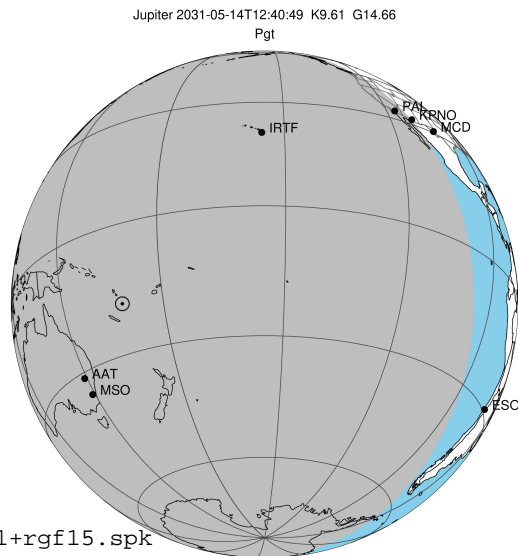


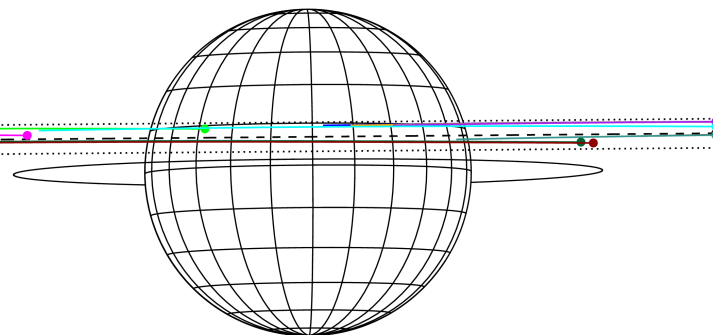
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-14T12:40:49.370
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068887403080190464
 2Mass ID (if available) : 17480601-2253307

Jupiter 2031-05-14T12:40:49 K9.61 G14.66 Pgt

ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 9.614
 G magnitude : 14.659
 RP magnitude : 13.369
 BP magnitude : 16.525
 DUPflag : 0
 Distance (au) : 4.424
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -11.35
 Sun-Target sep (deg) : 145.84
 Sun-Moon sep (deg) : 65.31
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.44
 Pole direction: RA (deg): 268.05695
 Dec (deg): 64.49651
 C/A sky separation (") : 4.868
 C/A sky separation (km) : 15622.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



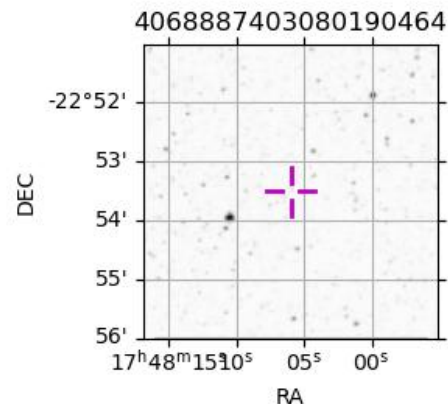
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 RIO
 ESO
 AAT
 MSO



2031-05-14T12:40:49.3700 at: 17 48 05.9984 s: -22 53 30.901 C/A 4.868° PA 180.50 deg v_sky -11.35 km/s D 04.42 AU
 Credit: Styled after SORA/Lucky Star

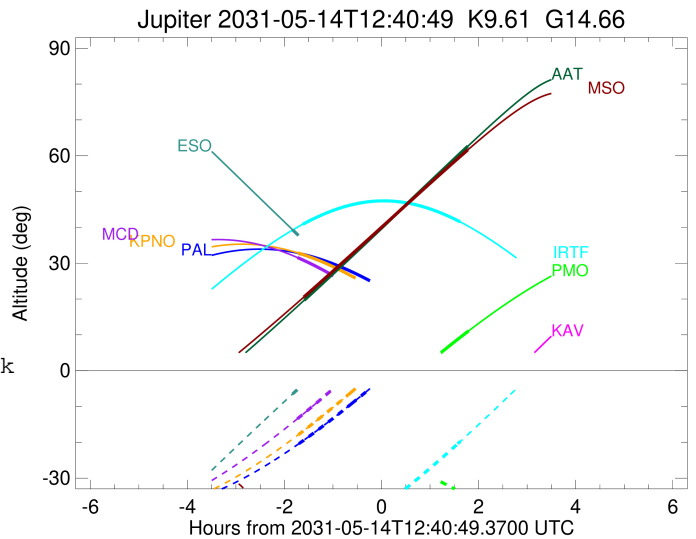
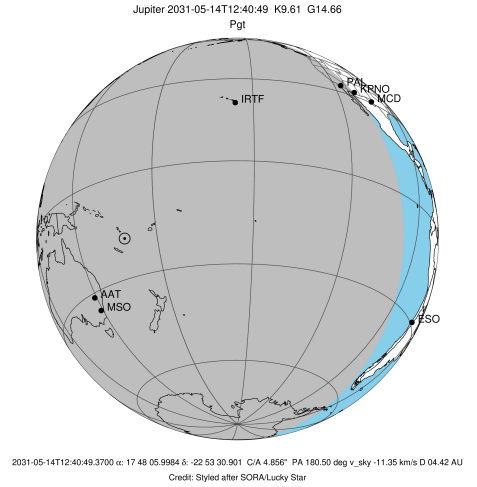
Observable events with sun below -5 deg and altitude above 5 deg

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	+	MAY 14 10:58 - MAY 14 10:58	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8	+	MAY 14 14:28 - MAY 14 14:28	Pne
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 14 10:57 - MAY 14 10:57	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 14 10:56 - MAY 14 10:56	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	MAY 14 11:03 - MAY 14 14:18	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8			Pnn
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	MAY 14 10:50 - MAY 14 10:50	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+	MAY 14 11:05 - MAY 14 14:27	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAY 14 11:04 - MAY 14 14:27	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-14T12:36:24.000
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        : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.614
G magnitude           : 14.659
RP magnitude          : 13.369
BP magnitude          : 16.525
DUPflag              : 0
Distance (au)         : 4.424
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg)  : 145.84
Sun-Moon sep (deg)    : 65.43
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (" ) : 6.393
C/A sky separation (km) : 20514.9
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
    
```

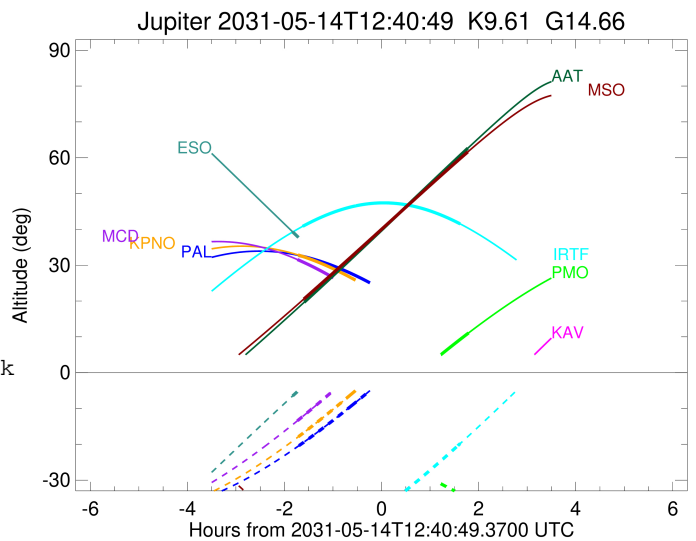
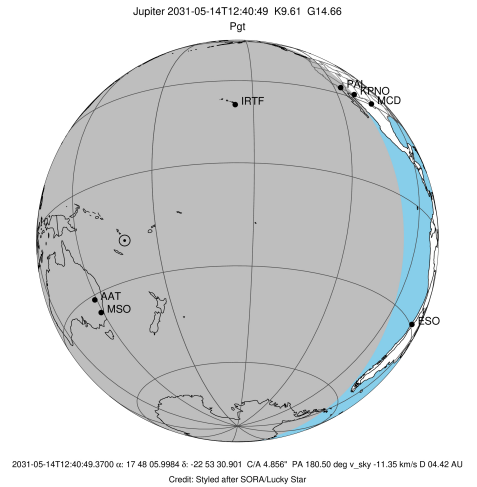


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-14T10:58:43.147	32.70	-20.38	71491.2	17.01	19.26
Jupiter	E	2031-05-14T14:14:43.690	8.94	16.37x	71491.3	16.05	18.20

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-14T12:48:22.940
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : PMO
Location              : Purple Mtn Obs. Nanking
Latitude (deg)        : 32.06667
E. Longitude (deg)    : 118.82089
Altitude (km)         : 0.364
Gaia source ID        : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.614
G magnitude           : 14.659
RP magnitude          : 13.369
BP magnitude          : 16.525
DUPflag              : 0
Distance (au)         : 4.424
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg)  : 145.84
Sun-Moon sep (deg)    : 65.50
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 5.889
C/A sky separation (km) : 18897.7
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
    
```

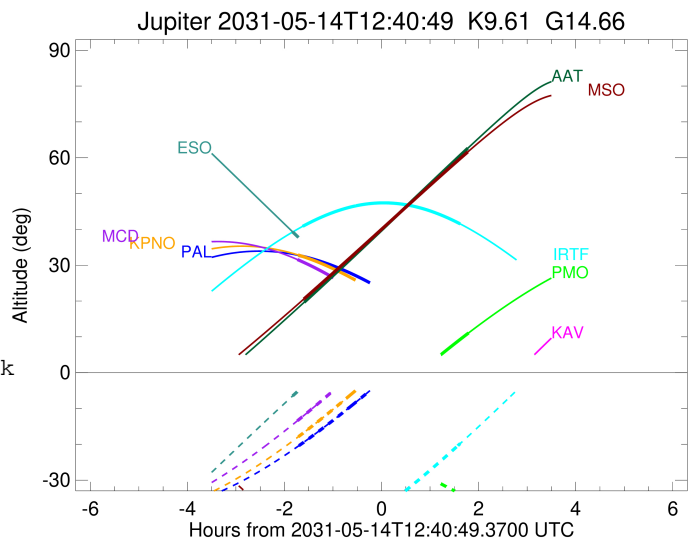
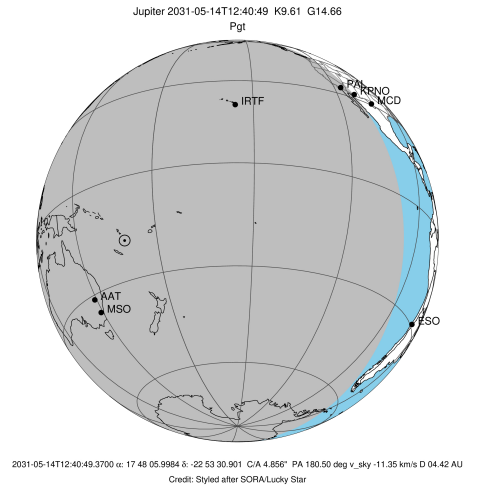


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-14T11:06:38.608	-28.25x	-3.34x	71491.4	14.60	16.58
Jupiter	E	2031-05-14T14:28:27.366	11.09	-34.78	71491.3	15.98	18.12

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-14T12:35:48.290
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        : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.614
G magnitude           : 14.659
RP magnitude          : 13.369
BP magnitude          : 16.525
DUPflag              : 0
Distance (au)         : 4.424
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg)  : 145.84
Sun-Moon sep (deg)    : 65.38
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (" ) : 6.327
C/A sky separation (km) : 20304.5
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
    
```

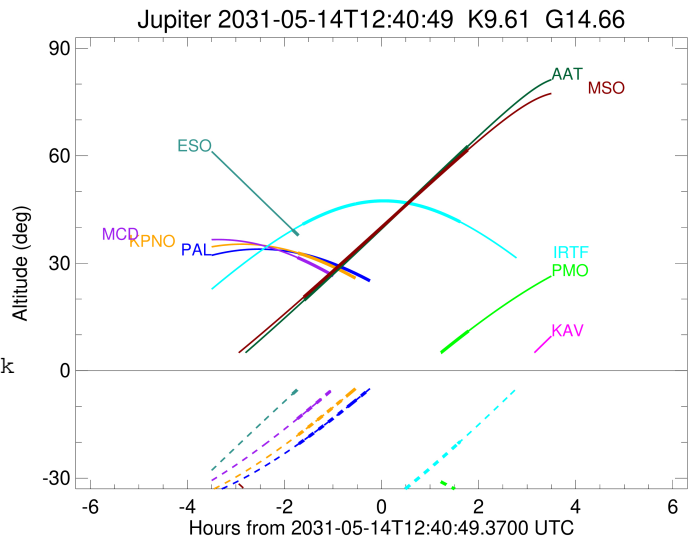
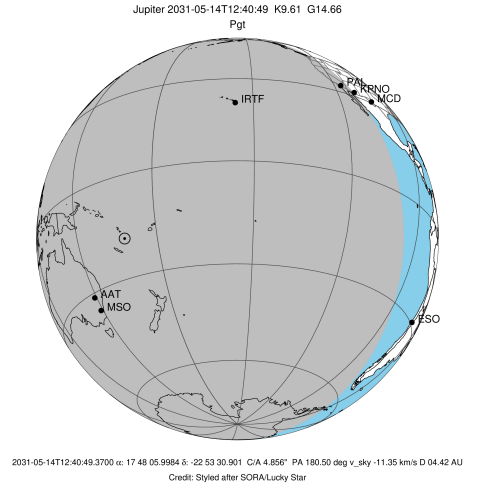


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-14T10:57:57.046	32.84	-17.90	71491.2	16.90	19.14
Jupiter	E	2031-05-14T14:14:25.135	6.05	20.40x	71491.3	15.82	17.94

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-14T12:35:02.370
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       : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.614
G magnitude           : 14.659
RP magnitude          : 13.369
BP magnitude          : 16.525
DUPflag              : 0
Distance (au)         : 4.424
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg) : 145.84
Sun-Moon sep (deg)   : 65.29
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 6.239
C/A sky separation (km) : 20019.7
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
    
```

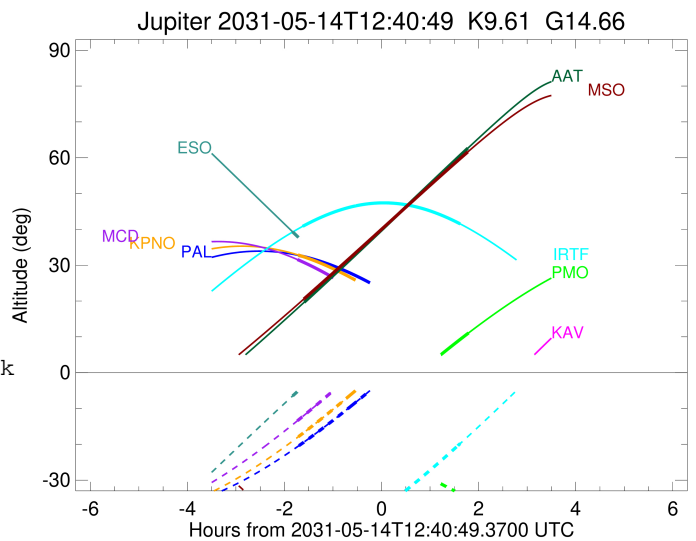
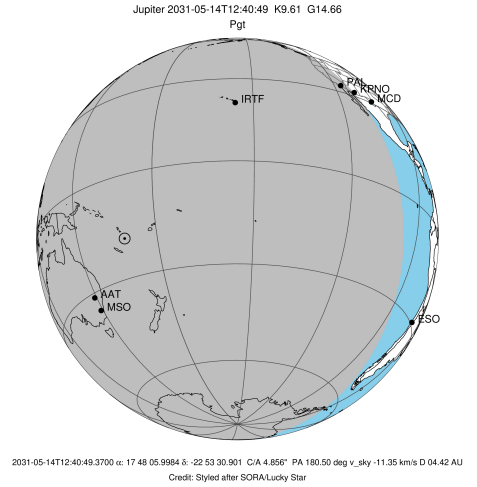


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-14T10:56:52.556	31.58	-13.43	71491.2	16.75	18.97
Jupiter	E	2031-05-14T14:14:06.742	1.11x	26.56x	71491.3	15.52	17.60

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-14T12:40:56.940
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       : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 9.614
G magnitude          : 14.659
RP magnitude         : 13.369
BP magnitude         : 16.525
DUPflag             : 0
Distance (au)        : 4.424
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg) : 145.84
Sun-Moon sep (deg)   : 65.95
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation ("): 6.214
C/A sky separation (km): 19940.1
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
    
```

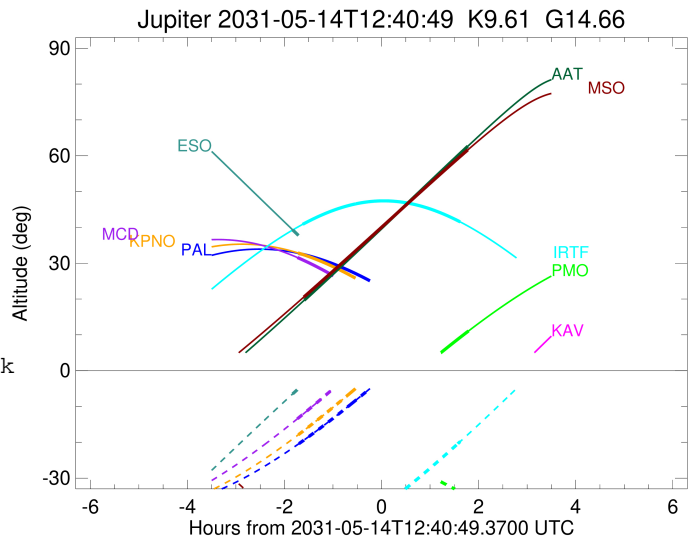
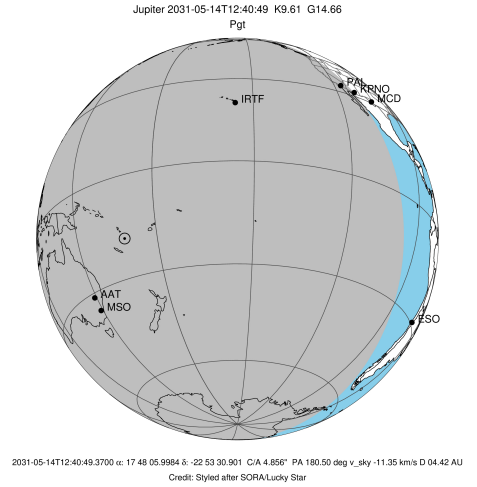


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-14T11:03:37.157	40.87	-50.08	71491.3	16.04	18.18
Jupiter	E	2031-05-14T14:18:05.930	41.52	-19.79	71491.3	15.97	18.11

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-14T12:32:57.920
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       : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.614
G magnitude           : 14.659
RP magnitude          : 13.369
BP magnitude          : 16.525
DUPflag              : 0
Distance (au)         : 4.424
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg) : 145.84
Sun-Moon sep (deg)   : 65.22
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 4.081
C/A sky separation (km) : 13096.1
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
    
```

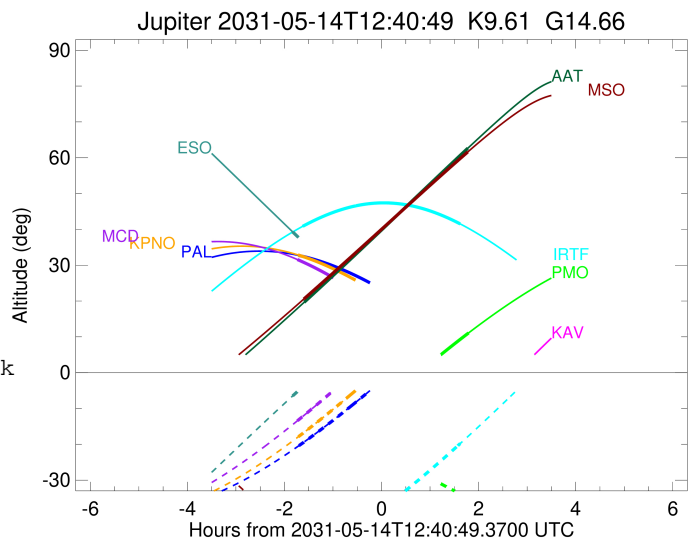
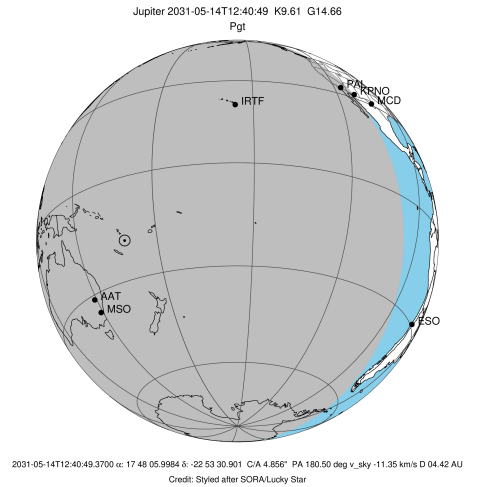


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-14T10:50:57.429	39.31	-6.51	71491.6	11.33	12.89
Jupiter	E	2031-05-14T14:16:22.348	-3.41x	31.08x	71491.7	9.70	11.05

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-14T12:47:06.870
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      : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 9.614
G magnitude         : 14.659
RP magnitude        : 13.369
BP magnitude        : 16.525
DUPflag            : 0
Distance (au)       : 4.424
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg) : 145.84
Sun-Moon sep (deg)  : 66.17
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (" ) : 4.299
C/A sky separation (km) : 13796.3
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
    
```

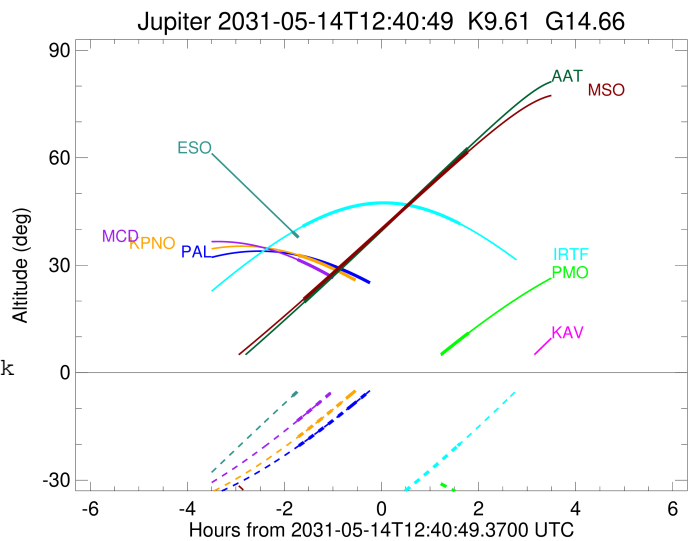
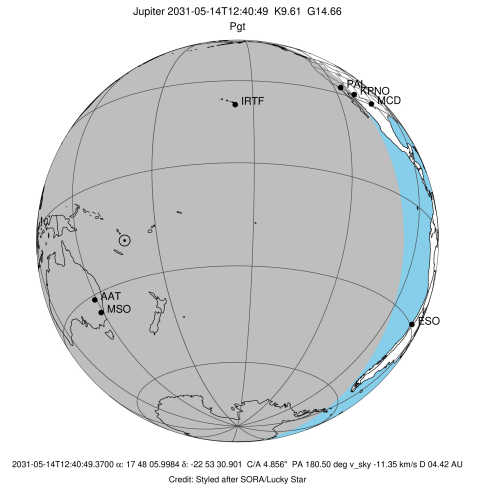


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-14T11:05:23.259	19.68	-48.76	71491.7	10.46	11.92
Jupiter	E	2031-05-14T14:27:26.916	62.63	-76.12	71491.6	11.57	13.17


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-14T12:46:50.520
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       : 4068887403080190464
2Mass ID (if available) : 17480601-2253307
ICRS Star Coord at Epoch: 17h 48m 05.99835s -22:53:30.90069s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.614
G magnitude           : 14.659
RP magnitude         : 13.369
BP magnitude         : 16.525
DUPflag              : 0
Distance (au)        : 4.424
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.35
Sun-Target sep (deg) : 145.84
Sun-Moon sep (deg)   : 66.16
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.44
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation ("): 4.174
C/A sky separation (km): 13393.0
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	2031-05-14T11:04:56.042	20.57	-47.97	71491.7	10.16	11.58
Jupiter	E	2031-05-14T14:27:24.197	61.60	-72.48	71491.6	11.22	12.78