

target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-07-15T03:07:44.240  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4114507270036368128  
 2Mass ID (if available) : 17173643-2241207

Jupiter 2031-07-15T03:07:44 K8.61 G12.22 Pgt

ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s

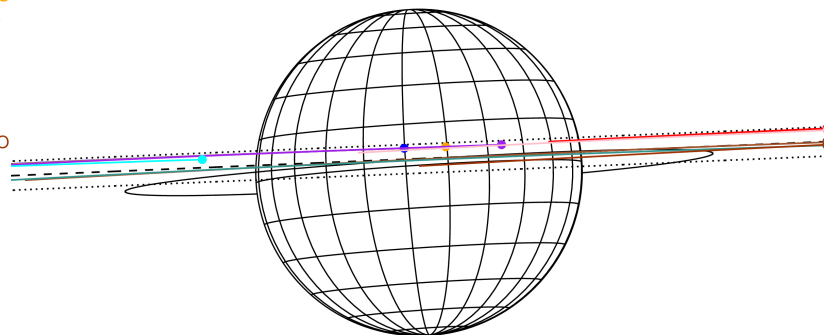
RUWE (>1.4 is poor) : 0.89  
 K magnitude : 8.605  
 G magnitude : 12.218  
 RP magnitude : 11.223  
 BP magnitude : 13.240  
 DUPflag : 0  
 Distance (au) : 4.379  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -12.12  
 Sun-Target sep (deg) : 148.19  
 Sun-Moon sep (deg) : 163.42  
 B (ring opening deg) : -2.55  
 PA of pole (deg) : 3.72  
 Pole direction: RA (deg): 268.05689  
 Dec (deg): 64.49652  
 C/A sky separation (") : 1.910  
 C/A sky separation (km) : 6066.2  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-07-15T03:07:44 K8.61 G12.22  
 Pgt



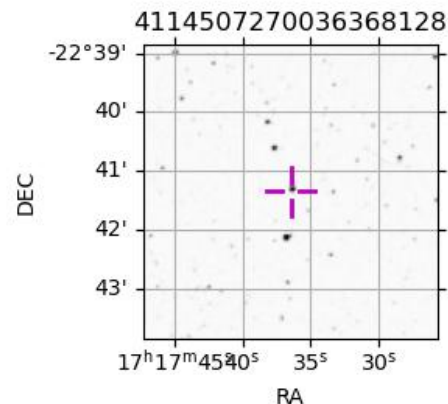
2031-07-15T03:07:44.2400 at: 17 17 36.4366 s: -22 41 20.693 C/A 1.899" PA 182.40 deg v\_sky -12.12 km/s D 04.38 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 SAAO



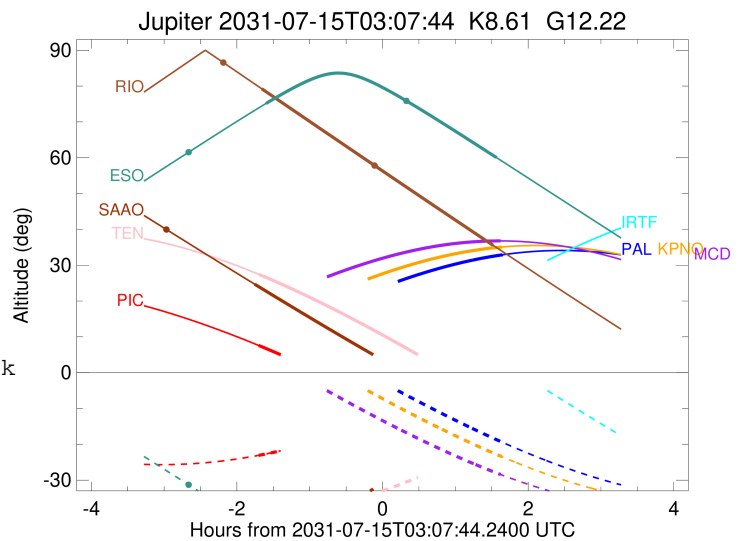
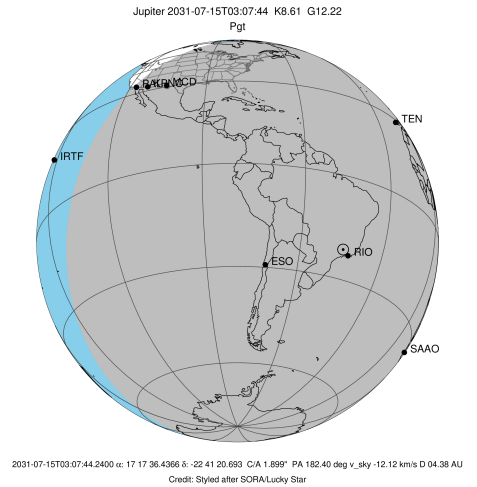
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events	Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUL 15 01:25 - JUL 15 01:25		Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUL 15 04:46 - JUL 15 04:46		Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8				Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUL 15 04:46 - JUL 15 04:46		Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUL 15 04:45 - JUL 15 04:45		Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUL 15 01:26 - JUL 15 01:26		Pin
IRTF	Mauna Kea/IRTF	19.8	204.5				Pnn
KAV	Kavalur Observatory	12.6	78.8				Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	JUL 15 01:28 - JUL 15 04:38		Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUL 15 01:31 - JUL 15 04:41		Pie
AAT	Siding Spring (AAT)	-31.3	149.1				Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUL 15 01:22 - JUL 15 01:22		Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0				Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-15T03:01:49.120
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       : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor) : 0.89
K magnitude           : 8.605
G magnitude           : 12.218
RP magnitude          : 11.223
BP magnitude          : 13.240
DUPflag              : 0
Distance (au)        : 4.379
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg) : 148.19
Sun-Moon sep (deg)   : 163.94
B (ring opening deg) : -2.55
PA of pole (deg)     : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 3.334
C/A sky separation (km) : 10589.2
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
    
```

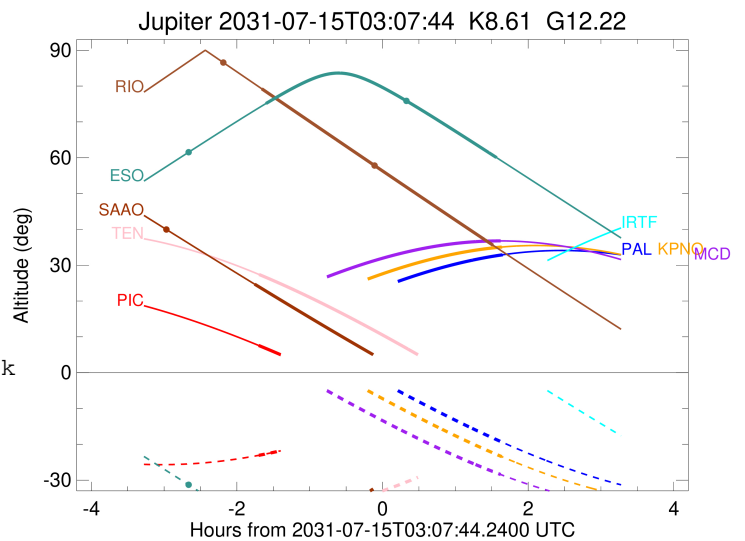
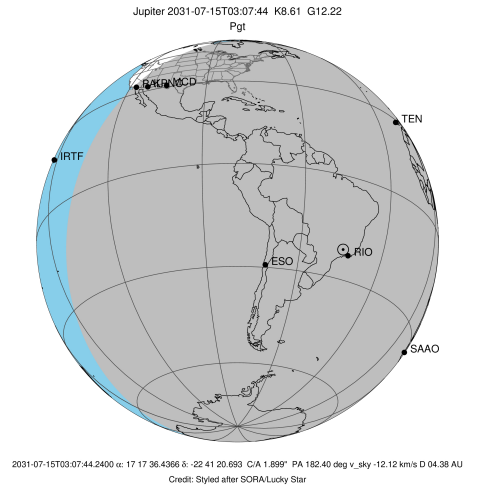


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T01:25:45.857	7.59	-23.07	71491.8	7.73	8.82
Jupiter	E	2031-07-15T04:39:06.015	-24.41x	-0.11x	71491.8	9.21	10.50

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-15T03:12:10.530
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        : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor)  : 0.89
K magnitude           : 8.605
G magnitude           : 12.218
RP magnitude          : 11.223
BP magnitude          : 13.240
DUPflag              : 0
Distance (au)         : 4.379
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg)  : 148.19
Sun-Moon sep (deg)    : 163.02
B (ring opening deg) : -2.55
PA of pole (deg)      : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 3.409
C/A sky separation (km) : 10828.4
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
    
```

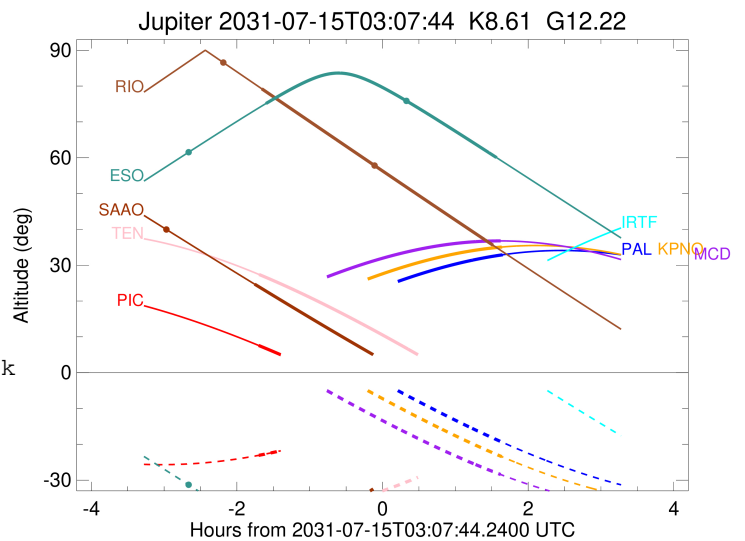
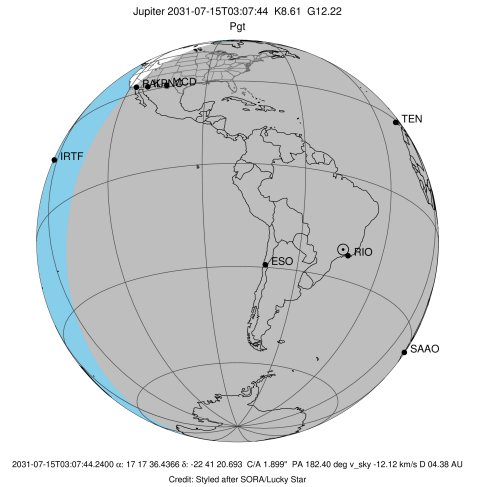


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T01:37:02.250	10.22	14.87x	71491.9	6.83	7.79
Jupiter	E	2031-07-15T04:46:43.405	32.90	-19.46	71491.7	10.36	11.81

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T03:11:41.770
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      : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor) : 0.89
K magnitude          : 8.605
G magnitude          : 12.218
RP magnitude         : 11.223
BP magnitude         : 13.240
DUPflag             : 0
Distance (au)       : 4.379
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg) : 148.19
Sun-Moon sep (deg)  : 163.08
B (ring opening deg) : -2.55
PA of pole (deg)    : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 3.417
C/A sky separation (km) : 10851.7
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
    
```

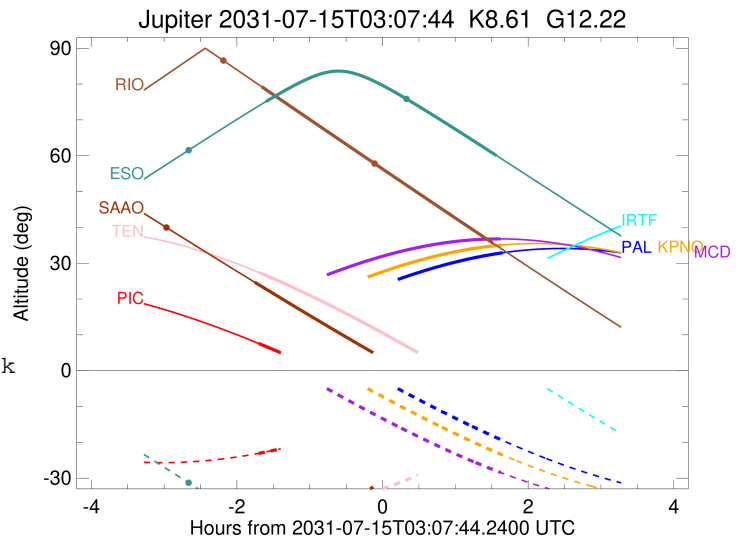
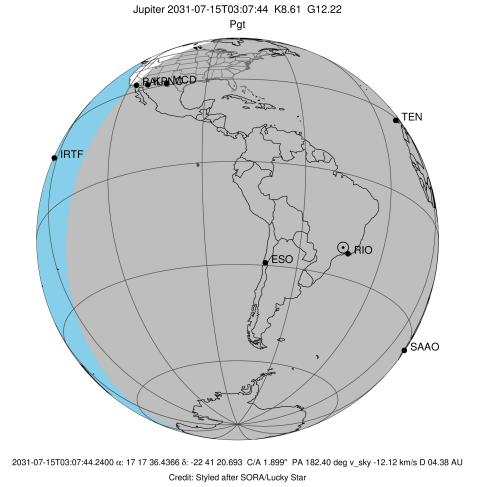


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T01:36:47.182	14.54	10.27x	71491.9	6.88	7.85
Jupiter	E	2031-07-15T04:46:05.903	35.07	-23.46	71491.7	10.33	11.77

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T03:10:54.220
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      : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor) : 0.89
K magnitude          : 8.605
G magnitude          : 12.218
RP magnitude         : 11.223
BP magnitude         : 13.240
DUPflag             : 0
Distance (au)       : 4.379
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg) : 148.19
Sun-Moon sep (deg)  : 163.18
B (ring opening deg) : -2.55
PA of pole (deg)    : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation ("): 3.435
C/A sky separation (km) : 10910.4
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
    
```

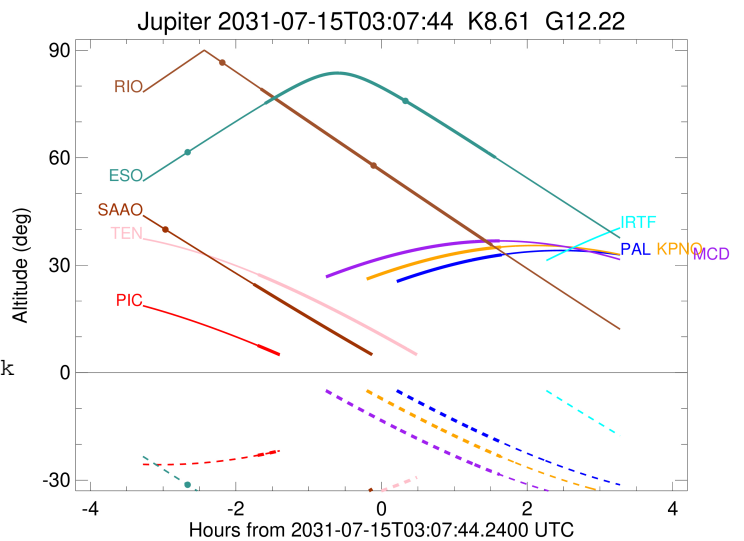
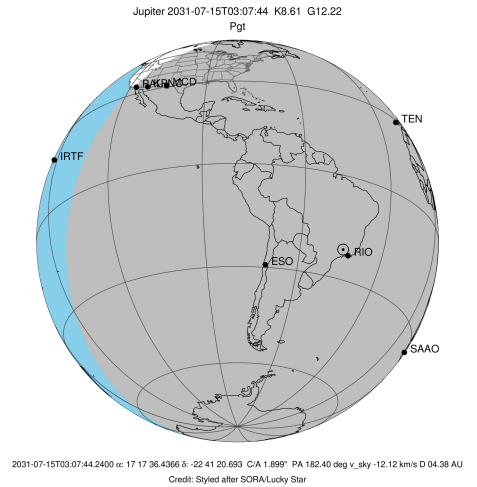


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T01:36:17.008	20.17	3.86x	71491.9	6.99	7.98
Jupiter	E	2031-07-15T04:45:09.030	36.78	-28.44	71491.7	10.30	11.74

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-15T03:01:16.960
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        : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor) : 0.89
K magnitude           : 8.605
G magnitude           : 12.218
RP magnitude          : 11.223
BP magnitude          : 13.240
DUPflag              : 0
Distance (au)         : 4.379
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg)  : 148.19
Sun-Moon sep (deg)    : 164.09
B (ring opening deg) : -2.55
PA of pole (deg)     : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation ("): 3.166
C/A sky separation (km): 10056.2
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
    
```

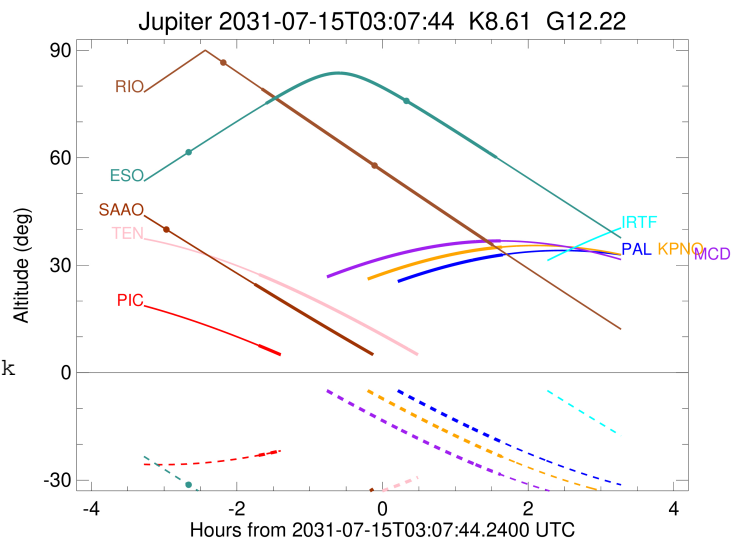
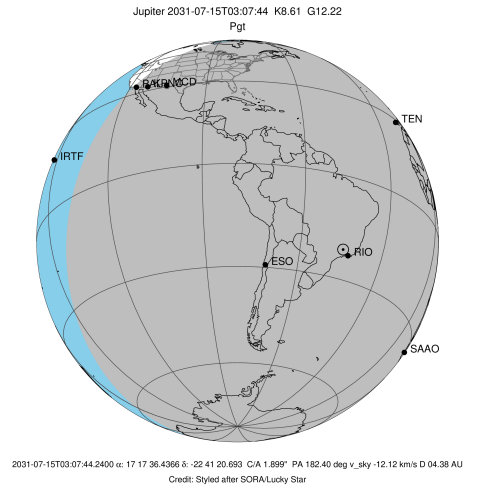


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T01:26:06.014	27.39	-40.18	71491.9	7.27	8.29
Jupiter	E	2031-07-15T04:37:44.315	-7.13x	-19.76	71491.8	8.71	9.94

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T03:03:04.930
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      : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor) : 0.89
K magnitude          : 8.605
G magnitude          : 12.218
RP magnitude         : 11.223
BP magnitude         : 13.240
DUPflag             : 0
Distance (au)       : 4.379
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg) : 148.19
Sun-Moon sep (deg)  : 164.11
B (ring opening deg) : -2.55
PA of pole (deg)    : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 1.818
C/A sky separation (km) : 5772.8
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
    
```

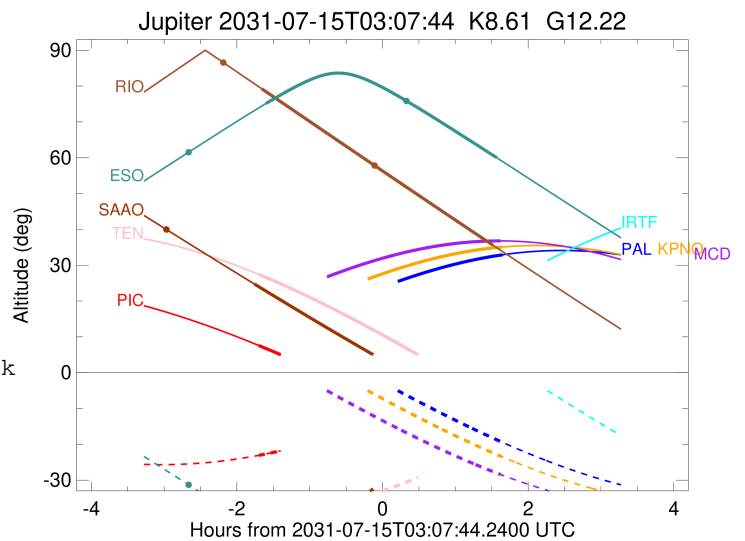
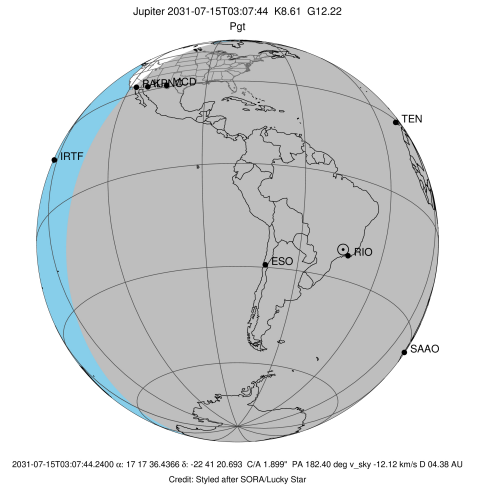


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T01:28:12.904	79.24	-69.00	71492.0	3.54	4.05
Jupiter	E	2031-07-15T04:38:50.361	35.56	-66.85	71491.9	5.44	6.21

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-15T03:06:31.890
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      : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor) : 0.89
K magnitude          : 8.605
G magnitude          : 12.218
RP magnitude        : 11.223
BP magnitude        : 13.240
DUPflag             : 0
Distance (au)       : 4.379
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg) : 148.19
Sun-Moon sep (deg)  : 163.79
B (ring opening deg) : -2.55
PA of pole (deg)    : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (" ) : 1.690
C/A sky separation (km) : 5366.0
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
    
```



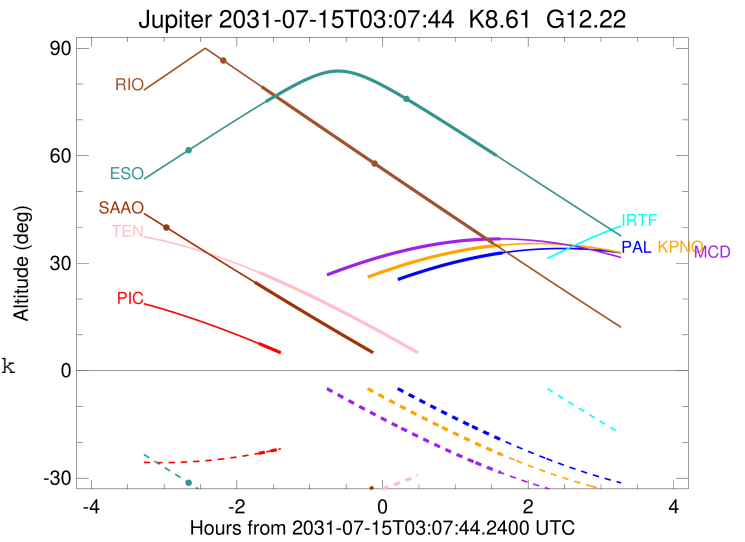
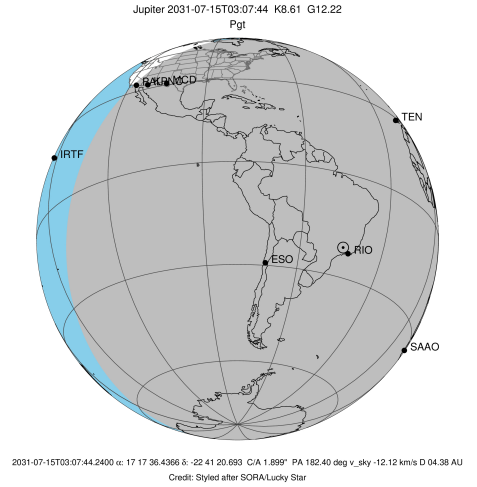
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-15T01:31:41.514	75.12	-45.13	71492.0	2.87	3.28
Jupiter	E	2031-07-15T04:41:40.439	60.03	-82.28	71491.9	5.43	6.21



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-15T03:00:16.800
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        : 4114507270036368128
2Mass ID (if available) : 17173643-2241207
ICRS Star Coord at Epoch: 17h 17m 36.43661s -22:41:20.69264s
RUWE (>1.4 is poor) : 0.89
K magnitude           : 8.605
G magnitude           : 12.218
RP magnitude          : 11.223
BP magnitude          : 13.240
DUPflag              : 0
Distance (au)         : 4.379
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.12
Sun-Target sep (deg)  : 148.19
Sun-Moon sep (deg)    : 164.19
B (ring opening deg) : -2.55
PA of pole (deg)      : 3.72
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation ("): 0.889
C/A sky separation (km): 2822.9
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	2031-07-15T01:22:22.206	24.70	-53.08	71492.0	1.65	1.88
Jupiter	E	2031-07-15T04:39:40.939	-13.14x	-11.90	71492.0	2.88	3.30