

target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-07-01T02:25:30.440  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4111734993246887936  
 2Mass ID (if available) : 17240118-2244589

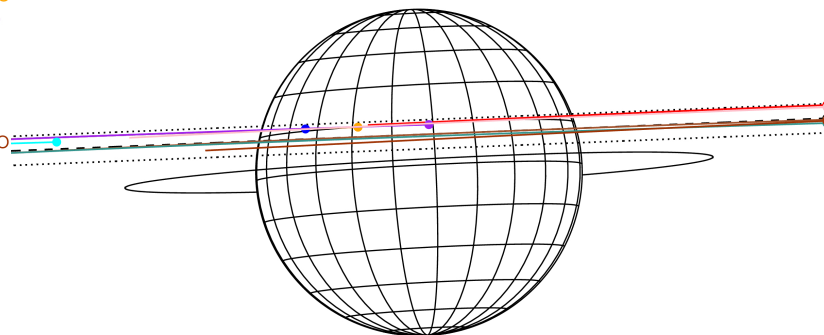
Jupiter 2031-07-01T02:25:30 K7.74 G13.73 Pgt

ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 7.735  
 G magnitude : 13.725  
 RP magnitude : 12.254  
 BP magnitude : 16.833  
 DUPflag : 0  
 Distance (au) : 4.294  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -15.21  
 Sun-Target sep (deg) : 163.04  
 Sun-Moon sep (deg) : 34.38  
 B (ring opening deg) : -2.58  
 PA of pole (deg) : 3.03  
 Pole direction: RA (deg): 268.05691  
 Dec (deg): 64.49651  
 C/A sky separation (") : 5.330  
 C/A sky separation (km) : 16601.0  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk



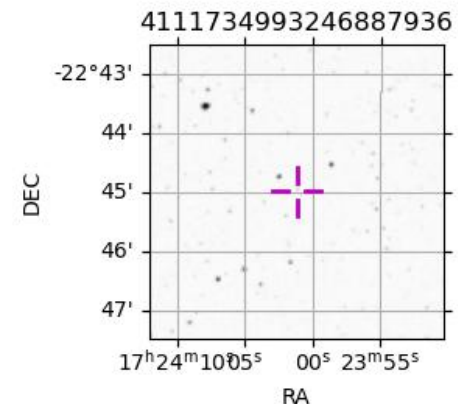
2031-07-01T02:25:30.4400 at: 17 24 01.1831 s: -22 44 59.080 C/A 5.318" PA 182.29 deg v\_sky -15.21 km/s D 04.29 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 SAAO



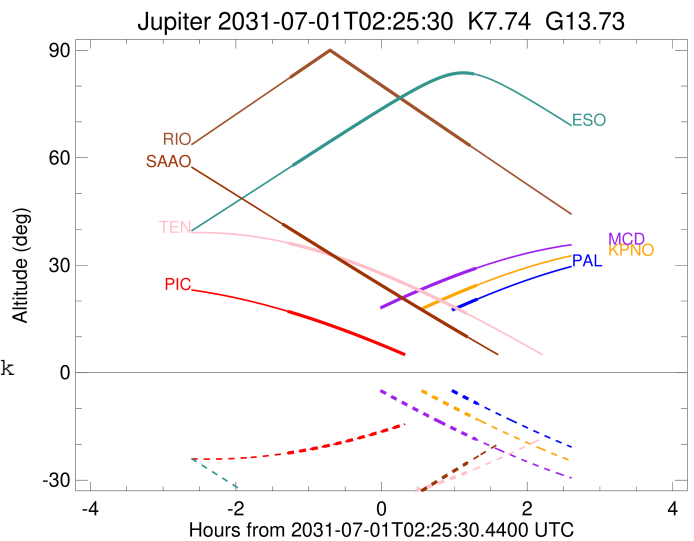
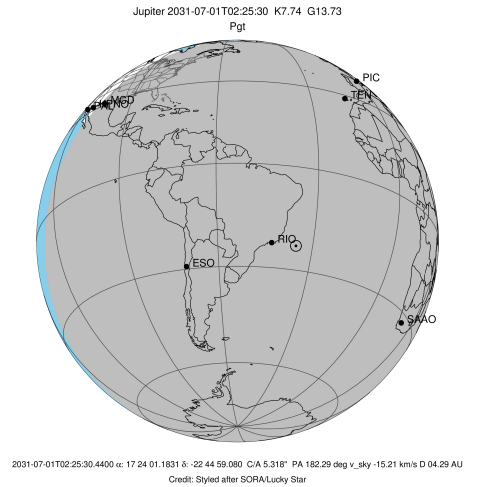
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events	Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUL 01 01:08	- JUL 01 01:08	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUL 01 03:44	- JUL 01 03:44	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8				Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUL 01 03:44	- JUL 01 03:44	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUL 01 03:43	- JUL 01 03:43	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUL 01 01:09	- JUL 01 03:35	Pie
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 01 01:10	- JUL 01 03:38	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUL 01 01:12	- JUL 01 03:41	Pie
AAT	Siding Spring (AAT)	-31.3	149.1				Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUL 01 01:04	- JUL 01 03:36	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0				Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-01T02:21:46.080
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       : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 7.735
G magnitude          : 13.725
RP magnitude         : 12.254
BP magnitude         : 16.833
DUPflag             : 0
Distance (au)       : 4.294
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg) : 163.04
Sun-Moon sep (deg)  : 34.93
B (ring opening deg) : -2.58
PA of pole (deg)    : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 7.003
C/A sky separation (km) : 21810.9
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
    
```

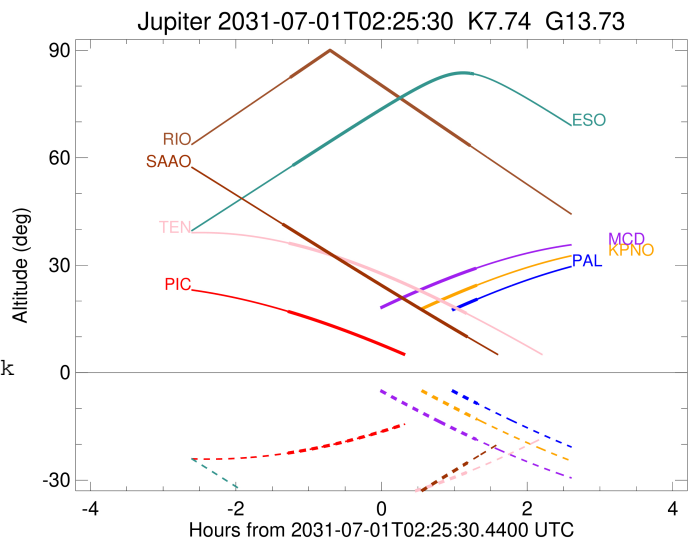
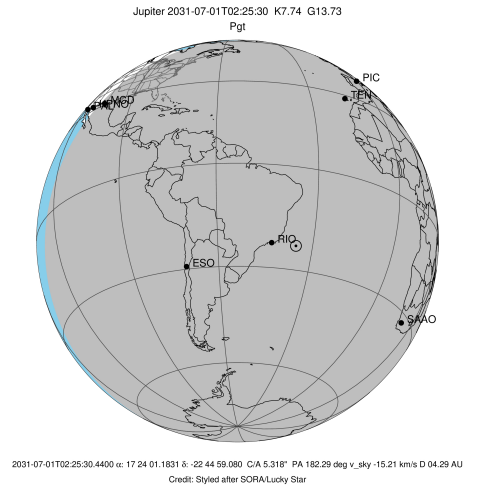


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T01:08:21.205	17.11	-22.44	71491.2	17.31	19.60
Jupiter	E	2031-07-01T03:35:37.375	-2.80x	-8.00	71491.1	18.07	20.45

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-01T02:30:36.970
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       : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 7.735
G magnitude           : 13.725
RP magnitude         : 12.254
BP magnitude         : 16.833
DUPflag              : 0
Distance (au)        : 4.294
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg) : 163.04
Sun-Moon sep (deg)   : 33.83
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 6.621
C/A sky separation (km): 20620.9
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
    
```

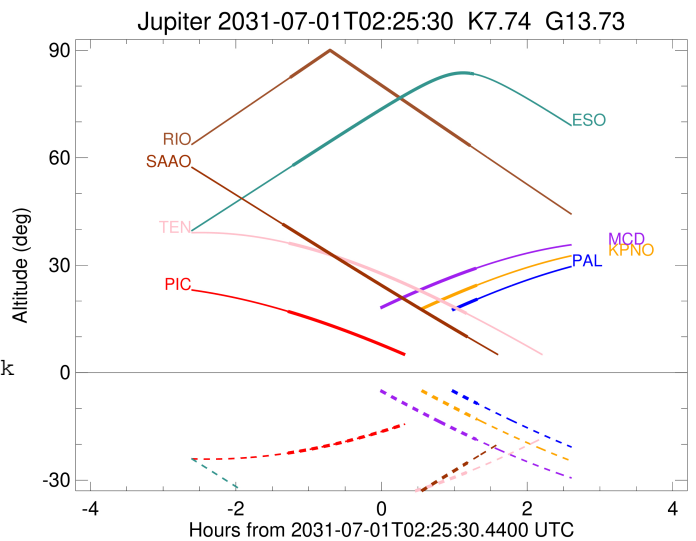
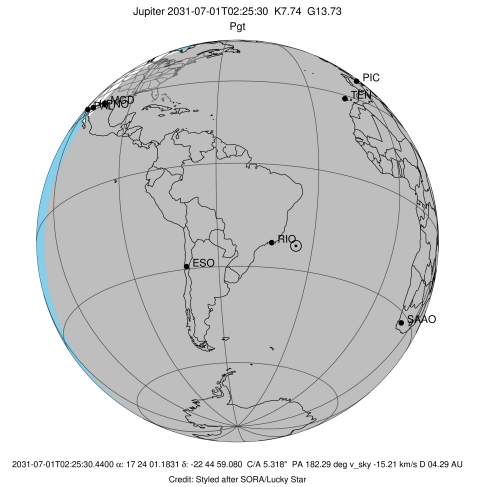


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T01:16:12.003	-4.76x	19.40x	71491.4	15.46	17.54
Jupiter	E	2031-07-01T03:44:32.375	20.53	-8.64	71491.1	17.96	20.32

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-01T02:30:25.650
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       : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 7.735
G magnitude           : 13.725
RP magnitude         : 12.254
BP magnitude         : 16.833
DUPflag              : 0
Distance (au)        : 4.294
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg) : 163.04
Sun-Moon sep (deg)   : 33.90
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 6.642
C/A sky separation (km) : 20686.8
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
    
```

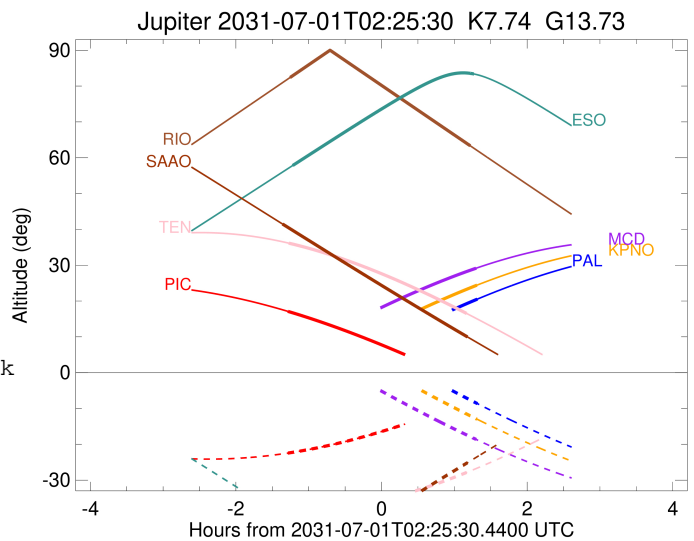
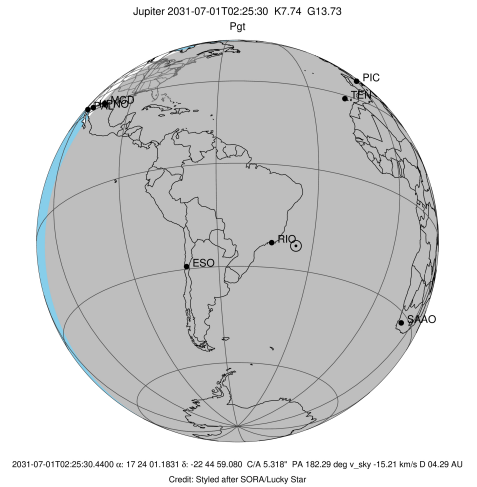


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T01:16:12.102	-0.16x	14.75x	71491.4	15.52	17.61
Jupiter	E	2031-07-01T03:44:11.007	24.42	-12.98	71491.1	17.99	20.36

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-01T02:30:02.280
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       : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 7.735
G magnitude           : 13.725
RP magnitude         : 12.254
BP magnitude         : 16.833
DUPflag             : 0
Distance (au)        : 4.294
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg) : 163.04
Sun-Moon sep (deg)   : 34.00
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 6.686
C/A sky separation (km) : 20824.2
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
    
```

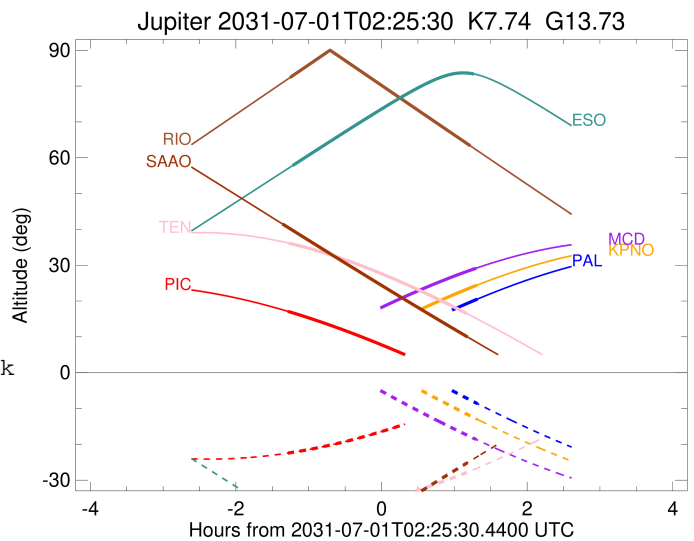
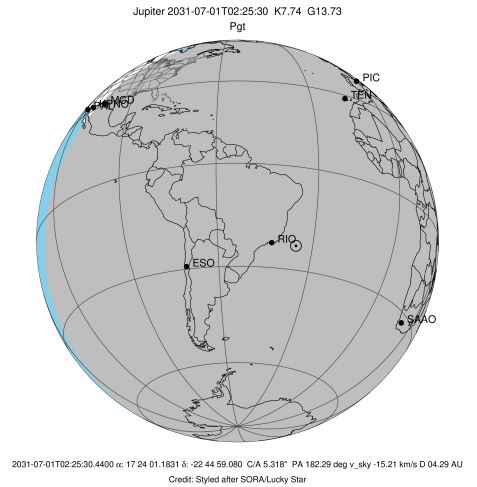


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T01:16:05.212	6.12	8.24x	71491.3	15.66	17.76
Jupiter	E	2031-07-01T03:43:33.828	29.17	-18.65	71491.1	18.06	20.43

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T02:22:08.910
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        : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 7.735
G magnitude           : 13.725
RP magnitude          : 12.254
BP magnitude          : 16.833
DUPflag              : 0
Distance (au)         : 4.294
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg) : 163.04
Sun-Moon sep (deg)   : 35.07
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 6.820
C/A sky separation (km) : 21242.1
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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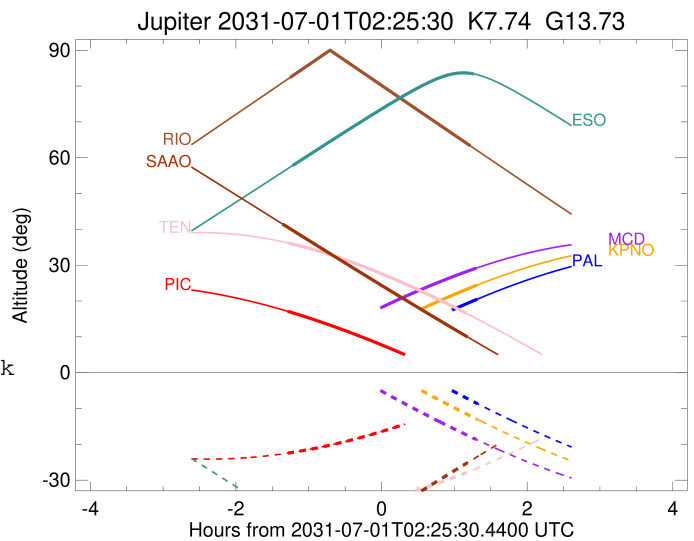
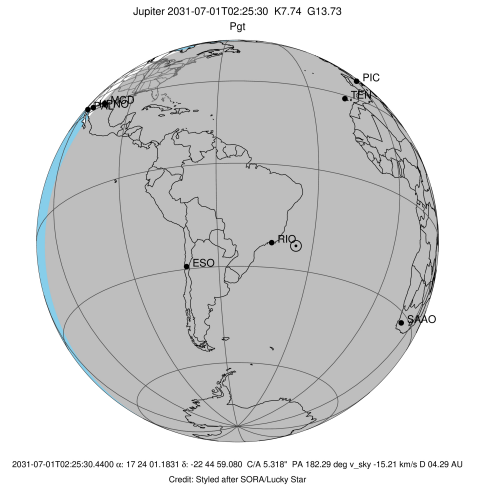


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T01:09:04.941	36.15	-38.75	71491.2	16.74	18.97
Jupiter	E	2031-07-01T03:35:36.148	16.53	-27.86	71491.2	17.63	19.95

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-01T02:24:22.000
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      : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 7.735
G magnitude          : 13.725
RP magnitude         : 12.254
BP magnitude         : 16.833
DUPflag             : 0
Distance (au)       : 4.294
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg) : 163.04
Sun-Moon sep (deg)  : 35.07
B (ring opening deg) : -2.58
PA of pole (deg)    : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 5.331
C/A sky separation (km): 16604.8
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
    
```



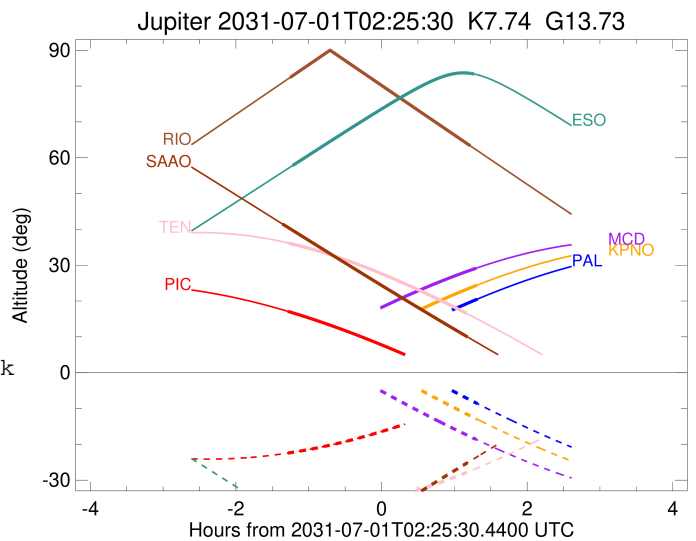
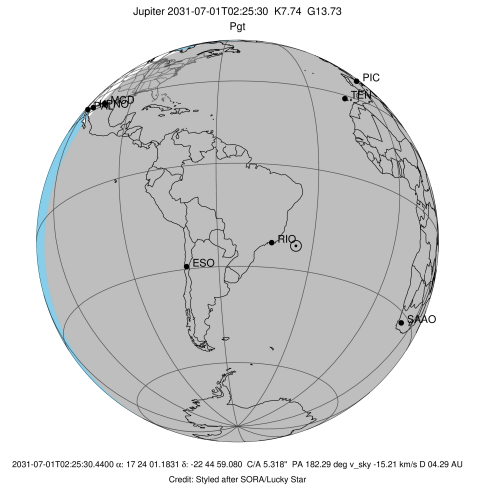
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T01:10:13.936	82.40	-65.52	71491.6	12.63	14.36
Jupiter	E	2031-07-01T03:38:38.606	63.33	-80.34	71491.5	14.01	15.91



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T02:27:08.400
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        : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 7.735
G magnitude           : 13.725
RP magnitude          : 12.254
BP magnitude          : 16.833
DUPflag              : 0
Distance (au)         : 4.294
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg)  : 163.04
Sun-Moon sep (deg)   : 34.71
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 5.058
C/A sky separation (km) : 15753.3
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
    
```



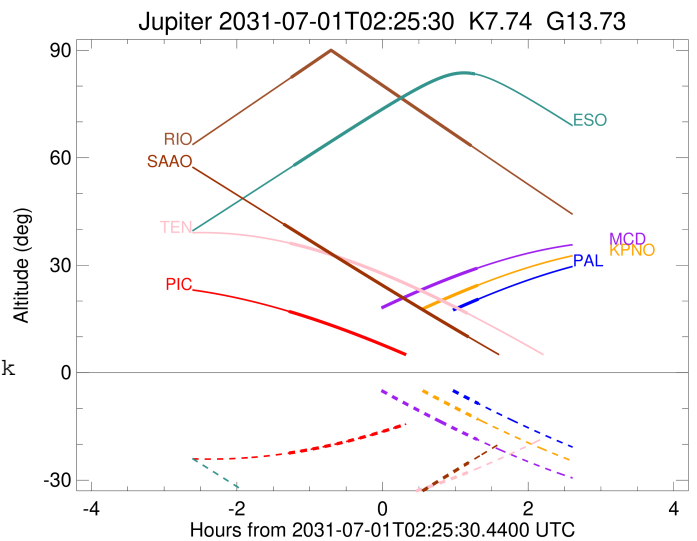
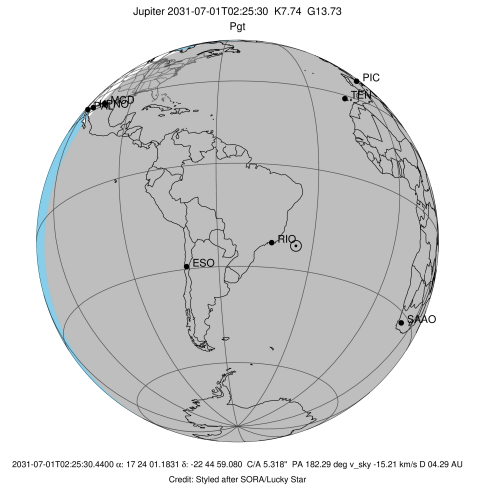
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T01:12:29.337	57.85	-41.94	71491.6	11.68	13.29
Jupiter	E	2031-07-01T03:41:38.528	83.37	-74.23	71491.5	13.58	15.44



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T02:19:53.670
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        : 4111734993246887936
2Mass ID (if available) : 17240118-2244589
ICRS Star Coord at Epoch: 17h 24m 01.18315s -22:44:59.08045s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 7.735
G magnitude           : 13.725
RP magnitude          : 12.254
BP magnitude          : 16.833
DUPflag              : 0
Distance (au)         : 4.294
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.21
Sun-Target sep (deg)  : 163.04
Sun-Moon sep (deg)   : 35.28
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.03
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 4.579
C/A sky separation (km) : 14262.0
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	2031-07-01T01:04:01.529	41.48	-57.13	71491.7	11.24	12.79
Jupiter	E	2031-07-01T03:36:24.609	9.96	-25.11	71491.6	11.68	13.29