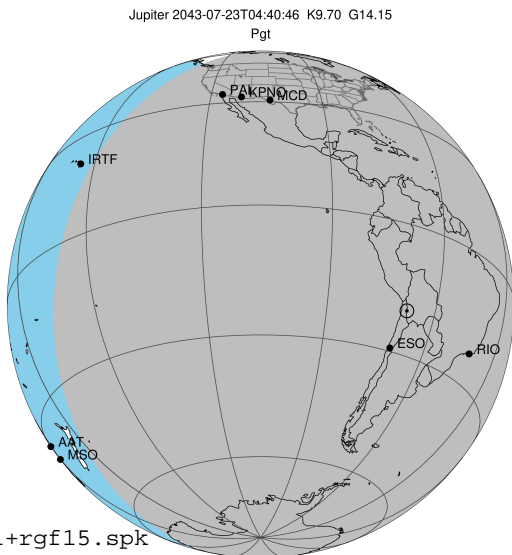


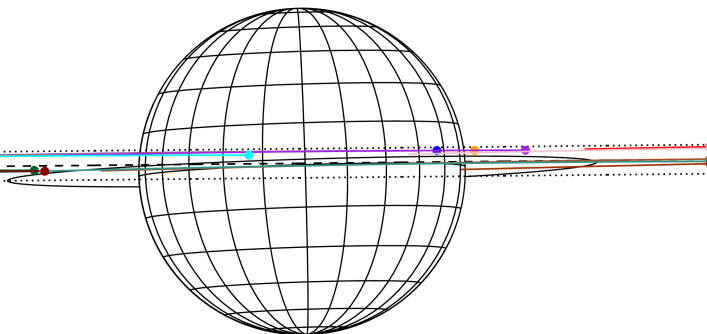
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2043-07-23T04:40:46.350  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4116686918795450112  
 2Mass ID (if available) : 17353240-2303186

Jupiter 2043-07-23T04:40:46 K9.70 G14.15 Pgt

ICRS Star Coord at Epoch: 17h 35m 32.39208s -23°03'18.99818s  
 RUWE (>1.4 is poor) : 0.91  
 K magnitude : 9.704  
 G magnitude : 14.154  
 RP magnitude : 12.977  
 BP magnitude : 15.646  
 DUPflag : 0  
 Distance (au) : 4.393  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -11.07  
 Sun-Target sep (deg) : 144.71  
 Sun-Moon sep (deg) : 47.95  
 B (ring opening deg) : -2.39  
 PA of pole (deg) : 1.80  
 Pole direction: RA (deg): 268.05670  
 Dec (deg): 64.49731  
 C/A sky separation (") : 1.129  
 C/A sky separation (km) : 3596.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk



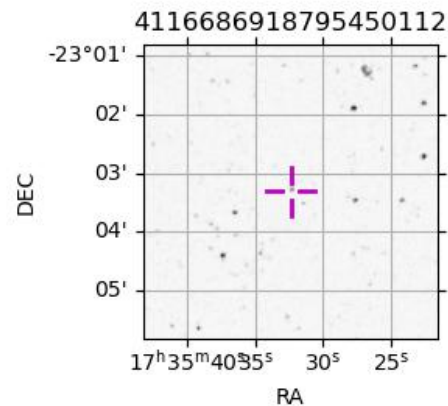
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 AAT  
 SAAO  
 MSO



2043-07-23T04:40:46.3500 at: 17 35 32.3921 s: -23 03 18.998 C/A 1.118" PA 180.57 deg v\_sky -11.07 km/s D 04.39 AU  
 Credit: Styled after SORA/Lucky Star

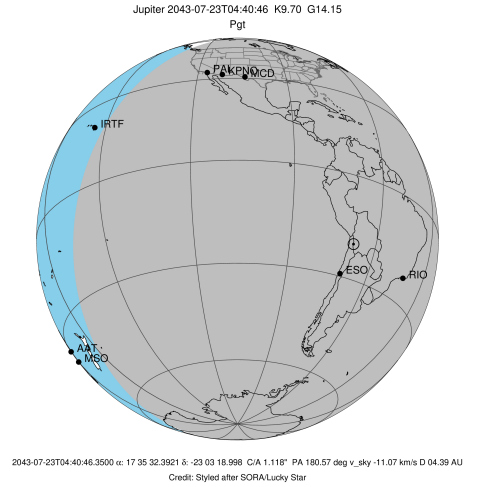
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events	Interval	OCode
PIC	Pic du Midi	42.9	0.1				Pnn
PAL	Palomar Mt (200")	33.4	243.1	+	JUL 23 06:25	- JUL 23 06:25	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8				Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUL 23 02:58	- JUL 23 06:24	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUL 23 02:57	- JUL 23 06:23	Pie
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUL 23 02:46	- JUL 23 02:46	Pin
IRTF	Mauna Kea/IRTF	19.8	204.5	+	JUL 23 06:31	- JUL 23 06:31	Pne
KAV	Kavalur Observatory	12.6	78.8				Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUL 23 02:48	- JUL 23 06:19	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUL 23 02:52	- JUL 23 06:21	Pie
AAT	Siding Spring (AAT)	-31.3	149.1				Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUL 23 02:45	- JUL 23 02:45	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0				Pnn

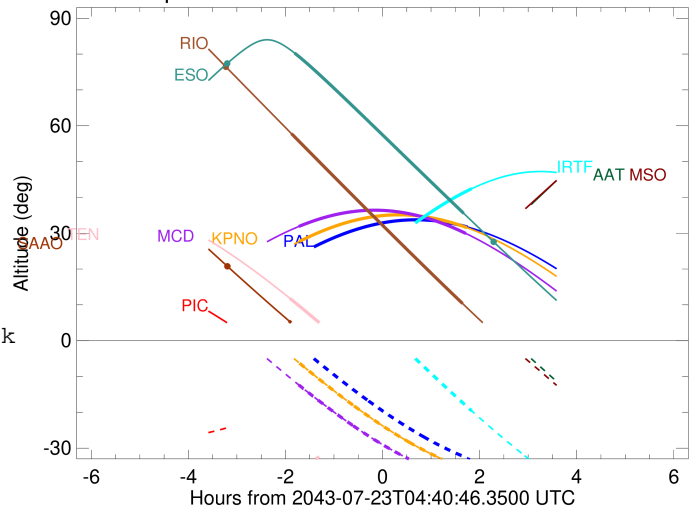


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2043-07-23T04:42:10.730
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : PAL
Location             : Palomar Mt (200")
Latitude (deg)       : 33.35622
E. Longitude (deg)   : 243.13601
Altitude (km)        : 1.706
Gaia source ID       : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude          : 9.704
G magnitude          : 14.154
RP magnitude         : 12.977
BP magnitude         : 15.646
DUPflag             : 0
Distance (au)        : 4.393
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg) : 144.71
Sun-Moon sep (deg)   : 48.50
B (ring opening deg) : -2.39
PA of pole (deg)     : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation ("): 2.781
C/A sky separation (km): 8859.4
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
    
```



Jupiter 2043-07-23T04:40:46 K9.70 G14.15

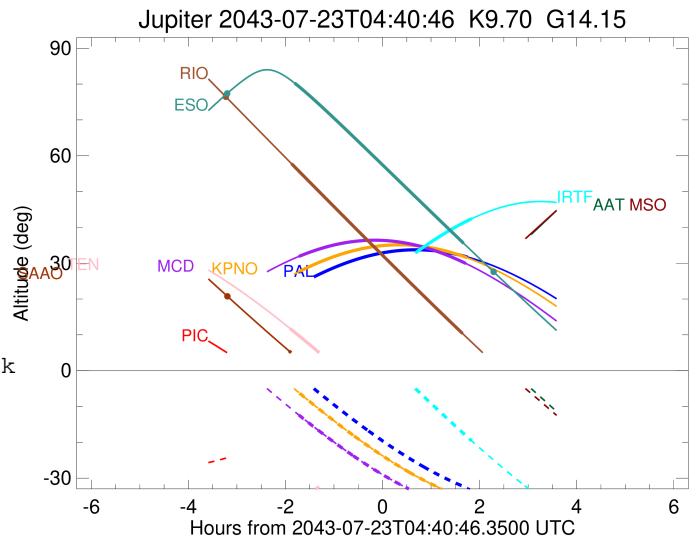
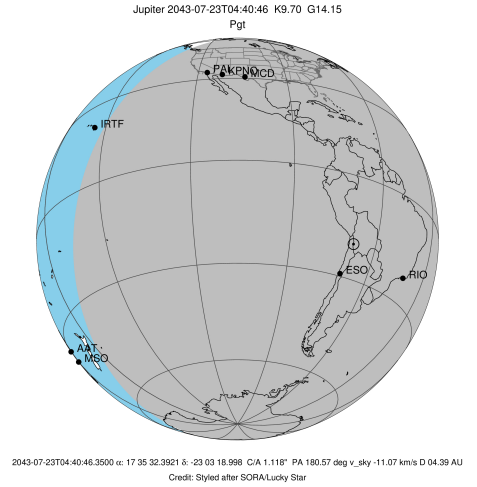


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2043-07-23T02:58:45.410	24.13	-1.79x	71491.9	5.58	6.38
Jupiter	E	2043-07-23T06:25:30.619	31.73	-32.72	71491.8	8.31	9.48

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2043-07-23T04:41:29.830
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : KPNO
Location              : Kitt Peak Natl Obs
Latitude (deg)        : 31.96333
E. Longitude (deg)    : 248.40000
Altitude (km)         : 2.120
Gaia source ID        : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude           : 9.704
G magnitude           : 14.154
RP magnitude          : 12.977
BP magnitude          : 15.646
DUPflag              : 0
Distance (au)         : 4.393
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg) : 144.71
Sun-Moon sep (deg)   : 48.48
B (ring opening deg) : -2.39
PA of pole (deg)     : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation (") : 2.762
C/A sky separation (km) : 8799.3
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
    
```

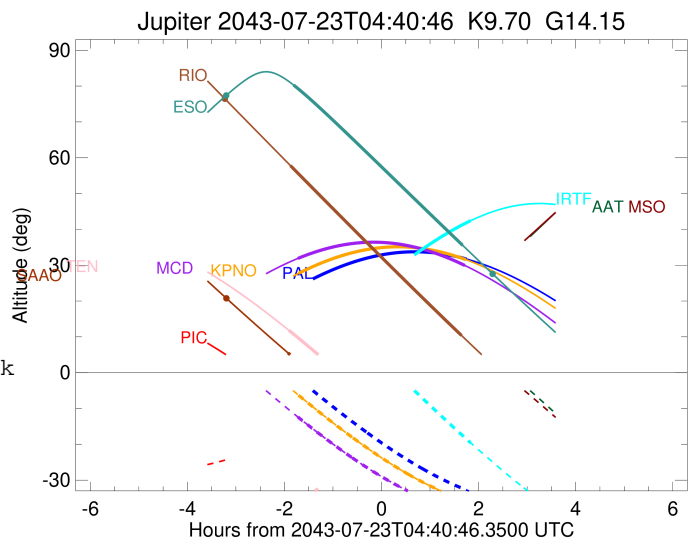
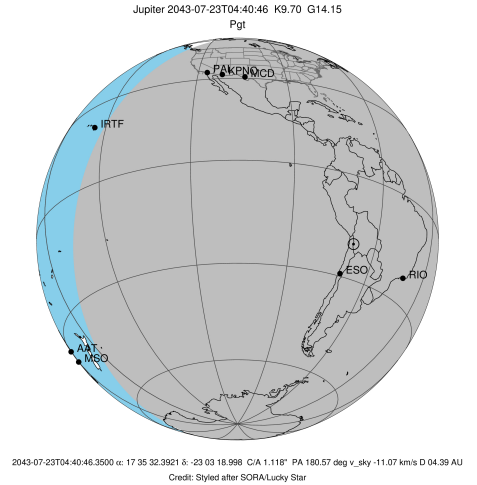


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2043-07-23T02:58:13.481	27.71	-6.28	71491.9	5.60	6.39
Jupiter	E	2043-07-23T06:24:48.793	31.57	-35.63	71491.8	8.19	9.35

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2043-07-23T04:40:28.410
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : MCD
Location            : McDonald Obs. 2.7m
Latitude (deg)      : 30.67158
E. Longitude (deg)  : 255.97844
Altitude (km)       : 2.075
Gaia source ID      : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude          : 9.704
G magnitude          : 14.154
RP magnitude         : 12.977
BP magnitude         : 15.646
DUPflag             : 0
Distance (au)       : 4.393
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg) : 144.71
Sun-Moon sep (deg)  : 48.42
B (ring opening deg) : -2.39
PA of pole (deg)    : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation (") : 2.739
C/A sky separation (km) : 8725.6
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
    
```

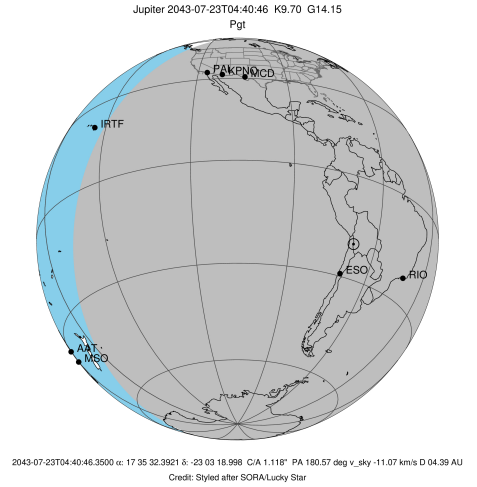


x: target alt < 5.0 deg or sun > -5.0 deg

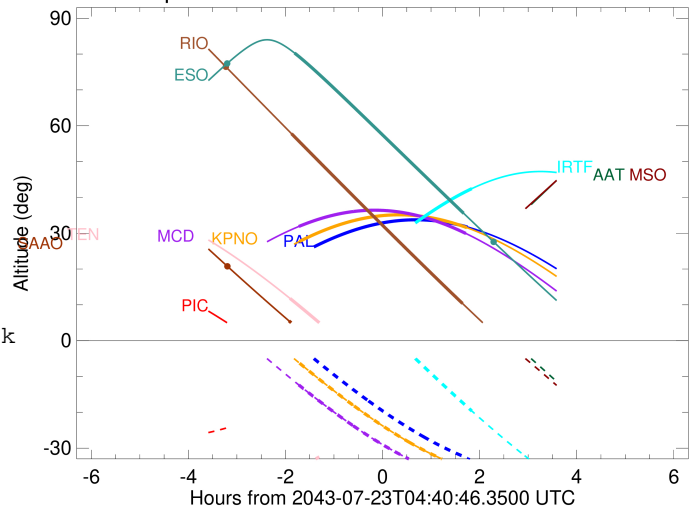
Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2043-07-23T02:57:20.831	31.88	-12.36	71491.9	5.63	6.43
Jupiter	E	2043-07-23T06:23:50.644	29.92	-38.57	71491.8	8.03	9.17

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2043-07-23T04:32:28.740
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        : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude           : 9.704
G magnitude           : 14.154
RP magnitude          : 12.977
BP magnitude          : 15.646
DUPflag              : 0
Distance (au)         : 4.393
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg)  : 144.71
Sun-Moon sep (deg)    : 47.31
B (ring opening deg) : -2.39
PA of pole (deg)      : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation (") : 2.032
C/A sky separation (km) : 6472.8
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
    
```



Jupiter 2043-07-23T04:40:46 K9.70 G14.15

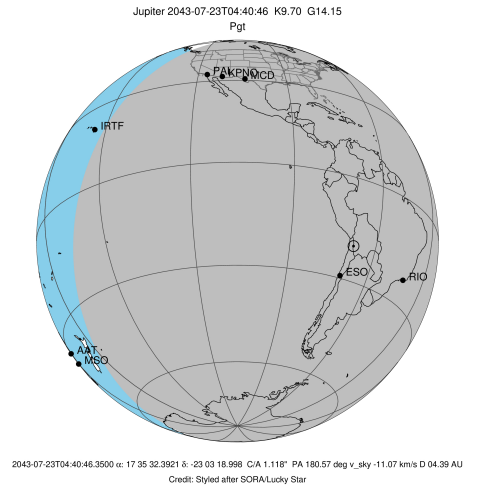


x: target alt < 5.0 deg or sun > -5.0 deg

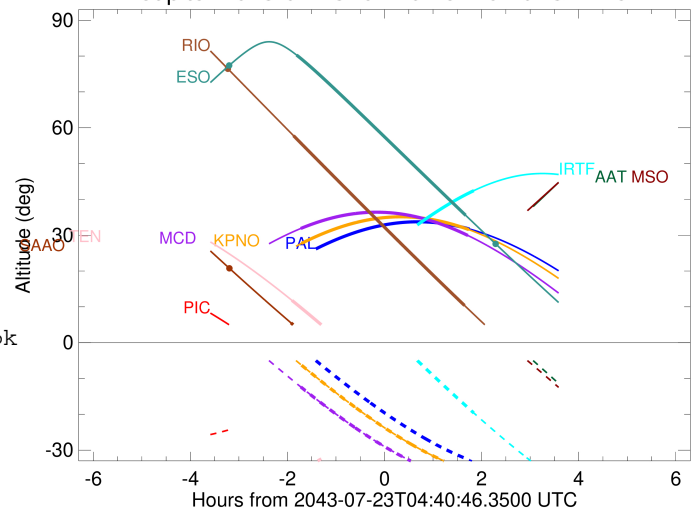
Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2043-07-23T02:46:27.382	11.79	-36.68	71491.9	4.75	5.43
Jupiter	E	2043-07-23T06:20:30.592	-31.86x	-1.40x	71491.9	5.60	6.40

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2043-07-23T04:47:19.760
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : IRTF
Location             : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude          : 9.704
G magnitude          : 14.154
RP magnitude         : 12.977
BP magnitude         : 15.646
DUPflag             : 0
Distance (au)        : 4.393
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg) : 144.71
Sun-Moon sep (deg)   : 48.75
B (ring opening deg) : -2.39
PA of pole (deg)     : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation (") : 2.243
C/A sky separation (km) : 7147.5
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
    
```



Jupiter 2043-07-23T04:40:46 K9.70 G14.15

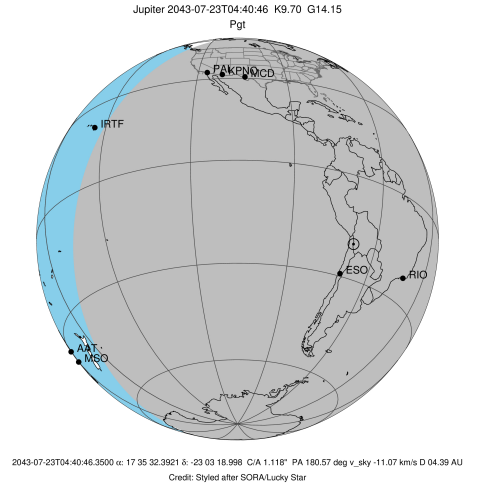


x: target alt < 5.0 deg or sun > -5.0 deg

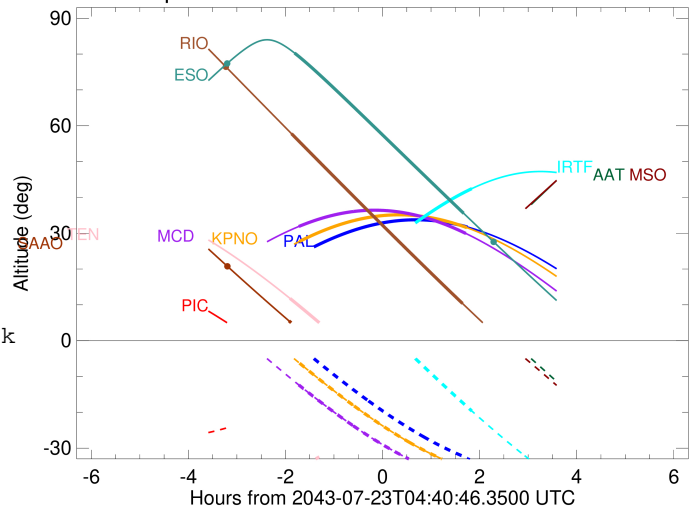
Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2043-07-23T03:02:20.453	6.40	26.10x	71492.0	3.75	4.29
Jupiter	E	2043-07-23T06:31:10.945	42.44	-19.62	71491.9	7.45	8.50

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2043-07-23T04:33:02.820
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       : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude          : 9.704
G magnitude          : 14.154
RP magnitude         : 12.977
BP magnitude         : 15.646
DUPflag             : 0
Distance (au)        : 4.393
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg) : 144.71
Sun-Moon sep (deg)   : 47.79
B (ring opening deg) : -2.39
PA of pole (deg)     : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation (") : 0.773
C/A sky separation (km) : 2461.4
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
    
```



Jupiter 2043-07-23T04:40:46 K9.70 G14.15

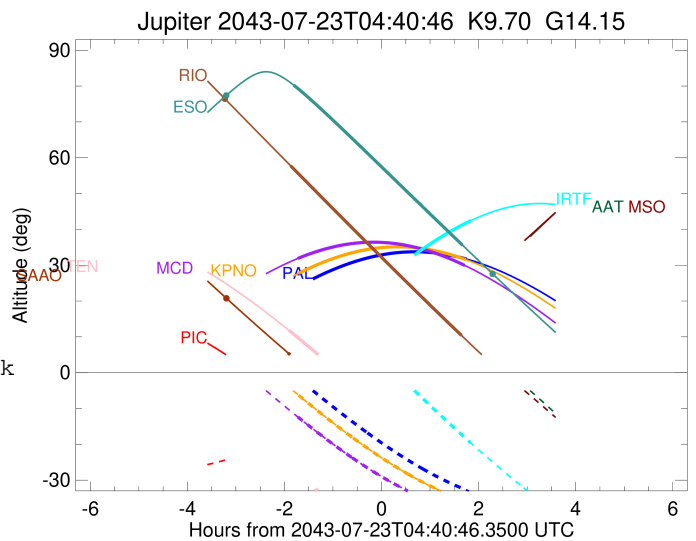
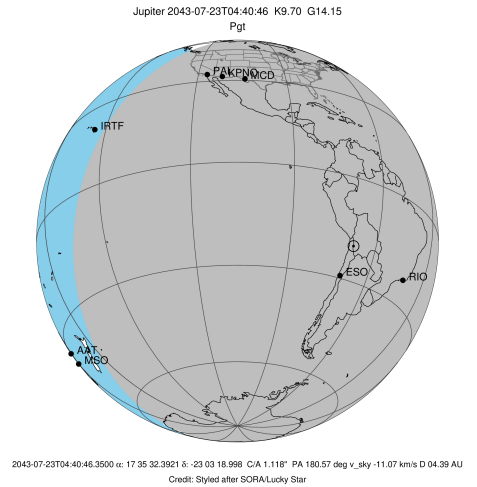


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2043-07-23T02:48:17.115	57.78	-86.30	71492.0	1.37	1.56
Jupiter	E	2043-07-23T06:19:35.687	10.40	-43.54	71492.0	2.38	2.72

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2043-07-23T04:36:02.120
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       : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude           : 9.704
G magnitude           : 14.154
RP magnitude          : 12.977
BP magnitude          : 15.646
DUPflag              : 0
Distance (au)         : 4.393
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg) : 144.71
Sun-Moon sep (deg)   : 48.21
B (ring opening deg) : -2.39
PA of pole (deg)     : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation (") : 0.803
C/A sky separation (km) : 2559.8
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
    
```



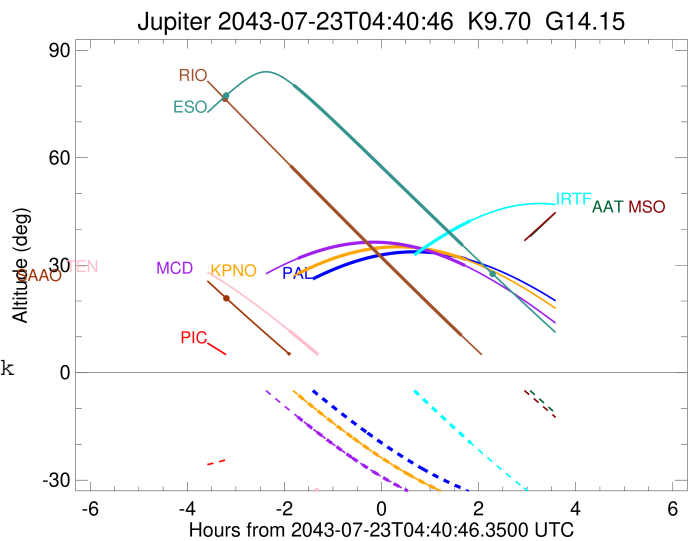
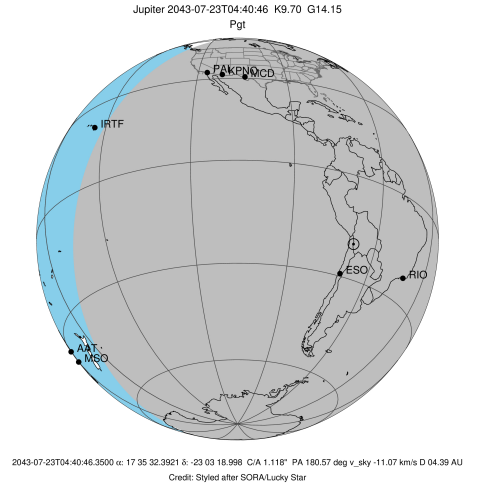
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2043-07-23T02:52:05.821	80.28	-61.95	71492.0	1.11	1.27
Jupiter	E	2043-07-23T06:21:06.176	35.54	-67.34	71492.0	2.69	3.08



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2043-07-23T04:34:07.590
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        : 4116686918795450112
2Mass ID (if available) : 17353240-2303186
ICRS Star Coord at Epoch: 17h 35m 32.39208s -23:03:18.99818s
RUWE (>1.4 is poor) : 0.91
K magnitude           : 9.704
G magnitude           : 14.154
RP magnitude          : 12.977
BP magnitude          : 15.646
DUPflag              : 0
Distance (au)         : 4.393
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.07
Sun-Target sep (deg)  : 144.71
Sun-Moon sep (deg)    : 47.29
B (ring opening deg) : -2.39
PA of pole (deg)      : 1.80
Pole direction: RA (deg): 268.05670
Dec (deg): 64.49731
C/A sky separation (") : 0.231
C/A sky separation (km) : 737.1
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	2043-07-23T02:45:12.537	5.52	-35.07	71492.0	-1.07	-1.22
Jupiter	E	2043-07-23T06:24:47.307	-29.14x	9.08x	71492.0	0.10	0.11