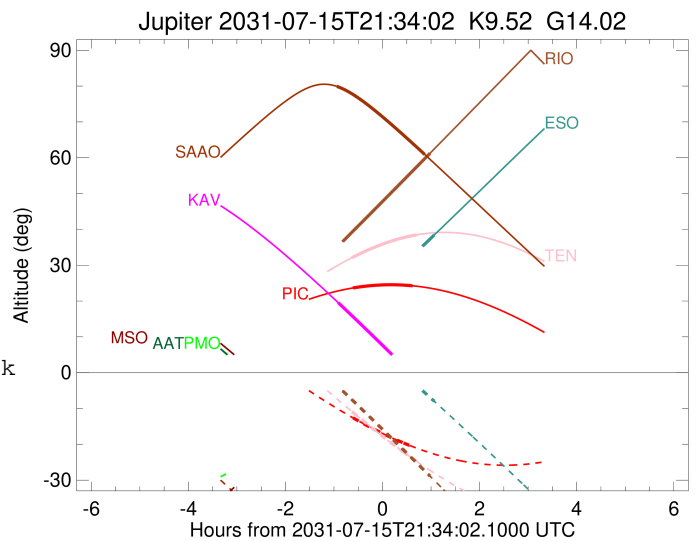
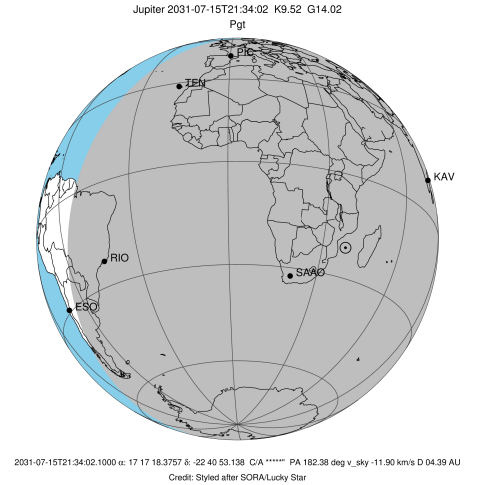


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T20:57:45.875	23.65	-12.64	71484.5	66.24	68.81
Jupiter	E	2031-07-15T22:11:13.338	24.24	-20.64	71484.2	69.13	71.44

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T21:36:19.540
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       : 4114507858485617920
2Mass ID (if available) : 17171838-2240531
ICRS Star Coord at Epoch: 17h 17m 18.37575s -22:40:53.13842s
RUWE (>1.4 is poor) : 1.02
K magnitude           : 9.515
G magnitude           : 14.017
RP magnitude          : 12.822
BP magnitude          : 15.541
DUPflag              : 0
Distance (au)         : 4.385
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.90
Sun-Target sep (deg)  : 147.38
Sun-Moon sep (deg)   : 172.23
B (ring opening deg) : -2.56
PA of pole (deg)     : 3.75
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 20.499
C/A sky separation (km) : 65197.1
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
    
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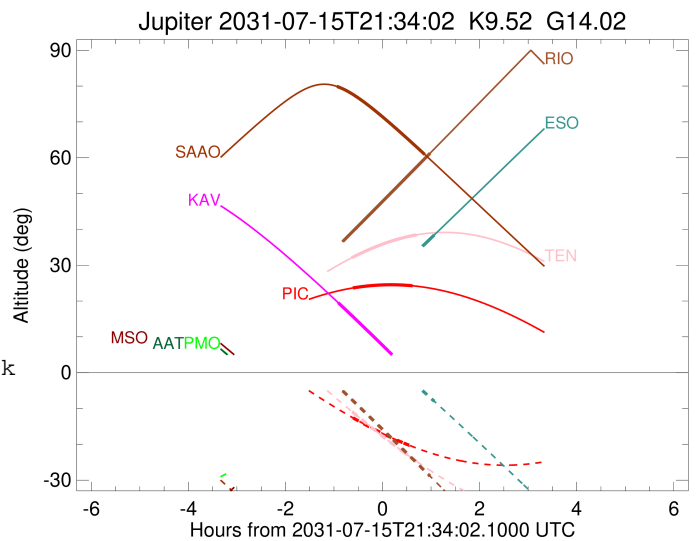
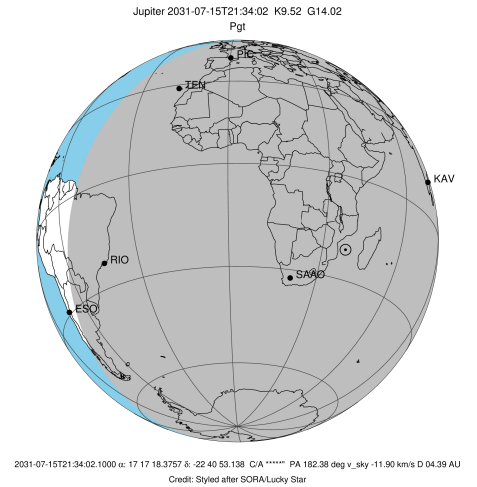


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T20:56:26.842	32.12	-10.89	71484.8	63.94	66.70
Jupiter	E	2031-07-15T22:16:09.233	38.47	-24.74	71484.4	67.27	69.75

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T21:26:56.740
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      : 4114507858485617920
2Mass ID (if available) : 17171838-2240531
ICRS Star Coord at Epoch: 17h 17m 18.37575s -22:40:53.13842s
RUWE (>1.4 is poor) : 1.02
K magnitude          : 9.515
G magnitude          : 14.017
RP magnitude         : 12.822
BP magnitude         : 15.541
DUPflag             : 0
Distance (au)       : 4.385
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.90
Sun-Target sep (deg) : 147.38
Sun-Moon sep (deg)  : 173.36
B (ring opening deg) : -2.56
PA of pole (deg)    : 3.75
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation ("): 19.681
C/A sky separation (km): 62595.6
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
    
```

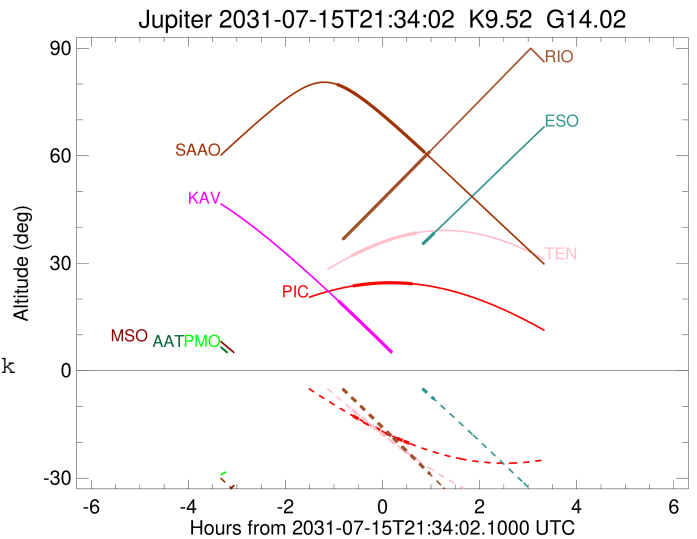
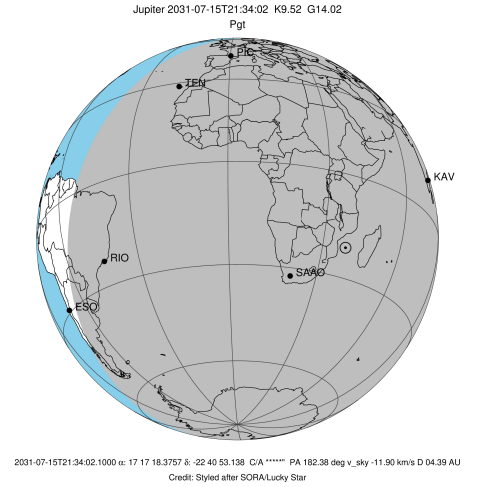


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T20:39:16.060	19.53	-46.85	71485.3	60.39	63.43
Jupiter	E	2031-07-15T22:15:00.139	-1.51x	-29.47	71485.1	61.58	64.52

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-15T21:38:54.830
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        : 4114507858485617920
2Mass ID (if available) : 17171838-2240531
ICRS Star Coord at Epoch: 17h 17m 18.37575s -22:40:53.13842s
RUWE (>1.4 is poor)  : 1.02
K magnitude           : 9.515
G magnitude           : 14.017
RP magnitude          : 12.822
BP magnitude          : 15.541
DUPflag              : 0
Distance (au)         : 4.385
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -11.90
Sun-Target sep (deg)  : 147.38
Sun-Moon sep (deg)    : 172.11
B (ring opening deg)  : -2.56
PA of pole (deg)      : 3.75
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 18.746
C/A sky separation (km) : 59621.5
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
    
```

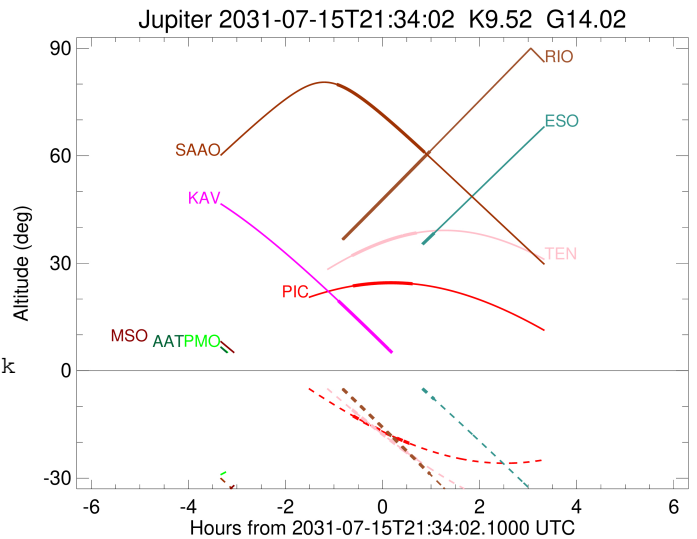
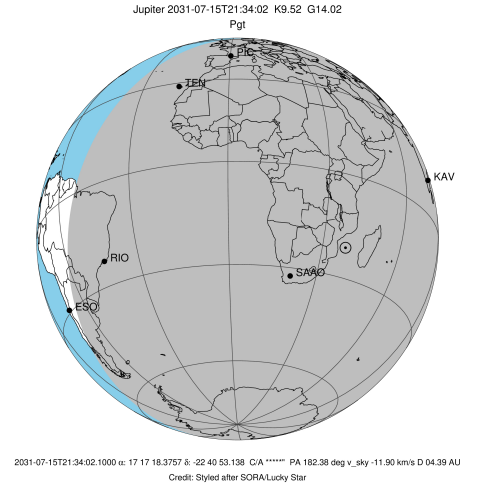


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T20:44:49.250	36.60	-5.09	71486.1	54.41	57.81
Jupiter	E	2031-07-15T22:32:44.808	61.23	-28.88	71485.5	58.33	61.50

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-15T21:40:17.210
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       : 4114507858485617920
2Mass ID (if available) : 17171838-2240531
ICRS Star Coord at Epoch: 17h 17m 18.37575s -22:40:53.13842s
RUWE (>1.4 is poor) : 1.02
K magnitude           : 9.515
G magnitude           : 14.017
RP magnitude          : 12.822
BP magnitude          : 15.541
DUPflag              : 0
Distance (au)        : 4.385
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.90
Sun-Target sep (deg) : 147.38
Sun-Moon sep (deg)   : 171.95
B (ring opening deg) : -2.56
PA of pole (deg)     : 3.75
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 18.252
C/A sky separation (km) : 58050.5
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
    
```

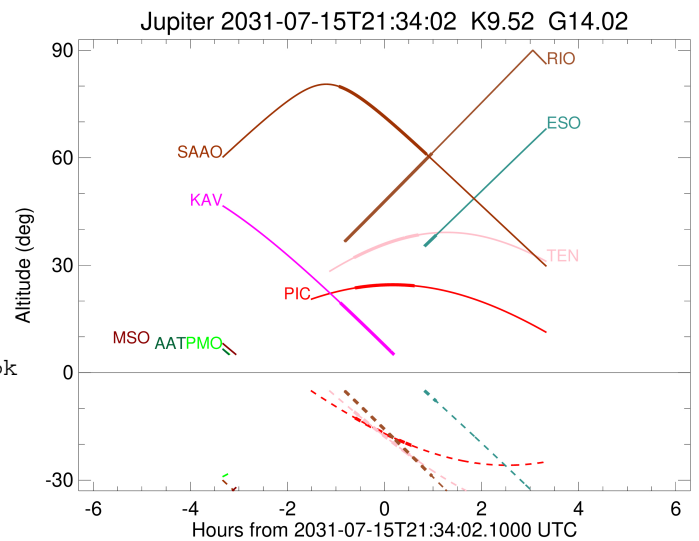
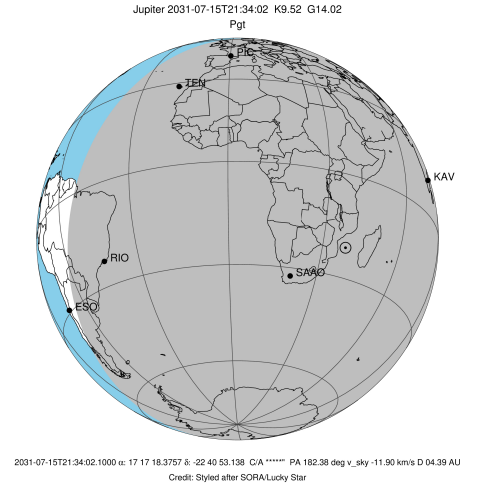


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T20:42:13.283	13.73	14.44x	71486.4	52.11	55.61
Jupiter	E	2031-07-15T22:37:57.248	38.42	-7.97	71485.8	56.28	59.58

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T21:31:54.810
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       : 4114507858485617920
2Mass ID (if available) : 17171838-2240531
ICRS Star Coord at Epoch: 17h 17m 18.37575s -22:40:53.13842s
RUWE (>1.4 is poor) : 1.02
K magnitude           : 9.515
G magnitude           : 14.017
RP magnitude          : 12.822
BP magnitude          : 15.541
DUPflag              : 0
Distance (au)         : 4.385
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.90
Sun-Target sep (deg)  : 147.38
Sun-Moon sep (deg)    : 172.95
B (ring opening deg) : -2.56
PA of pole (deg)     : 3.75
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 18.662
C/A sky separation (km) : 59354.0
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	2031-07-15T20:37:47.410	79.88	-60.24	71486.1	54.74	58.12
Jupiter	E	2031-07-15T22:26:11.649	60.91	-78.61	71485.7	57.18	60.43