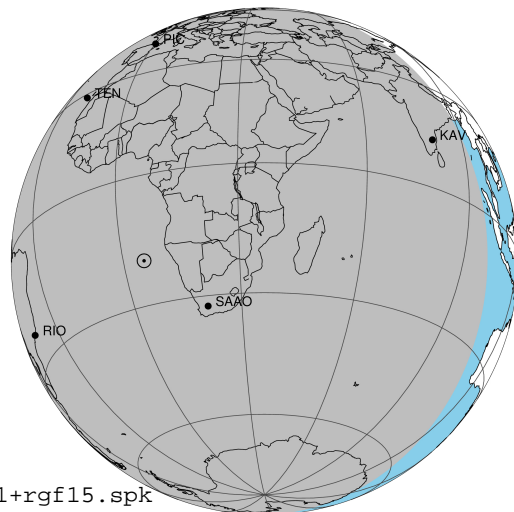


target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-05-19T23:33:35.610  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4068854482106659840  
 2Mass ID (if available) : 17455621-2252563

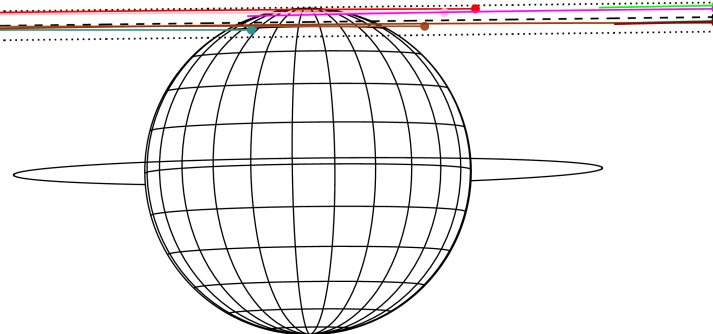
Jupiter 2031-05-19T23:33:35 K9.57 G13.39 Pgt

ICRS Star Coord at Epoch: 17h 45m 56.22120s -22:52:56.56855s  
 RUWE (>1.4 is poor) : 1.61  
 K magnitude : 9.568  
 G magnitude : 13.387  
 RP magnitude : 12.335  
 BP magnitude : 14.518  
 DUPflag : 0  
 Distance (au) : 4.377  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -12.90  
 Sun-Target sep (deg) : 151.60  
 Sun-Moon sep (deg) : 136.63  
 B (ring opening deg) : -2.61  
 PA of pole (deg) : 0.68  
 Pole direction: RA (deg): 268.05694  
 Dec (deg): 64.49651  
 C/A sky separation (") : 20.627  
 C/A sky separation (km) : 65489.1  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk



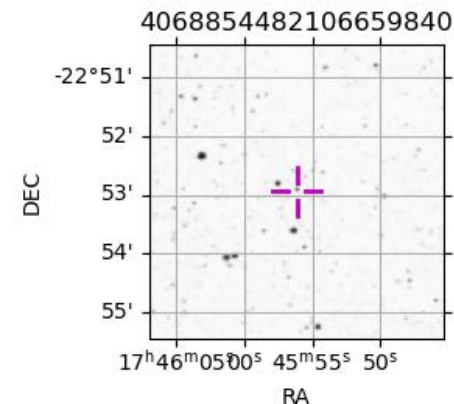
2031-05-19T23:33:35.6100 a: 17 45 56.2212 d: -22 52 56.5689 C/A \*\*\*\*\* PA 180.69 deg v\_sky -12.90 km/s D 04.38 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PIC  
 PMO  
 TEN  
 KAV  
 RIO  
 ESO  
 AAT  
 SAAO  
 MSO



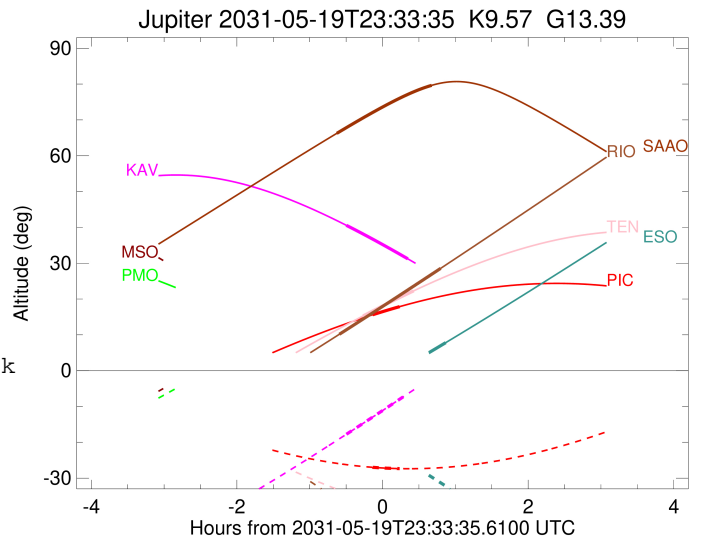
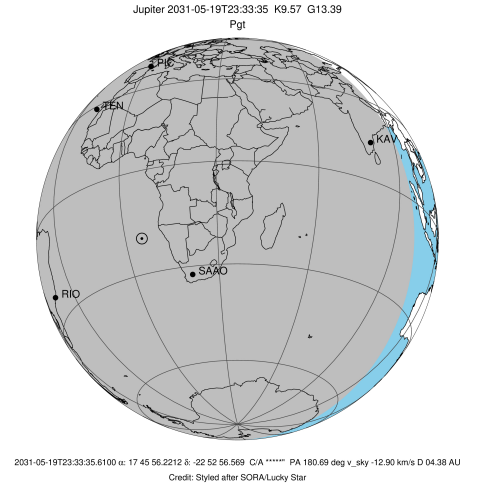
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+ +	MAY 19 23:25 - MAY 19 23:47	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 19 23:17 - MAY 19 23:59	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8	+ +	MAY 19 23:03 - MAY 19 23:54	Pie
RIO	Rio de Janeiro	-22.9	316.8	+ +	MAY 19 22:58 - MAY 20 00:21	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 20 00:25 - MAY 20 00:25	Pne
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	MAY 19 22:56 - MAY 20 00:14	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T23:36:35.510
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       : 4068854482106659840
2Mass ID (if available) : 17455621-2252563
ICRS Star Coord at Epoch: 17h 45m 56.22120s -22:52:56.56855s
RUWE (>1.4 is poor) : 1.61
K magnitude           : 9.568
G magnitude           : 13.387
RP magnitude          : 12.335
BP magnitude          : 14.518
DUPflag              : 0
Distance (au)         : 4.377
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.90
Sun-Target sep (deg) : 151.60
Sun-Moon sep (deg)   : 136.53
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.68
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 22.343
C/A sky separation (km) : 70937.0
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
    
```

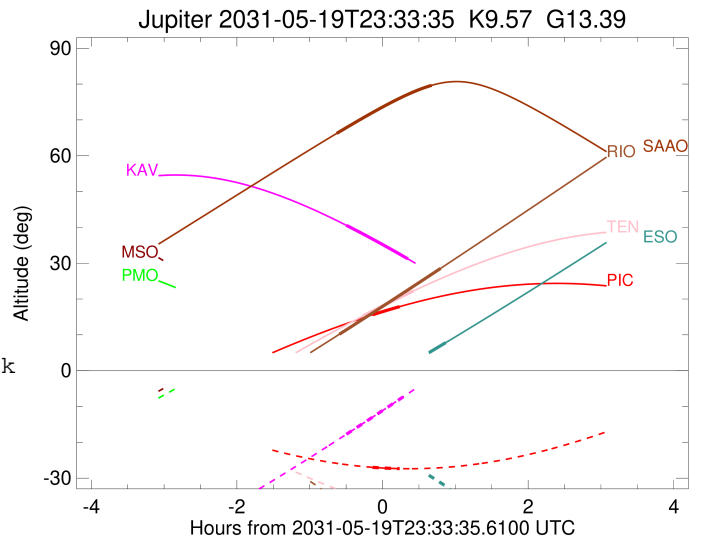
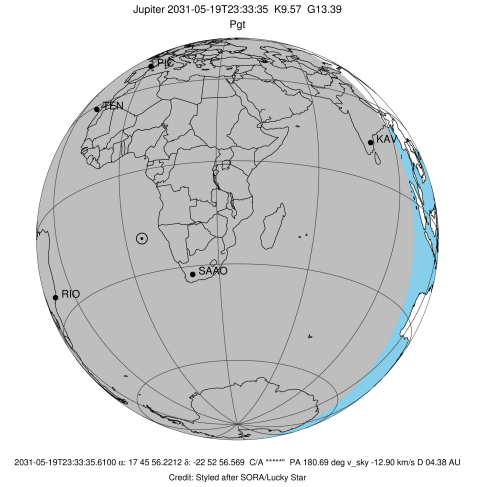


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T23:25:25.337	15.60	-26.98	71482.9	82.13	83.06
Jupiter	E	2031-05-19T23:47:45.110	17.88	-27.34	71482.9	82.75	83.60

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T23:38:26.920
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      : 4068854482106659840
2Mass ID (if available) : 17455621-2252563
ICRS Star Coord at Epoch: 17h 45m 56.22120s -22:52:56.56855s
RUWE (>1.4 is poor) : 1.61
K magnitude          : 9.568
G magnitude          : 13.387
RP magnitude         : 12.335
BP magnitude         : 14.518
DUPflag             : 0
Distance (au)       : 4.377
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.90
Sun-Target sep (deg) : 151.60
Sun-Moon sep (deg)  : 136.36
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.68
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 21.918
C/A sky separation (km) : 69587.6
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
    
```

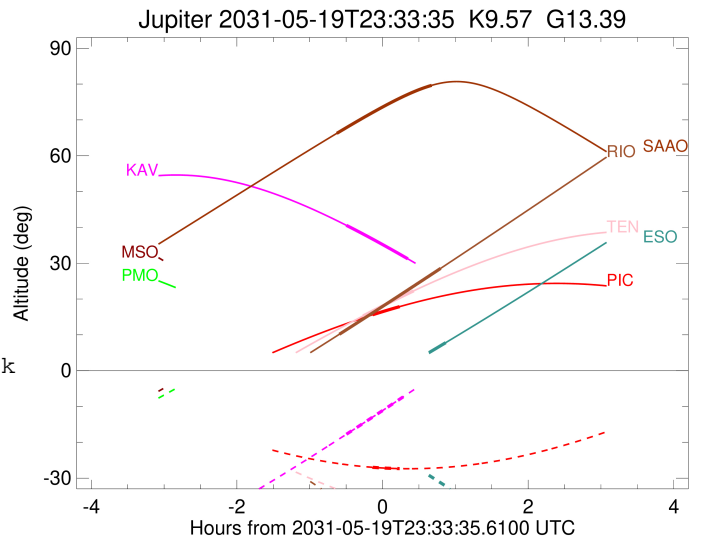
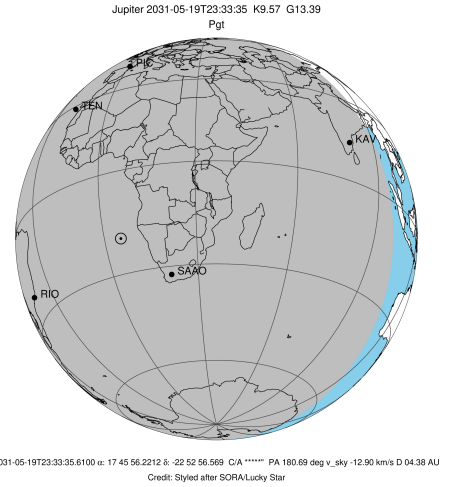


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T23:17:40.981	15.29	-35.71	71483.2	75.98	77.59
Jupiter	E	2031-05-19T23:59:09.885	22.26	-39.60	71483.2	77.03	78.53

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T23:29:03.350
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      : 4068854482106659840
2Mass ID (if available) : 17455621-2252563
ICRS Star Coord at Epoch: 17h 45m 56.22120s -22:52:56.56855s
RUWE (>1.4 is poor) : 1.61
K magnitude          : 9.568
G magnitude          : 13.387
RP magnitude         : 12.335
BP magnitude         : 14.518
DUPflag             : 0
Distance (au)       : 4.378
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.90
Sun-Target sep (deg) : 151.60
Sun-Moon sep (deg)  : 137.44
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.68
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 21.611
C/A sky separation (km) : 68610.8
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
    
```

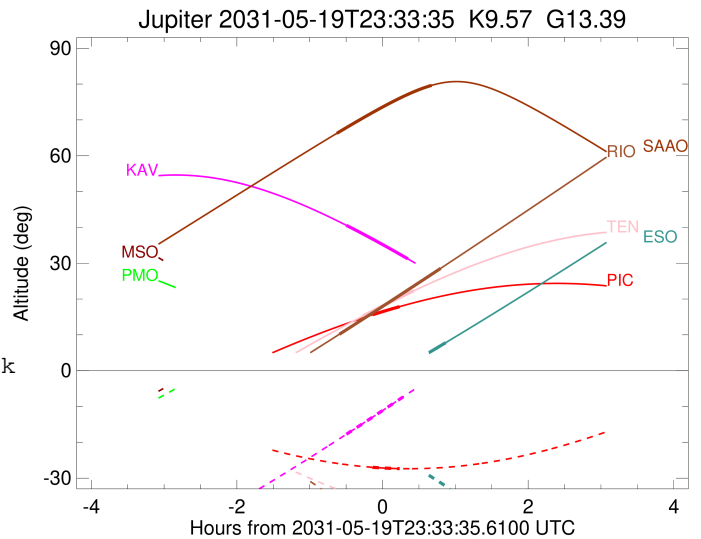
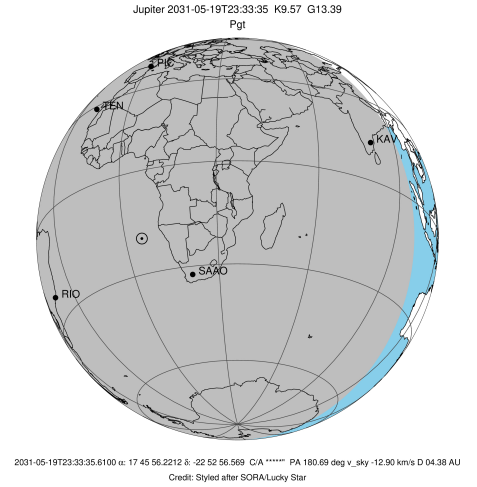


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T23:03:47.235	40.57	-17.76	71483.4	73.97	75.79
Jupiter	E	2031-05-19T23:54:22.644	31.23	-6.47	71483.5	72.96	74.89

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T23:39:57.390
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     : 4068854482106659840
2Mass ID (if available) : 17455621-2252563
ICRS Star Coord at Epoch: 17h 45m 56.22120s -22:52:56.56855s
RUWE (>1.4 is poor) : 1.61
K magnitude         : 9.568
G magnitude         : 13.387
RP magnitude        : 12.335
BP magnitude        : 14.518
DUPflag            : 0
Distance (au)      : 4.377
f0 (km)            : 0.00
g0 (km)            : 0.00
skyplane vel. (km/s) : -12.90
Sun-Target sep (deg) : 151.60
Sun-Moon sep (deg)  : 136.22
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.68
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 20.051
C/A sky separation (km) : 63657.4
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
    
```

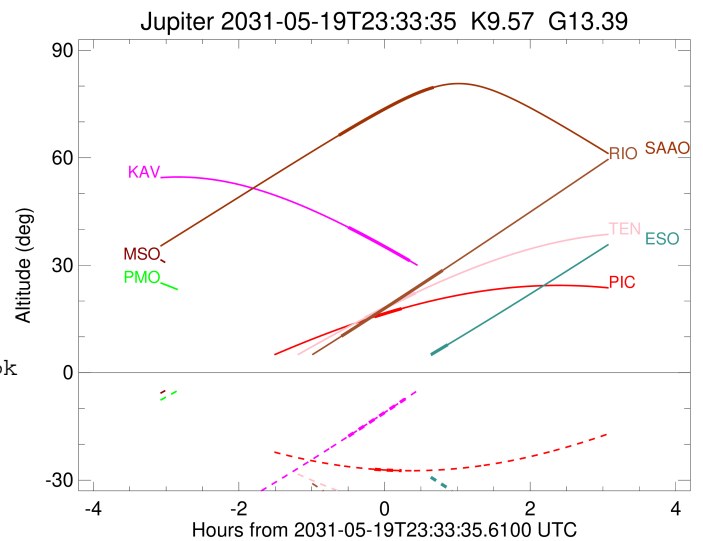
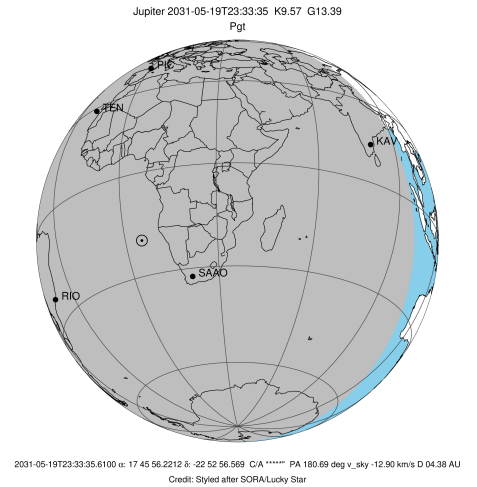


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T22:58:05.619	10.17	-36.39	71484.7	62.11	65.02
Jupiter	E	2031-05-20T00:21:33.760	28.57	-55.54	71484.6	63.50	66.30

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T23:39:32.670
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      : 4068854482106659840
2Mass ID (if available) : 17455621-2252563
ICRS Star Coord at Epoch: 17h 45m 56.22120s -22:52:56.56855s
RUWE (>1.4 is poor) : 1.61
K magnitude          : 9.568
G magnitude          : 13.387
RP magnitude         : 12.335
BP magnitude         : 14.518
DUPflag             : 0
Distance (au)       : 4.377
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.90
Sun-Target sep (deg) : 151.60
Sun-Moon sep (deg)  : 136.04
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.68
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.534
C/A sky separation (km) : 62016.4
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
    
```

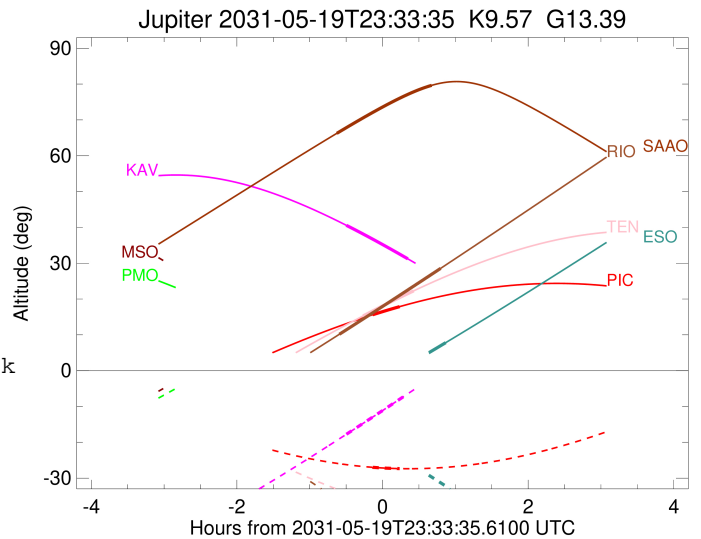
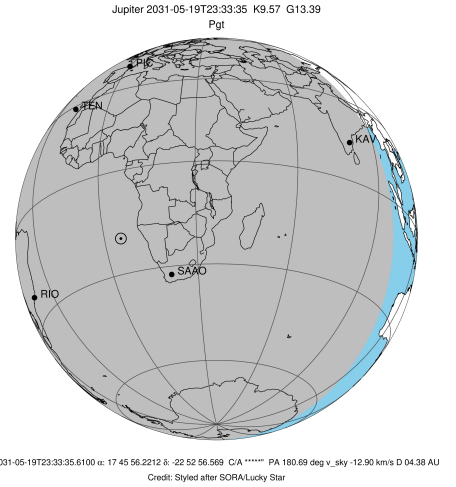


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T22:53:07.007	-10.15x	-12.38	71485.1	59.43	62.54
Jupiter	E	2031-05-20T00:25:40.285	7.82	-32.20	71484.9	60.74	63.75

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T23:35:06.480
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       : 4068854482106659840
2Mass ID (if available) : 17455621-2252563
ICRS Star Coord at Epoch: 17h 45m 56.22120s -22:52:56.56855s
RUWE (>1.4 is poor) : 1.61
K magnitude           : 9.568
G magnitude           : 13.387
RP magnitude         : 12.335
BP magnitude         : 14.518
DUPflag              : 0
Distance (au)        : 4.377
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.90
Sun-Target sep (deg) : 151.60
Sun-Moon sep (deg)   : 137.08
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.68
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 20.276
C/A sky separation (km) : 64374.9
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
    
```



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	2031-05-19T22:55:59.934	66.25	-76.67	71484.5	63.89	66.65
Jupiter	E	2031-05-20T00:14:08.919	79.64	-64.31	71484.5	64.22	66.96