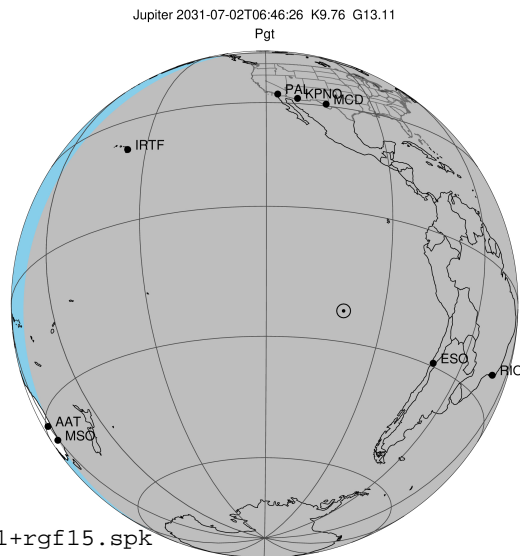


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-07-02T06:46:26.480
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4111645172552342656
 2Mass ID (if available) : 17232546-2244240

Jupiter 2031-07-02T06:46:26 K9.76 G13.11 Pgt

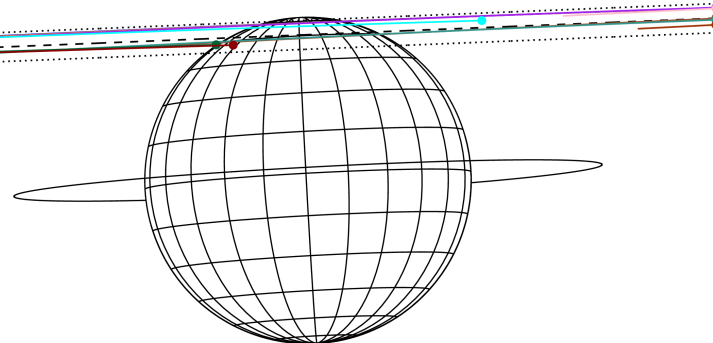
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s

RUWE (>1.4 is poor) : 1.06
 K magnitude : 9.755
 G magnitude : 13.106
 RP magnitude : 12.156
 BP magnitude : 14.033
 DUPflag : 0
 Distance (au) : 4.299
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -15.01
 Sun-Target sep (deg) : 161.77
 Sun-Moon sep (deg) : 17.18
 B (ring opening deg) : -2.58
 PA of pole (deg) : 3.10
 Pole direction: RA (deg): 268.05690
 Dec (deg): 64.49651
 C/A sky separation (") : 20.469
 C/A sky separation (km) : 63826.9
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



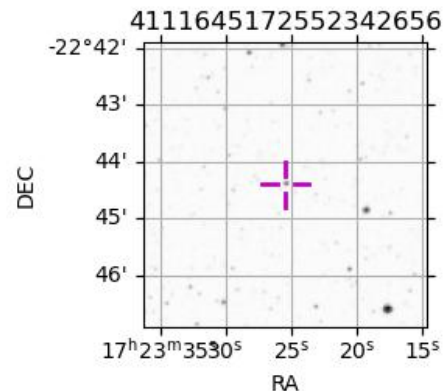
2031-07-02T06:46:26.4800 a: 17 23 25.4774 s: -22 44 24.037 C/A ***** PA 182.32 deg v_sky -15.01 km/s D 04.30 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO



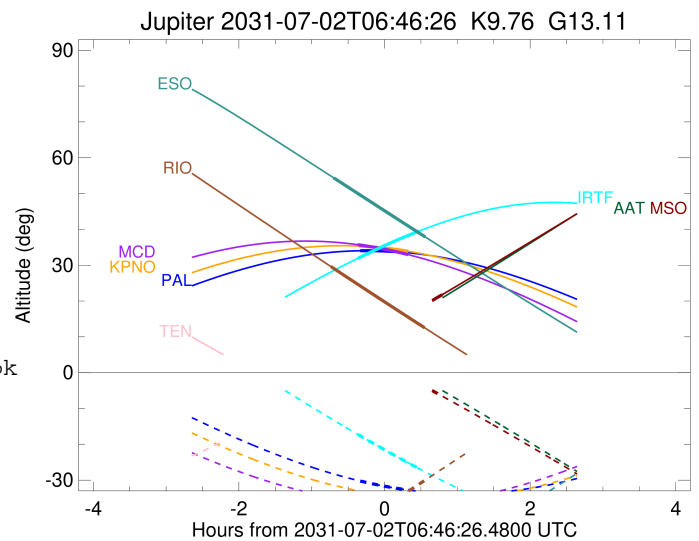
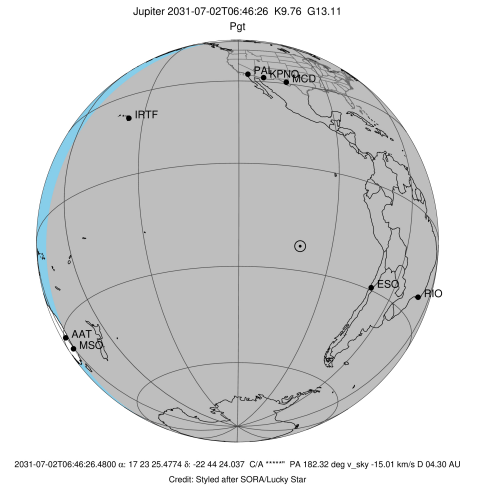
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+ +	JUL 02 06:26 - JUL 02 07:06	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUL 02 06:25 - JUL 02 07:05	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUL 02 06:24 - JUL 02 07:05	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUL 02 06:24 - JUL 02 07:15	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUL 02 06:02 - JUL 02 07:19	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUL 02 06:04 - JUL 02 07:20	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUL 02 07:33 - JUL 02 07:33	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-02T06:46:16.320
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       : 4111645172552342656
2Mass ID (if available) : 17232546-2244240
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s
RUWE (>1.4 is poor) : 1.06
K magnitude           : 9.755
G magnitude           : 13.106
RP magnitude         : 12.156
BP magnitude         : 14.033
DUPflag              : 0
Distance (au)        : 4.299
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.01
Sun-Target sep (deg) : 161.77
Sun-Moon sep (deg)   : 17.36
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.10
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation ("): 22.164
C/A sky separation (km): 69112.0
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
    
```

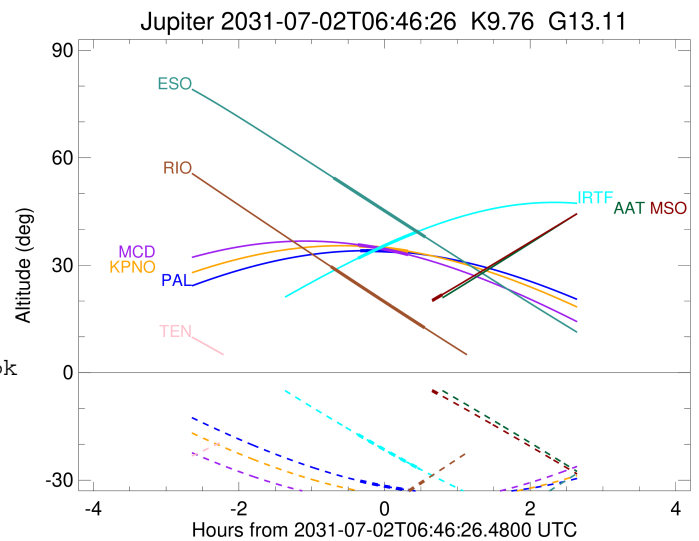
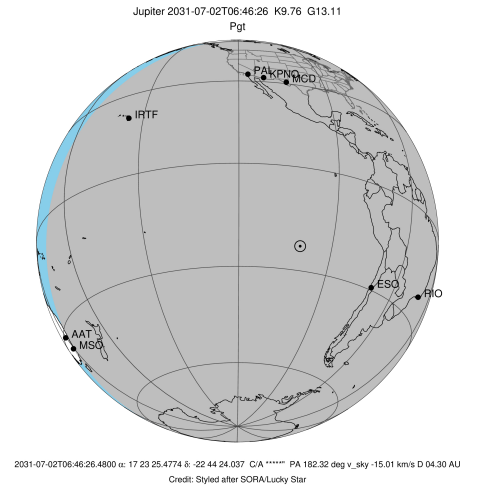


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-02T06:26:28.987	34.03	-30.24	71483.6	74.17	75.97
Jupiter	E	2031-07-02T07:06:03.908	33.47	-32.75	71483.5	75.75	77.38

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-02T06:45:47.620
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        : 4111645172552342656
2Mass ID (if available) : 17232546-2244240
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s
RUWE (>1.4 is poor) : 1.06
K magnitude           : 9.755
G magnitude           : 13.106
RP magnitude          : 12.156
BP magnitude          : 14.033
DUPflag              : 0
Distance (au)         : 4.299
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.01
Sun-Target sep (deg) : 161.77
Sun-Moon sep (deg)   : 17.44
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.10
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 22.135
C/A sky separation (km) : 69022.9
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
    
```

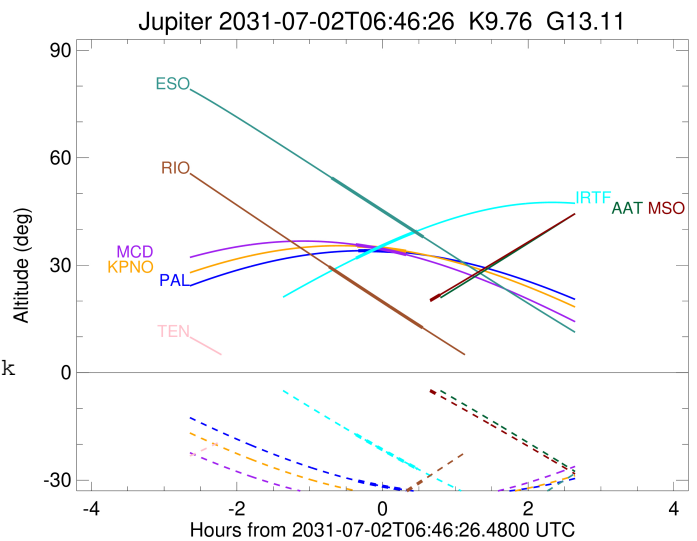
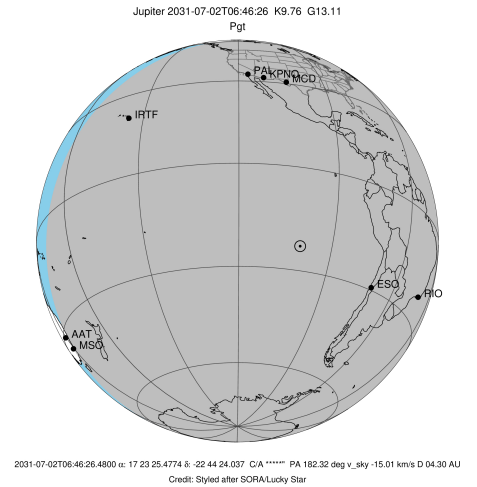


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-02T06:25:38.895	35.33	-33.02	71483.6	73.95	75.77
Jupiter	E	2031-07-02T07:05:56.849	33.89	-34.86	71483.5	75.42	77.09

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-02T06:45:06.370
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      : 4111645172552342656
2Mass ID (if available) : 17232546-2244240
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s
RUWE (>1.4 is poor) : 1.06
K magnitude          : 9.755
G magnitude          : 13.106
RP magnitude         : 12.156
BP magnitude         : 14.033
DUPflag             : 0
Distance (au)       : 4.299
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.01
Sun-Target sep (deg) : 161.77
Sun-Moon sep (deg)  : 17.55
B (ring opening deg) : -2.58
PA of pole (deg)    : 3.10
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 22.098
C/A sky separation (km) : 68906.1
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
    
```

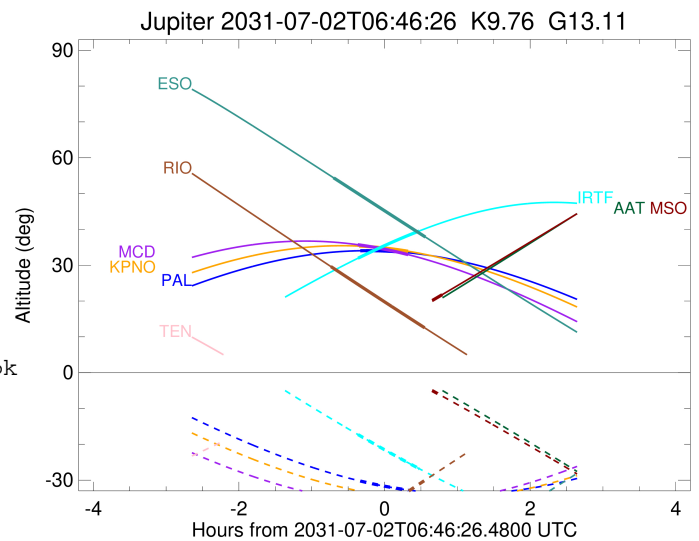
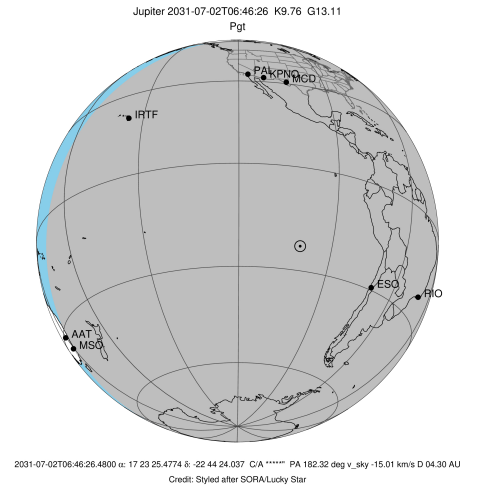


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-02T06:24:29.614	35.71	-35.78	71483.6	73.67	75.52
Jupiter	E	2031-07-02T07:05:44.023	32.96	-36.44	71483.5	75.00	76.71

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-02T06:49:49.130
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      : 4111645172552342656
2Mass ID (if available) : 17232546-2244240
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s
RUWE (>1.4 is poor) : 1.06
K magnitude         : 9.755
G magnitude         : 13.106
RP magnitude        : 12.156
BP magnitude        : 14.033
DUPflag            : 0
Distance (au)       : 4.299
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -15.01
Sun-Target sep (deg) : 161.77
Sun-Moon sep (deg)  : 16.80
B (ring opening deg) : -2.58
PA of pole (deg)    : 3.10
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 21.680
C/A sky separation (km) : 67605.8
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
    
```

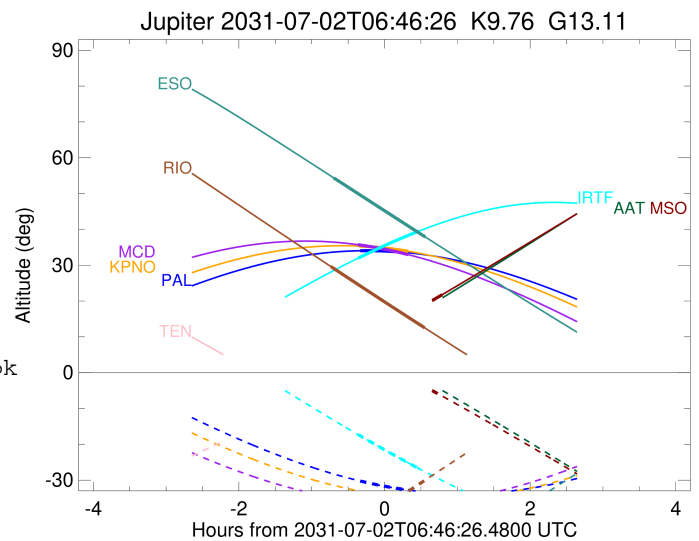
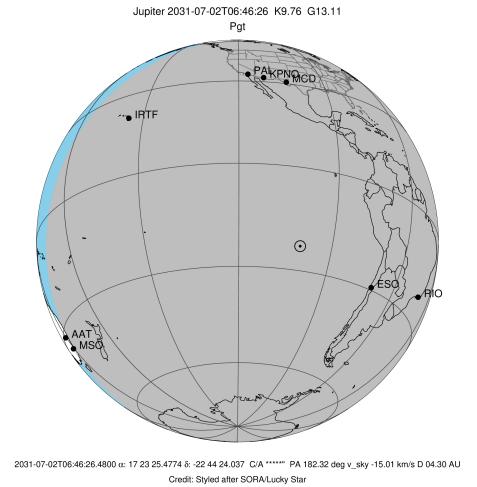


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-02T06:24:34.983	31.94	-17.27	71484.0	69.67	71.92
Jupiter	E	2031-07-02T07:15:00.905	39.54	-26.80	71483.8	72.02	74.04

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-02T06:40:46.040
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      : 4111645172552342656
2Mass ID (if available) : 17232546-2244240
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s
RUWE (>1.4 is poor) : 1.06
K magnitude          : 9.755
G magnitude          : 13.106
RP magnitude         : 12.156
BP magnitude         : 14.033
DUPflag             : 0
Distance (au)       : 4.299
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.01
Sun-Target sep (deg) : 161.77
Sun-Moon sep (deg)  : 18.17
B (ring opening deg) : -2.58
PA of pole (deg)    : 3.10
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 19.988
C/A sky separation (km) : 62328.7
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
    
```

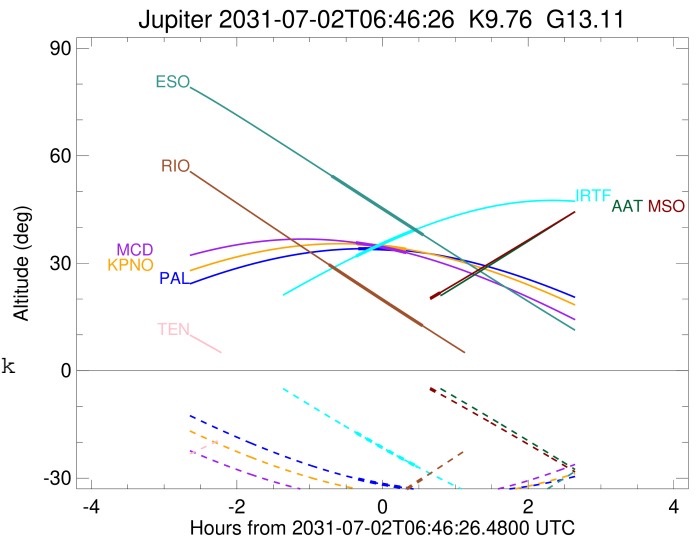
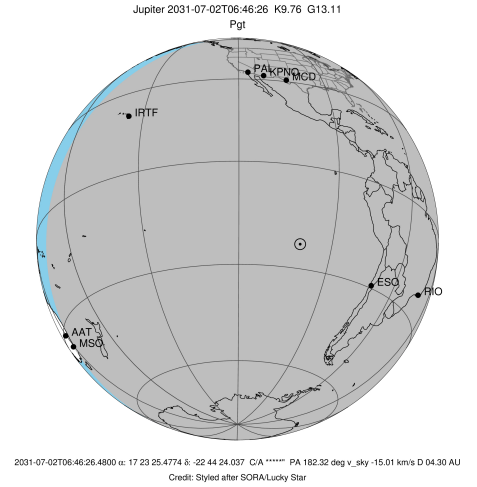


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-02T06:02:16.022	29.62	-47.50	71485.1	60.37	63.41
Jupiter	E	2031-07-02T07:19:26.958	12.54	-30.10	71485.1	60.75	63.76

```

target           : Jupiter
target radius (km) : 71492.00
C/A epoch       : 2031-07-02T06:42:14.170
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  : 4111645172552342656
2Mass ID (if available) : 17232546-2244240
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s
RUWE (>1.4 is poor) : 1.06
K magnitude     : 9.755
G magnitude     : 13.106
RP magnitude    : 12.156
BP magnitude    : 14.033
DUPflag        : 0
Distance (au)   : 4.299
f0 (km)         : 0.00
g0 (km)         : 0.00
skyplane vel. (km/s) : -15.01
Sun-Target sep (deg) : 161.77
Sun-Moon sep (deg) : 18.05
B (ring opening deg) : -2.58
PA of pole (deg) : 3.10
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 20.060
C/A sky separation (km) : 62551.0
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
    
```

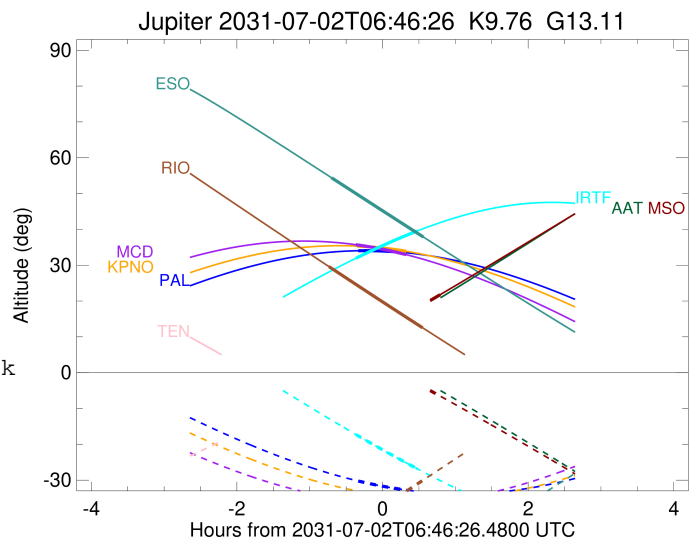
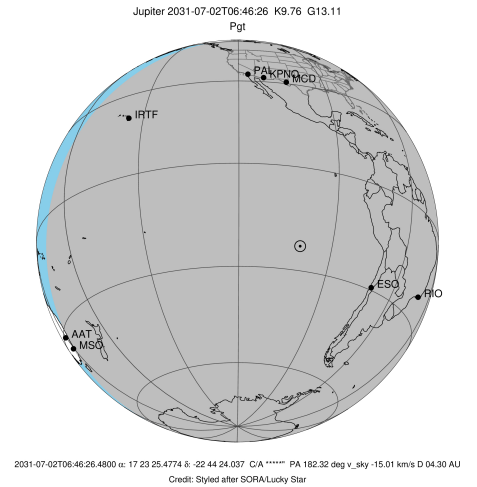


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-02T06:04:31.673	54.38	-71.59	71485.1	60.53	63.56
Jupiter	E	2031-07-02T07:20:04.342	37.87	-55.24	71485.0	61.28	64.25

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-02T06:51:25.620
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : MSO
Location             : Mt. Stromlo Observatory
Latitude (deg)       : -35.32000
E. Longitude (deg)   : 149.00833
Altitude (km)        : 0.770
Gaia source ID       : 4111645172552342656
2Mass ID (if available) : 17232546-2244240
ICRS Star Coord at Epoch: 17h 23m 25.47745s -22:44:24.03710s
RUWE (>1.4 is poor) : 1.06
K magnitude           : 9.755
G magnitude           : 13.106
RP magnitude         : 12.156
BP magnitude         : 14.033
DUPflag              : 0
Distance (au)        : 4.299
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.01
Sun-Target sep (deg) : 161.77
Sun-Moon sep (deg)   : 16.51
B (ring opening deg) : -2.58
PA of pole (deg)     : 3.10
Pole direction: RA (deg): 268.05690
Dec (deg): 64.49651
C/A sky separation (") : 19.331
C/A sky separation (km) : 60280.4
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	2031-07-02T06:08:41.031	5.23	8.57x	71485.7	56.06	59.37
Jupiter	E	2031-07-02T07:33:59.362	21.77	-6.54	71485.4	58.73	61.88