

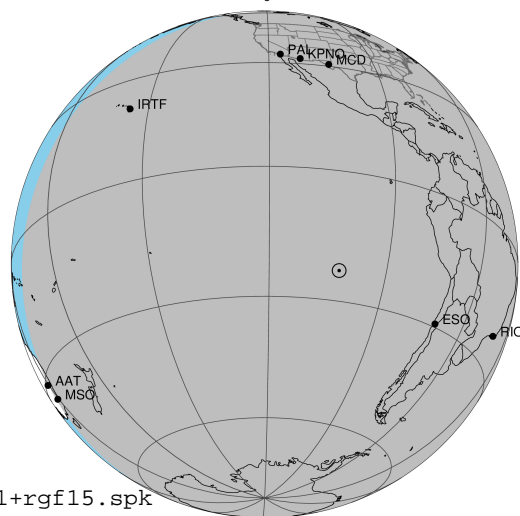
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-07-01T06:53:42.480
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4111735091981620096
 2Mass ID (if available) : 17235545-2245188

Jupiter 2031-07-01T06:53:42 K9.38 G14.20 Pgt

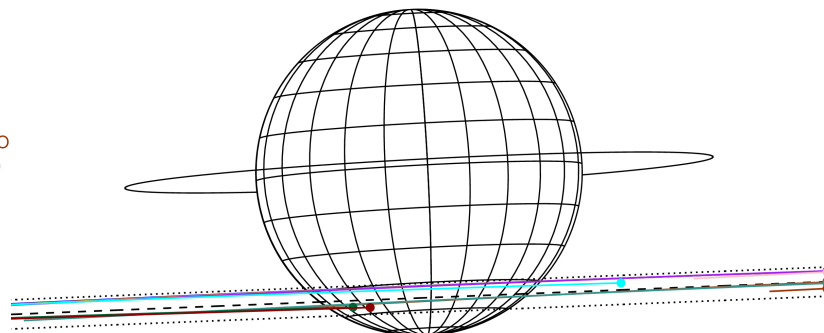
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s

RUWE (>1.4 is poor) : 1.03
 K magnitude : 9.375
 G magnitude : 14.198
 RP magnitude : 12.933
 BP magnitude : 15.884
 DUPflag : 0
 Distance (au) : 4.295
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -15.18
 Sun-Target sep (deg) : 162.84
 Sun-Moon sep (deg) : 31.70
 B (ring opening deg) : -2.57
 PA of pole (deg) : 3.04
 Pole direction: RA (deg): 268.05691
 Dec (deg): 64.49651
 C/A sky separation (") : 17.639
 C/A sky separation (km) : 54946.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-07-01T06:53:42 K9.38 G14.20
 Pgt



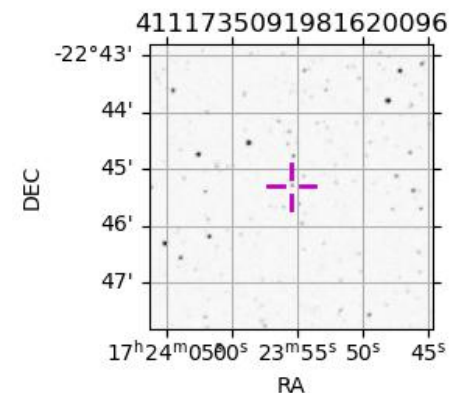
Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO



2031-07-01T06:53:42.4800 α: 17 23 55.4464 δ: -22 45 18.887 C/A ***** PA 2.30 deg v_sky -15.18 km/s D 04.30 AU
 Credit: Styled after SORA/Lucky Star

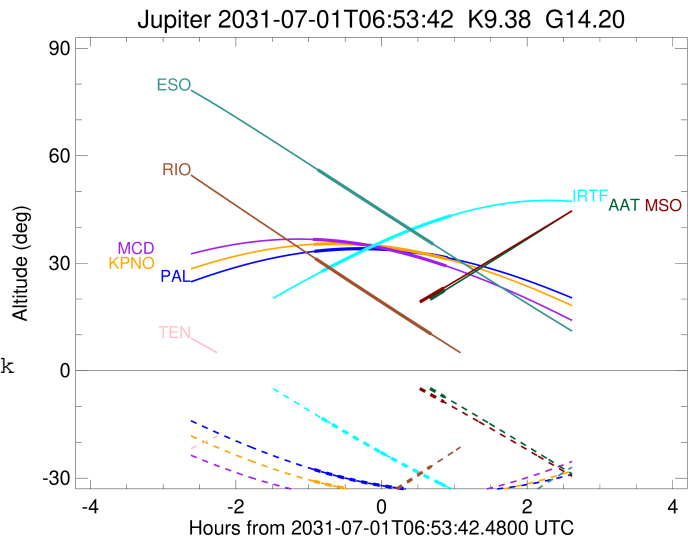
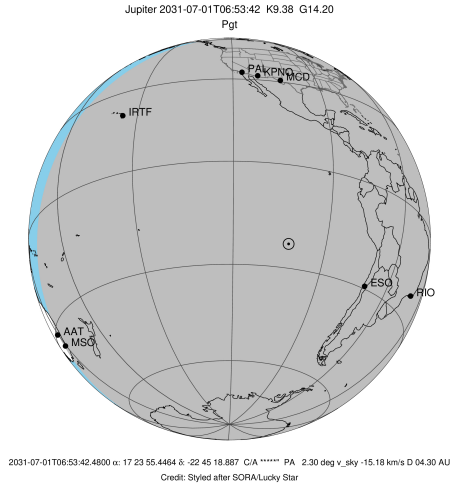
Observable events with sun below -5 deg and altitude above 5 deg

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 01 05:58 - JUL 01 07:48	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUL 01 05:58 - JUL 01 07:47	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUL 01 05:57 - JUL 01 07:46	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	JUL 01 06:04 - JUL 01 07:51	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUL 01 05:59 - JUL 01 07:34	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUL 01 06:01 - JUL 01 07:36	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	JUL 01 07:45 - JUL 01 07:45	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	JUL 01 07:44 - JUL 01 07:44	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T06:53:30.260
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        : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 9.375
G magnitude           : 14.198
RP magnitude          : 12.933
BP magnitude          : 15.884
DUPflag              : 0
Distance (au)         : 4.295
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg)  : 162.84
Sun-Moon sep (deg)    : 32.04
B (ring opening deg) : -2.57
PA of pole (deg)      : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 15.942
C/A sky separation (km) : 49660.0
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
    
```

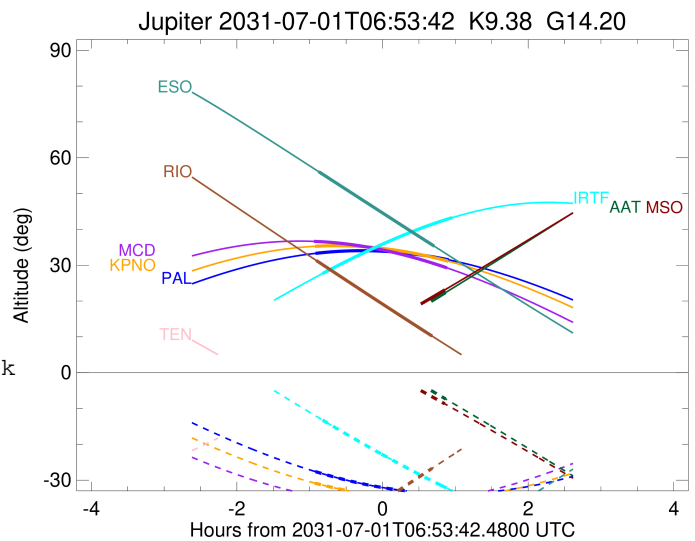
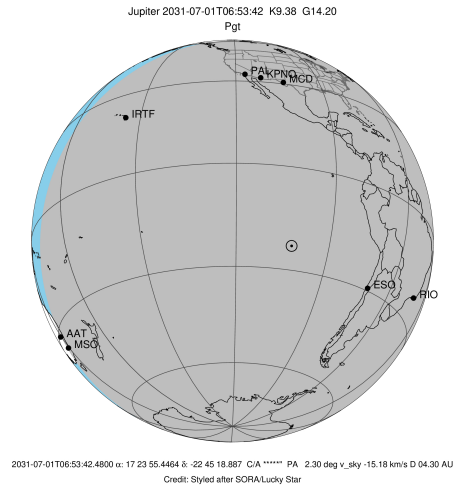


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T05:58:31.204	33.30	-27.63	71487.5	-44.77	-48.47
Jupiter	E	2031-07-01T07:48:31.644	31.47	-33.71	71487.7	-43.26	-46.97

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T06:52:55.090
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        : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor)  : 1.03
K magnitude           : 9.375
G magnitude           : 14.198
RP magnitude          : 12.933
BP magnitude          : 15.884
DUPflag              : 0
Distance (au)         : 4.295
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg)  : 162.84
Sun-Moon sep (deg)    : 32.11
B (ring opening deg)  : -2.57
PA of pole (deg)      : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 15.971
C/A sky separation (km) : 49751.5
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
    
```

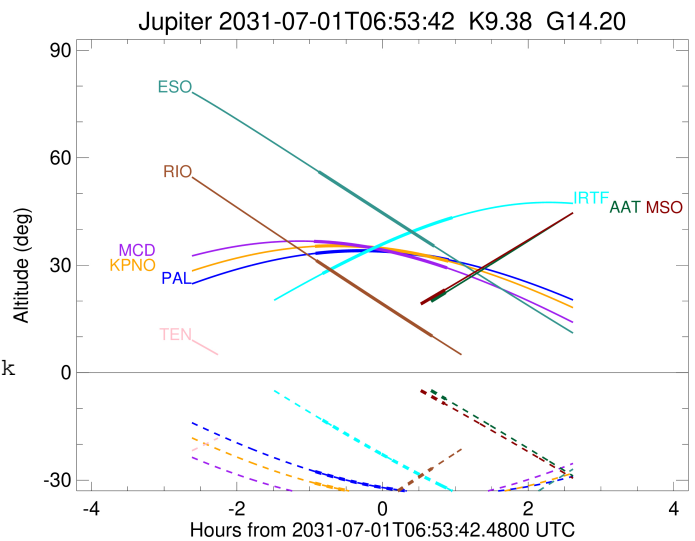
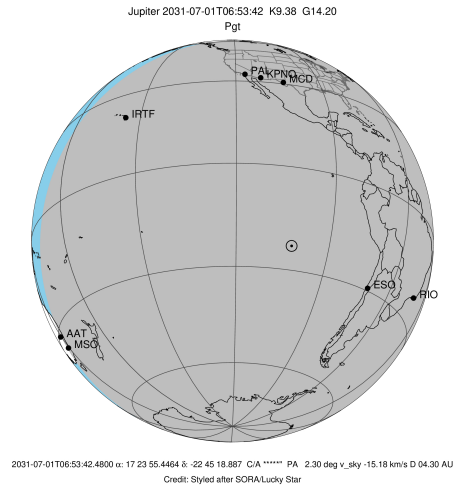


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T05:58:03.214	35.27	-30.84	71487.5	-44.82	-48.52
Jupiter	E	2031-07-01T07:47:51.126	31.13	-34.94	71487.7	-43.41	-47.13

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T06:52:04.460
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        : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 9.375
G magnitude           : 14.198
RP magnitude          : 12.933
BP magnitude          : 15.884
DUPflag              : 0
Distance (au)         : 4.295
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg) : 162.84
Sun-Moon sep (deg)   : 32.20
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 16.009
C/A sky separation (km) : 49871.6
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
    
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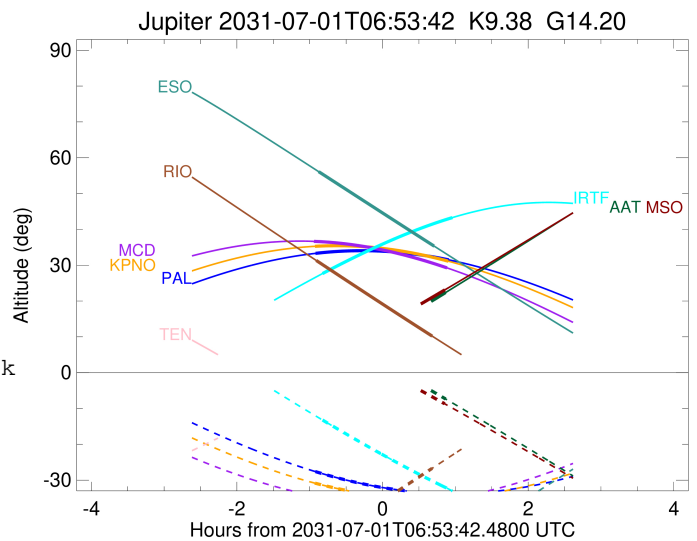
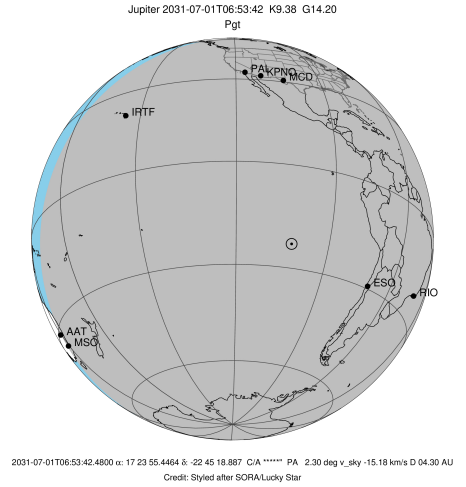


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T05:57:20.254	36.64	-34.32	71487.5	-44.88	-48.58
Jupiter	E	2031-07-01T07:46:55.432	29.24	-35.22	71487.7	-43.62	-47.33

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T06:57:52.290
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       : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 9.375
G magnitude           : 14.198
RP magnitude         : 12.933
BP magnitude         : 15.884
DUPflag              : 0
Distance (au)        : 4.295
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg) : 162.84
Sun-Moon sep (deg)   : 31.55
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 16.418
C/A sky separation (km) : 51145.2
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
    
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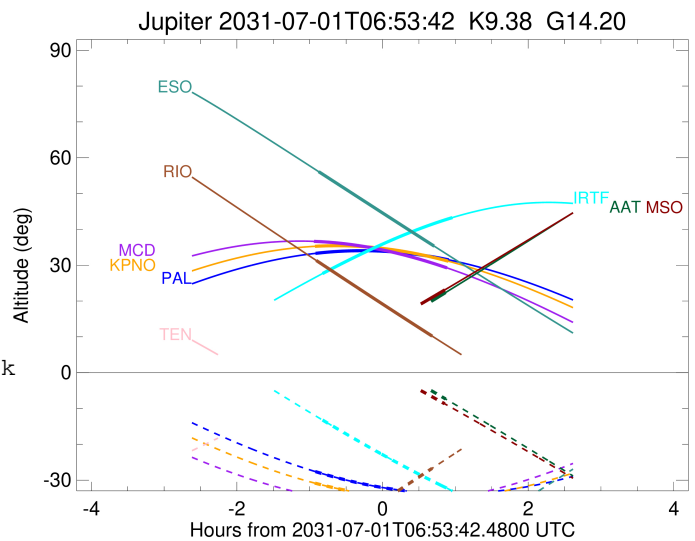
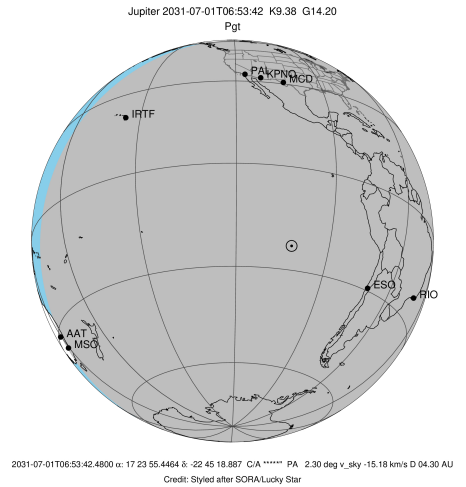


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T06:04:15.812	27.65	-13.22	71487.2	-46.81	-50.48
Jupiter	E	2031-07-01T07:51:17.737	43.28	-32.98	71487.5	-44.55	-48.25

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-01T06:46:44.290
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       : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 9.375
G magnitude           : 14.198
RP magnitude          : 12.933
BP magnitude          : 15.884
DUPflag              : 0
Distance (au)         : 4.295
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg) : 162.84
Sun-Moon sep (deg)   : 32.64
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 18.127
C/A sky separation (km) : 56466.8
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
    
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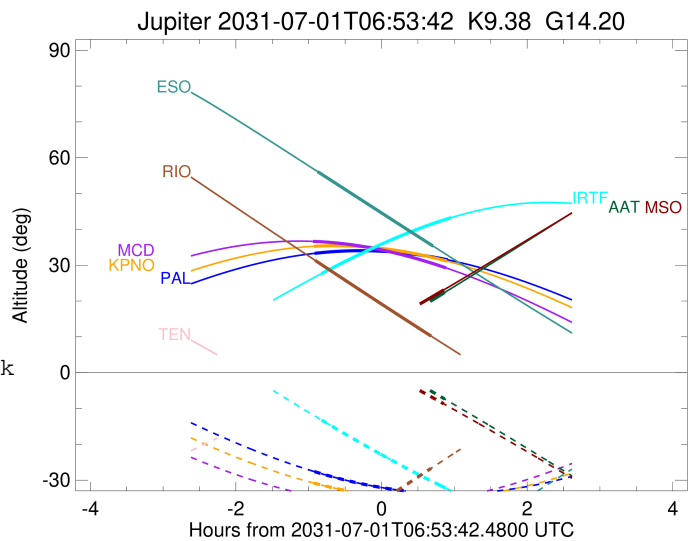
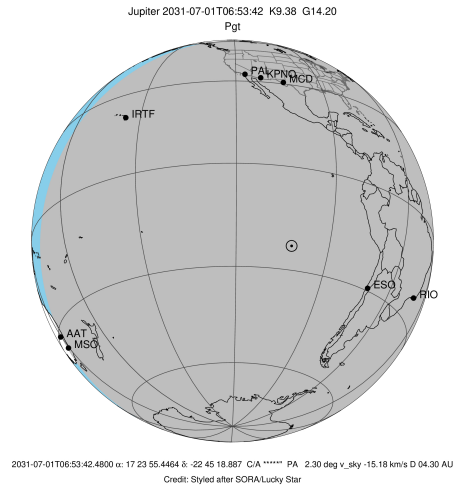


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T05:59:07.250	31.32	-48.18	71486.3	-52.28	-55.78
Jupiter	E	2031-07-01T07:34:38.907	10.20	-26.69	71486.3	-51.97	-55.48

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T06:48:35.640
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        : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 9.375
G magnitude           : 14.198
RP magnitude          : 12.933
BP magnitude          : 15.884
DUPflag              : 0
Distance (au)         : 4.295
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg) : 162.84
Sun-Moon sep (deg)   : 32.65
B (ring opening deg) : -2.57
PA of pole (deg)     : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 18.053
C/A sky separation (km) : 56238.2
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
    
```

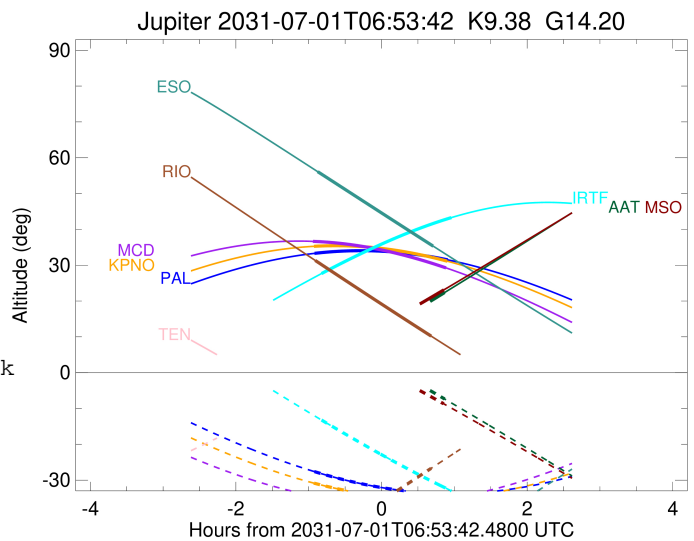
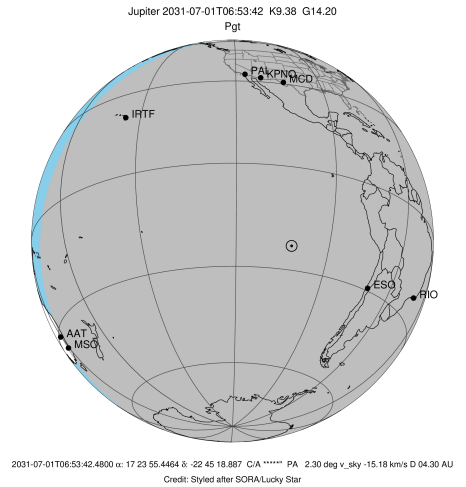


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T06:01:08.296	56.10	-72.29	71486.3	-52.19	-55.69
Jupiter	E	2031-07-01T07:36:15.787	35.32	-51.69	71486.4	-51.51	-55.04

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-01T07:00:13.290
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : AAT
Location              : Siding Spring (AAT)
Latitude (deg)        : -31.27703
E. Longitude (deg)    : 149.06608
Altitude (km)         : 1.164
Gaia source ID        : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 9.375
G magnitude           : 14.198
RP magnitude          : 12.933
BP magnitude          : 15.884
DUPflag              : 0
Distance (au)         : 4.295
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg)  : 162.84
Sun-Moon sep (deg)    : 31.09
B (ring opening deg) : -2.57
PA of pole (deg)      : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 18.656
C/A sky separation (km) : 58117.6
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
    
```

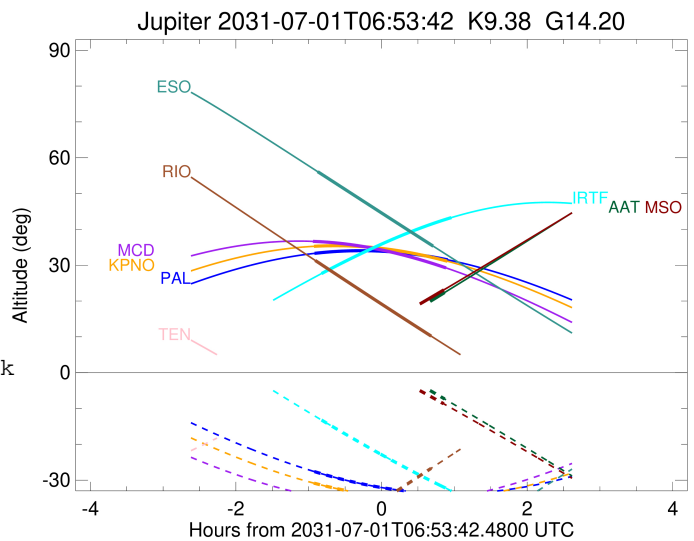
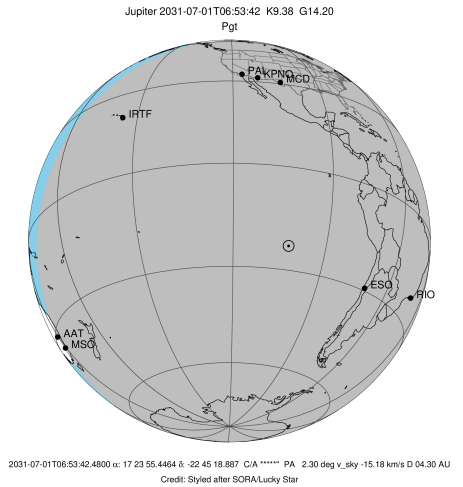


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-01T06:14:25.308	3.86x	9.81x	71485.8	-55.62	-58.96
Jupiter	E	2031-07-01T07:45:47.309	22.38	-7.35	71486.2	-52.99	-56.46


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-01T06:59:54.690
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      : 4111735091981620096
2Mass ID (if available) : 17235545-2245188
ICRS Star Coord at Epoch: 17h 23m 55.44640s -22:45:18.88734s
RUWE (>1.4 is poor) : 1.03
K magnitude          : 9.375
G magnitude          : 14.198
RP magnitude         : 12.933
BP magnitude         : 15.884
DUPflag             : 0
Distance (au)        : 4.295
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.18
Sun-Target sep (deg) : 162.84
Sun-Moon sep (deg)  : 31.14
B (ring opening deg) : -2.57
PA of pole (deg)    : 3.04
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 18.767
C/A sky separation (km) : 58461.1
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	2031-07-01T06:14:38.853	5.51	7.50x	71485.7	-56.07	-59.38
Jupiter	E	2031-07-01T07:44:57.549	23.08	-8.69	71486.1	-53.49	-56.93