

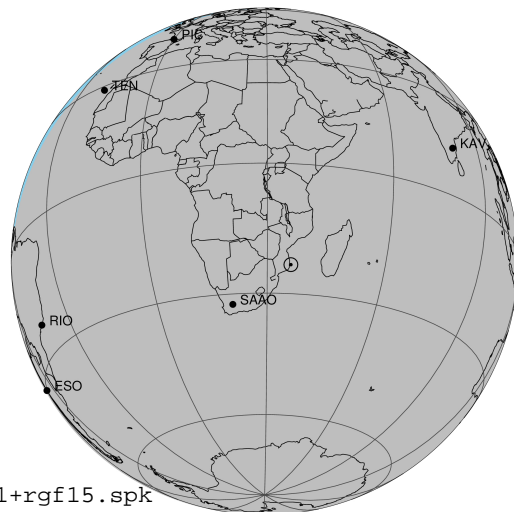
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-20T21:38:17.400  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4111500247532158336  
 2Mass ID (if available) : 17292662-2247430

Jupiter 2031-06-20T21:38:17 K9.40 G14.41 Pgt

ICRS Star Coord at Epoch: 17h 29m 26.60626s -22:47:43.03453s

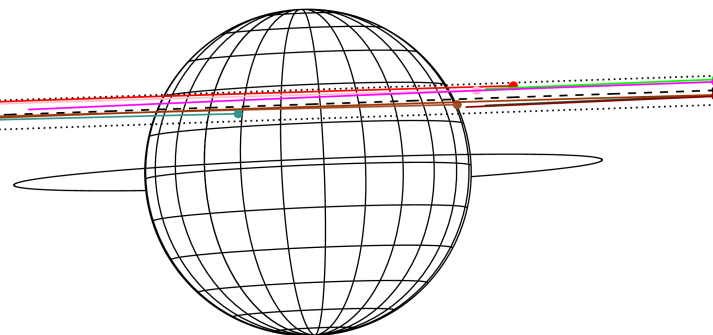
RUWE (>1.4 is poor) : 0.95  
 K magnitude : 9.397  
 G magnitude : 14.414  
 RP magnitude : 13.172  
 BP magnitude : 16.134  
 DUPflag : 0  
 Distance (au) : 4.267  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.33  
 Sun-Target sep (deg) : 174.00  
 Sun-Moon sep (deg) : 163.22  
 B (ring opening deg) : -2.60  
 PA of pole (deg) : 2.45  
 Pole direction: RA (deg): 268.05691  
 Dec (deg): 64.49651  
 C/A sky separation (") : 9.643  
 C/A sky separation (km) : 29841.1  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-06-20T21:38:17 K9.40 G14.41  
 Pgt



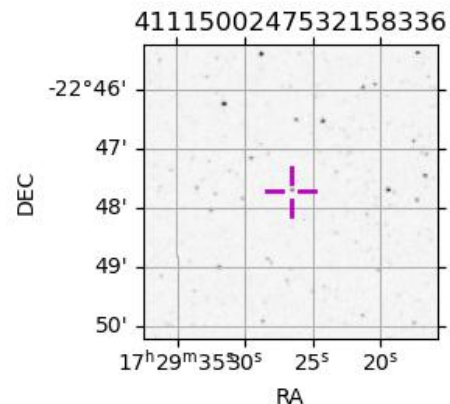
2031-06-20T21:38:17.4000 at: 17 29 26.6063 s: -22 47 43.035 C/A 9.631" PA 181.97 deg v\_sky -16.33 km/s D 04.27 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PIC  
 PMO  
 TEN  
 KAV  
 RIO  
 ESO  
 AAT  
 SAAO  
 MSO



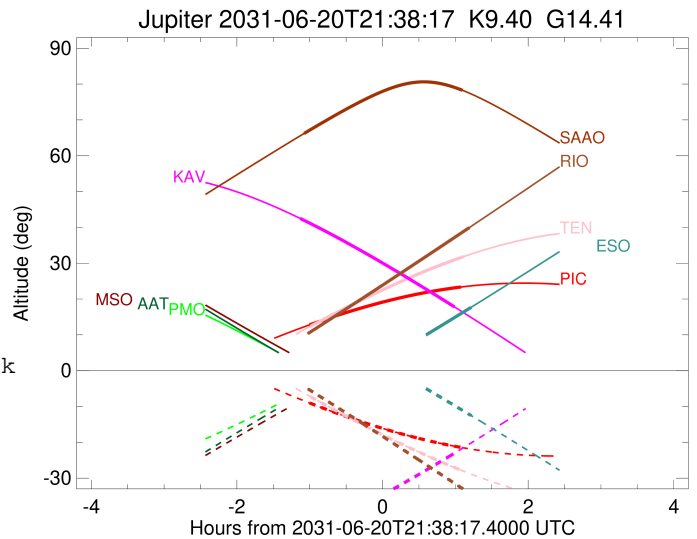
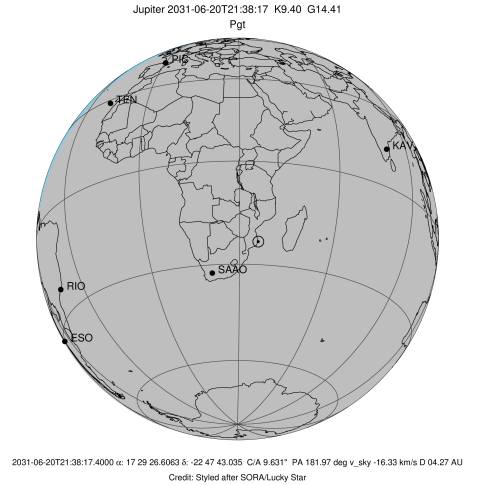
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+ +	JUN 20 20:38 - JUN 20 22:42	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 20 20:38 - JUN 20 22:45	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8	+ +	JUN 20 20:30 - JUN 20 22:37	Pie
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUN 20 20:36 - JUN 20 22:49	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3		JUN 20 22:51 - JUN 20 22:51	Pne
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	JUN 20 20:33 - JUN 20 22:44	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-20T21:40:35.820
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     : 4111500247532158336
2Mass ID (if available) : 17292662-2247430
ICRS Star Coord at Epoch: 17h 29m 26.60626s -22:47:43.03453s
RUWE (>1.4 is poor) : 0.95
K magnitude         : 9.397
G magnitude         : 14.414
RP magnitude        : 13.172
BP magnitude        : 16.134
DUPflag            : 0
Distance (au)      : 4.267
f0 (km)            : 0.00
g0 (km)            : 0.00
skyplane vel. (km/s) : -16.33
Sun-Target sep (deg) : 174.00
Sun-Moon sep (deg) : 163.49
B (ring opening deg) : -2.60
PA of pole (deg)   : 2.45
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 11.422
C/A sky separation (km) : 35347.4
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
    
```

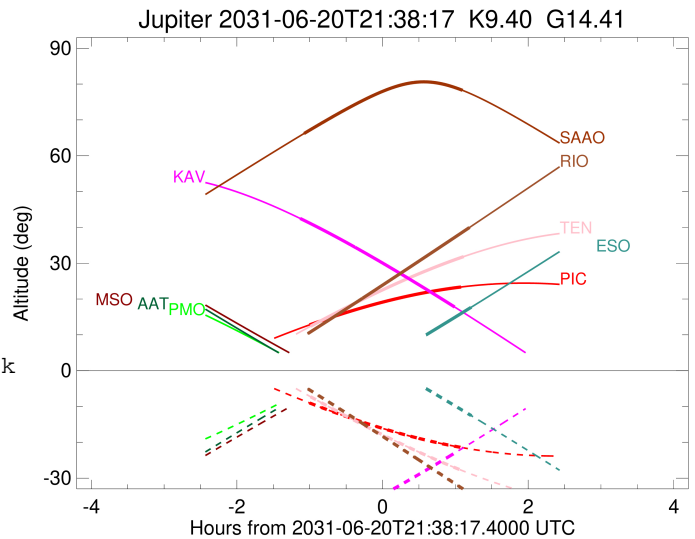
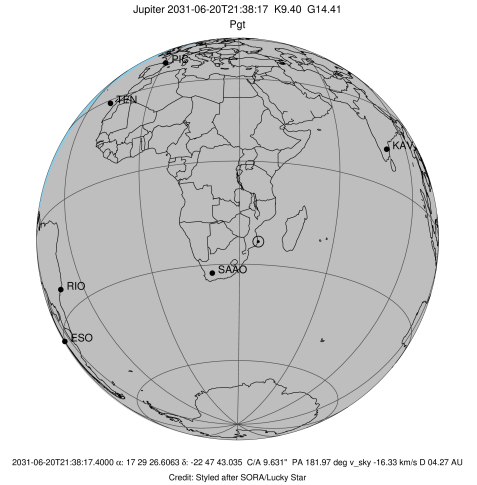


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T20:38:10.967	12.79	-9.01	71489.9	28.82	32.12
Jupiter	E	2031-06-20T22:42:51.206	23.34	-21.41	71489.7	30.27	33.66

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-20T21:42:13.220
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        : 4111500247532158336
2Mass ID (if available) : 17292662-2247430
ICRS Star Coord at Epoch: 17h 29m 26.60626s -22:47:43.03453s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 9.397
G magnitude           : 14.414
RP magnitude          : 13.172
BP magnitude          : 16.134
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.33
Sun-Target sep (deg)  : 174.00
Sun-Moon sep (deg)   : 163.77
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.45
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 10.997
C/A sky separation (km) : 34032.8
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
    
```

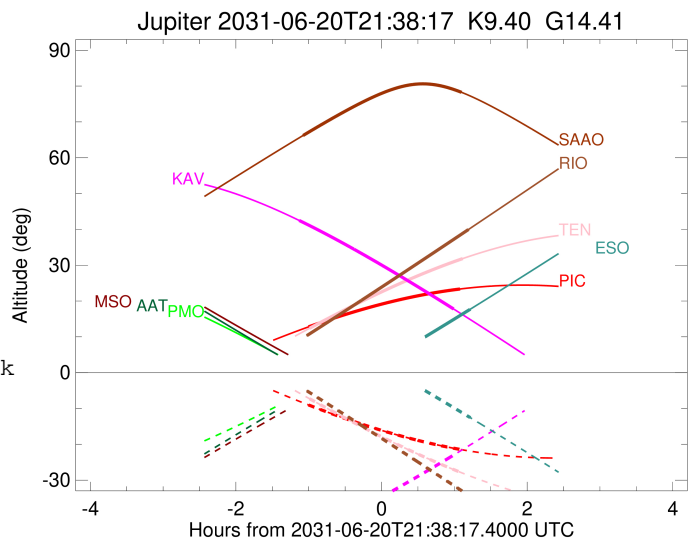
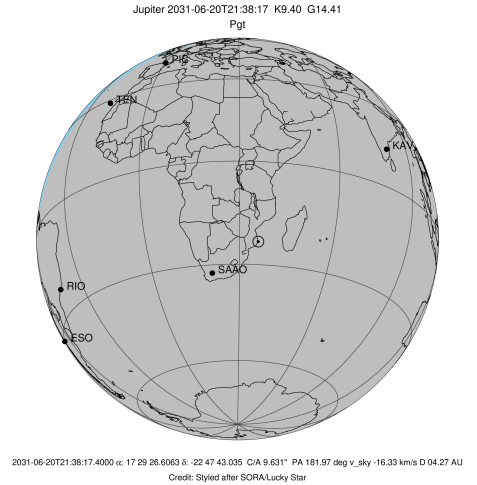


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T20:38:58.314	12.39	-7.27	71490.0	27.45	30.66
Jupiter	E	2031-06-20T22:45:10.731	31.84	-28.05	71489.8	29.24	32.56

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-20T21:33:52.790
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      : 4111500247532158336
2Mass ID (if available) : 17292662-2247430
ICRS Star Coord at Epoch: 17h 29m 26.60626s -22:47:43.03453s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 9.397
G magnitude          : 14.414
RP magnitude         : 13.172
BP magnitude         : 16.134
DUPflag             : 0
Distance (au)       : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.33
Sun-Target sep (deg) : 174.00
Sun-Moon sep (deg)  : 162.67
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.45
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 10.619
C/A sky separation (km) : 32861.2
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
    
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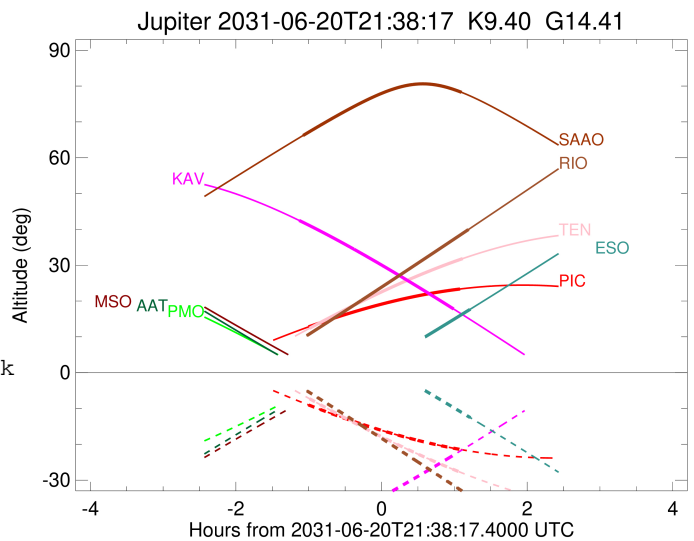
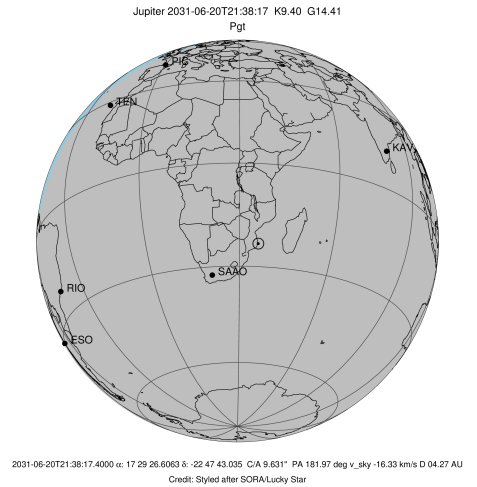


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T20:30:23.889	42.49	-45.97	71490.1	27.21	30.40
Jupiter	E	2031-06-20T22:37:43.141	17.77	-23.00	71490.1	27.34	30.54

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-20T21:43:38.280
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       : 4111500247532158336
2Mass ID (if available) : 17292662-2247430
ICRS Star Coord at Epoch: 17h 29m 26.60626s -22:47:43.03453s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 9.397
G magnitude          : 14.414
RP magnitude         : 13.172
BP magnitude         : 16.134
DUPflag             : 0
Distance (au)        : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.33
Sun-Target sep (deg) : 174.00
Sun-Moon sep (deg)   : 164.10
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.45
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 9.090
C/A sky separation (km) : 28130.2
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
    
```

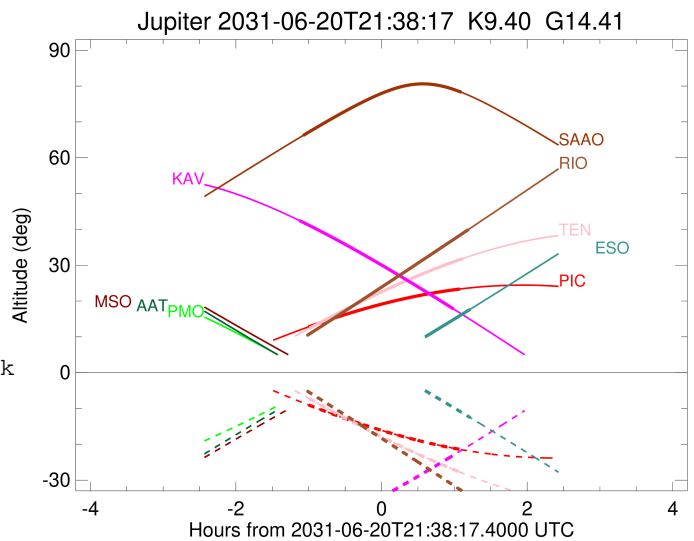
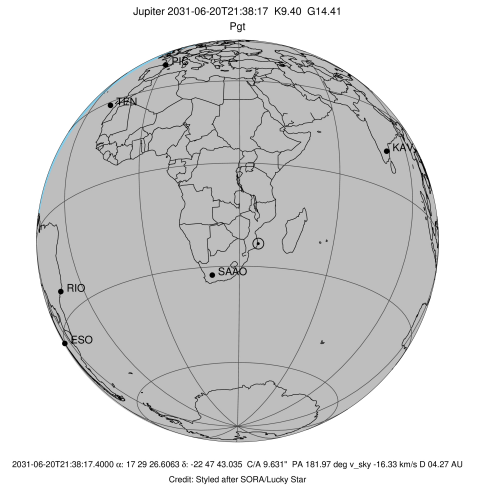


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T20:36:51.040	10.36	-5.08	71490.7	22.09	24.87
Jupiter	E	2031-06-20T22:49:57.980	39.97	-34.20	71490.5	24.16	27.11

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-20T21:43:33.010
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        : 4111500247532158336
2Mass ID (if available) : 17292662-2247430
ICRS Star Coord at Epoch: 17h 29m 26.60626s -22:47:43.03453s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 9.397
G magnitude           : 14.414
RP magnitude          : 13.172
BP magnitude          : 16.134
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.33
Sun-Target sep (deg) : 174.00
Sun-Moon sep (deg)   : 164.03
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.45
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 8.559
C/A sky separation (km): 26485.5
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
    
```

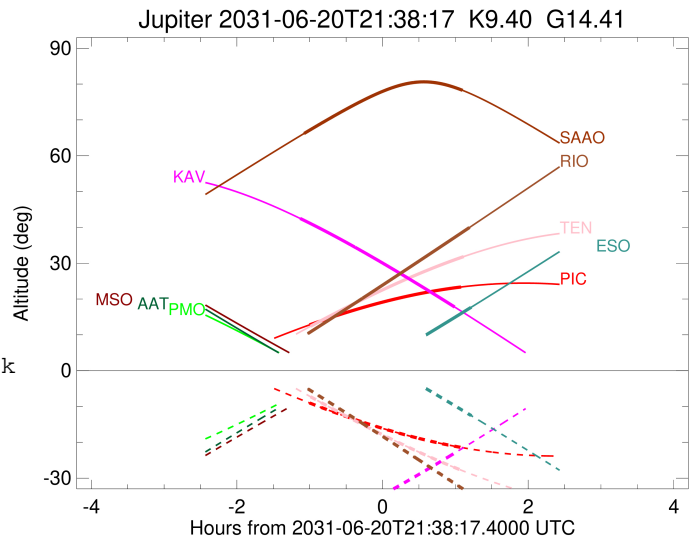
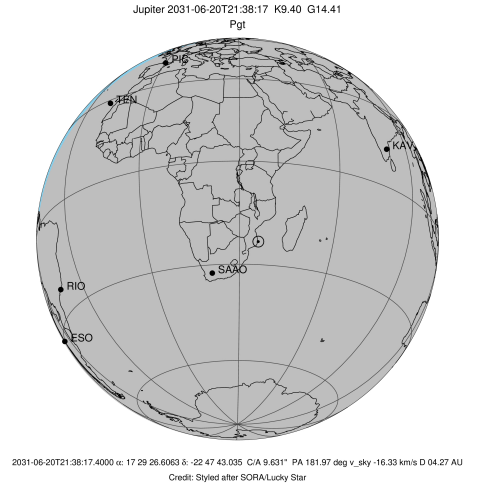


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-20T20:35:16.209	-9.39x	13.61x	71490.8	20.73	23.37
Jupiter	E	2031-06-20T22:51:21.128	17.69	-12.53	71490.6	22.75	25.59

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-20T21:38:59.830
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      : 4111500247532158336
2Mass ID (if available) : 17292662-2247430
ICRS Star Coord at Epoch: 17h 29m 26.60626s -22:47:43.03453s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 9.397
G magnitude          : 14.414
RP magnitude         : 13.172
BP magnitude         : 16.134
DUPflag             : 0
Distance (au)       : 4.267
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.33
Sun-Target sep (deg) : 174.00
Sun-Moon sep (deg)  : 163.60
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.45
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (" ) : 9.292
C/A sky separation (km) : 28755.2
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	2031-06-20T20:33:39.481	66.20	-61.17	71490.6	23.02	25.88
Jupiter	E	2031-06-20T22:44:16.709	78.24	-81.13	71490.5	24.21	27.18