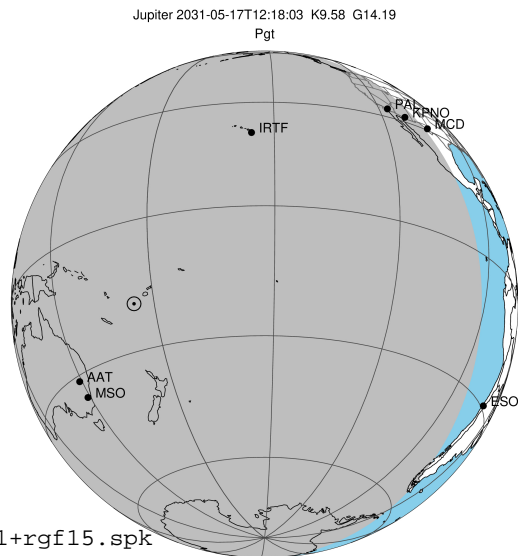


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-17T12:18:03.050
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068936361499921152
 2Mass ID (if available) : 17465719-2253088

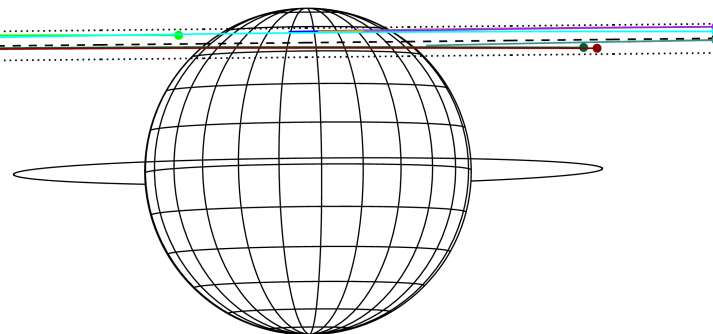
Jupiter 2031-05-17T12:18:03 K9.58 G14.19 Pgt

ICRS Star Coord at Epoch: 17h 46m 57.20346s -22:53:08.96989s

RUWE (>1.4 is poor) : 5.20
 K magnitude : 9.579
 G magnitude : 14.191
 RP magnitude : 12.882
 BP magnitude : 15.496
 DUPflag : 0
 Distance (au) : 4.398
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -12.23
 Sun-Target sep (deg) : 148.99
 Sun-Moon sep (deg) : 105.16
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.57
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 17.694
 C/A sky separation (km) : 56436.9
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



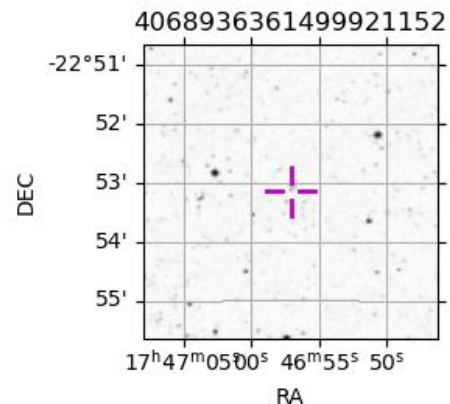
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 RIO
 ESO
 AAT
 MSO



2031-05-17T12:18:03.0500 a: 17 46 57.2035 s: -22 53 08.970 C/A ***** PA 180.61 deg v_sky -12.23 km/s D 04.40 AU
 Credit: Styled after SORA/Lucky Star

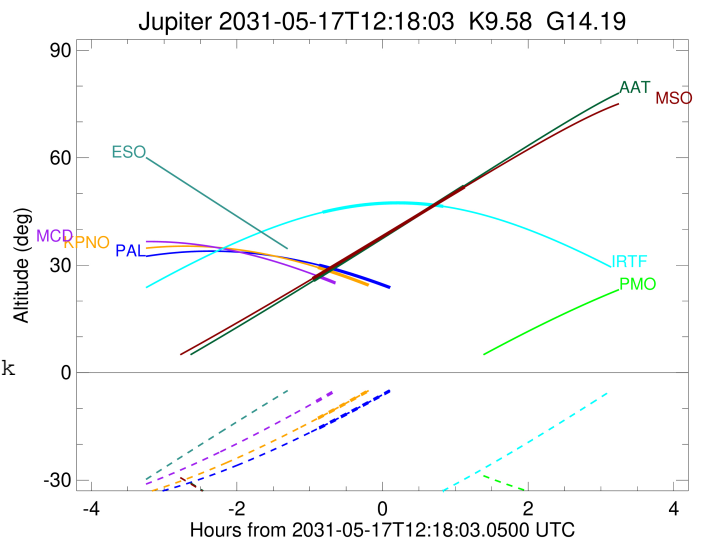
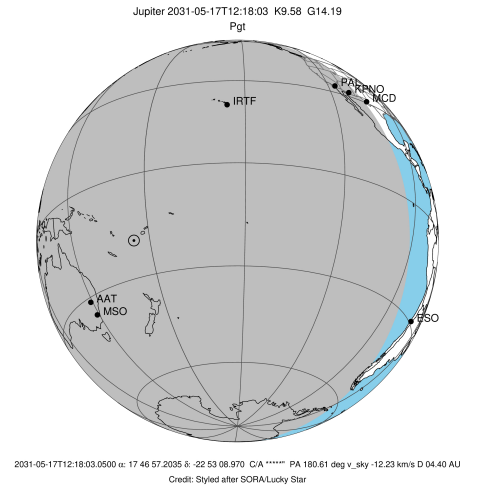
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+	MAY 17 11:25 - MAY 17 11:25	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 17 11:24 - MAY 17 11:24	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 17 11:23 - MAY 17 11:23	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 17 11:28 - MAY 17 13:08	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			Pnn
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	MAY 17 11:21 - MAY 17 13:25	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	MAY 17 11:20 - MAY 17 13:25	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-17T12:14:31.930
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       : 4068936361499921152
2Mass ID (if available) : 17465719-2253088
ICRS Star Coord at Epoch: 17h 46m 57.20346s -22:53:08.96989s
RUWE (>1.4 is poor) : 5.20
K magnitude           : 9.579
G magnitude           : 14.191
RP magnitude         : 12.882
BP magnitude         : 15.496
DUPflag              : 0
Distance (au)        : 4.398
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.23
Sun-Target sep (deg) : 148.99
Sun-Moon sep (deg)   : 105.67
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.57
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 19.244
C/A sky separation (km): 61382.1
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
    
```

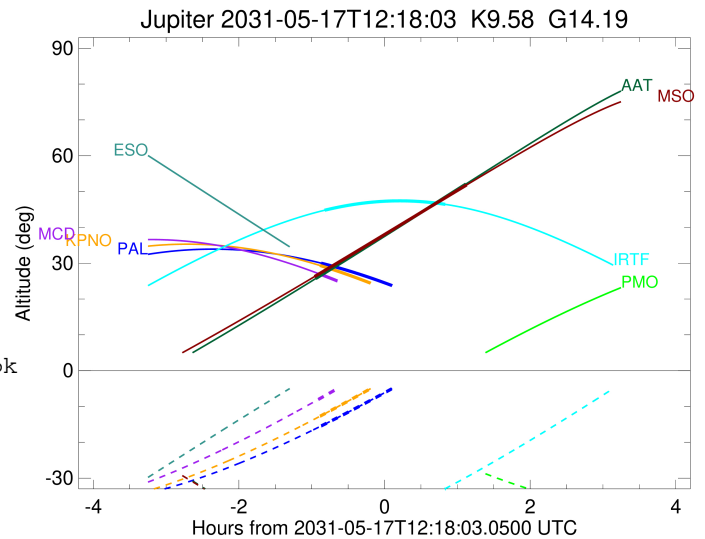
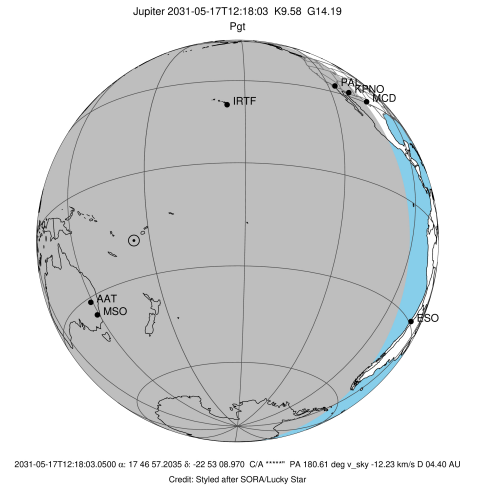


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T11:25:50.838	30.01	-15.43	71485.1	59.42	62.52
Jupiter	E	2031-05-17T13:03:21.384	18.35	2.44x	71485.2	58.59	61.75

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-17T12:14:01.170
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        : 4068936361499921152
2Mass ID (if available) : 17465719-2253088
ICRS Star Coord at Epoch: 17h 46m 57.20346s -22:53:08.96989s
RUWE (>1.4 is poor) : 5.20
K magnitude           : 9.579
G magnitude           : 14.191
RP magnitude          : 12.882
BP magnitude          : 15.496
DUPflag              : 0
Distance (au)         : 4.398
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.23
Sun-Target sep (deg) : 148.99
Sun-Moon sep (deg)   : 105.66
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.57
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 19.181
C/A sky separation (km): 61178.9
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
    
```

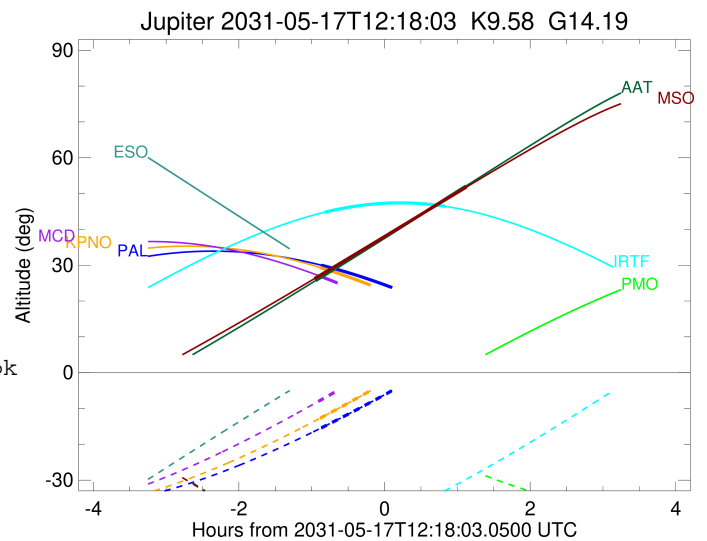
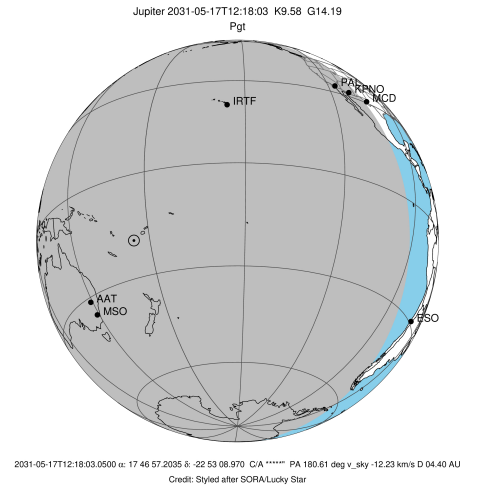


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T11:24:50.349	29.36	-12.73	71485.1	59.16	62.28
Jupiter	E	2031-05-17T13:03:22.085	16.04	6.12x	71485.3	58.22	61.40

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-17T12:13:21.310
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       : 4068936361499921152
2Mass ID (if available) : 17465719-2253088
ICRS Star Coord at Epoch: 17h 46m 57.20346s -22:53:08.96989s
RUWE (>1.4 is poor) : 5.20
K magnitude           : 9.579
G magnitude           : 14.191
RP magnitude          : 12.882
BP magnitude          : 15.496
DUPflag              : 0
Distance (au)         : 4.398
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.23
Sun-Target sep (deg) : 148.99
Sun-Moon sep (deg)   : 105.63
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.57
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 19.094
C/A sky separation (km): 60903.3
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
    
```

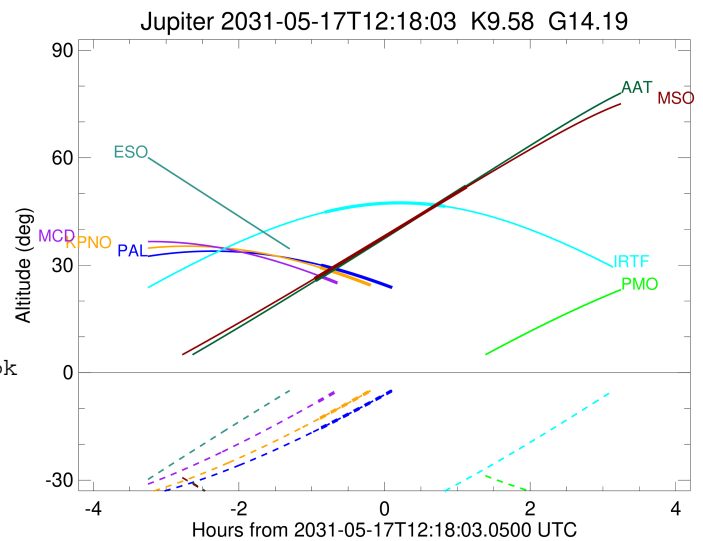
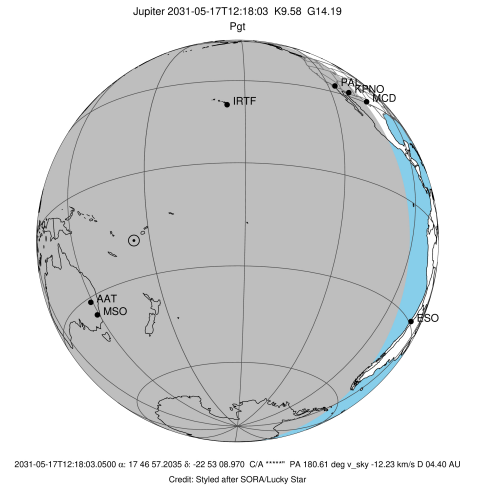


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T11:23:28.559	27.12	-8.04	71485.2	58.82	61.96
Jupiter	E	2031-05-17T13:03:26.540	11.73	11.95x	71485.4	57.73	60.94

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-17T12:18:27.040
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       : 4068936361499921152
2Mass ID (if available) : 17465719-2253088
ICRS Star Coord at Epoch: 17h 46m 57.20346s -22:53:08.96989s
RUWE (>1.4 is poor) : 5.20
K magnitude           : 9.579
G magnitude           : 14.191
RP magnitude         : 12.882
BP magnitude         : 15.496
DUPflag              : 0
Distance (au)        : 4.398
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.23
Sun-Target sep (deg) : 148.99
Sun-Moon sep (deg)   : 105.82
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.57
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 19.046
C/A sky separation (km): 60749.3
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
    
```

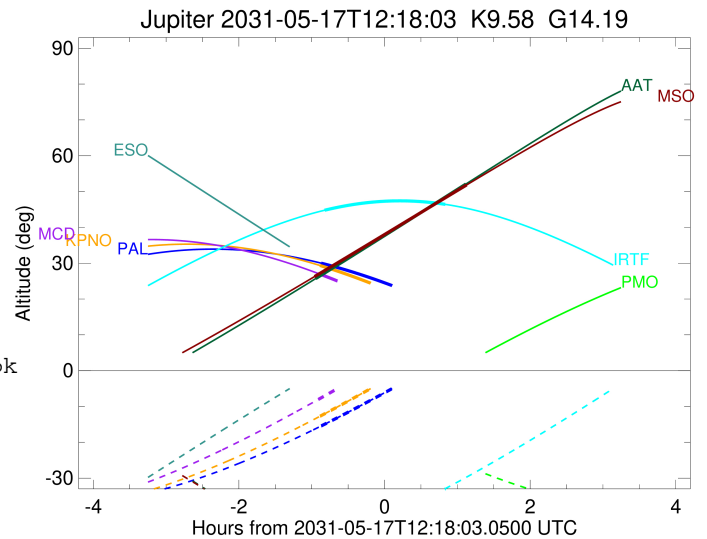
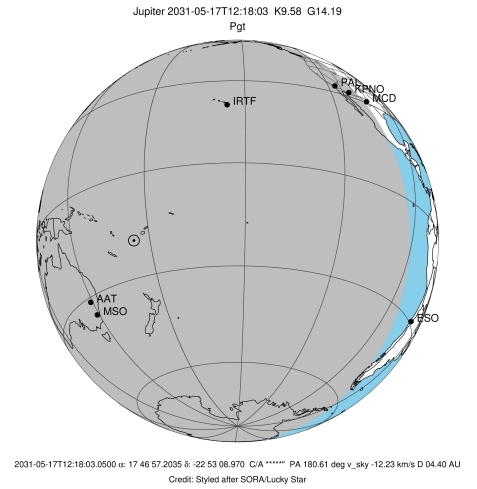


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T11:28:42.980	44.78	-47.31	71485.3	57.99	61.19
Jupiter	E	2031-05-17T13:08:07.802	46.42	-32.93	71485.3	58.03	61.22

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-17T12:23:30.050
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      : 4068936361499921152
2Mass ID (if available) : 17465719-2253088
ICRS Star Coord at Epoch: 17h 46m 57.20346s -22:53:08.96989s
RUWE (>1.4 is poor) : 5.20
K magnitude         : 9.579
G magnitude         : 14.191
RP magnitude        : 12.882
BP magnitude        : 15.496
DUPflag            : 0
Distance (au)       : 4.398
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -12.23
Sun-Target sep (deg) : 148.99
Sun-Moon sep (deg)  : 105.53
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.57
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 17.094
C/A sky separation (km) : 54521.6
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
    
```

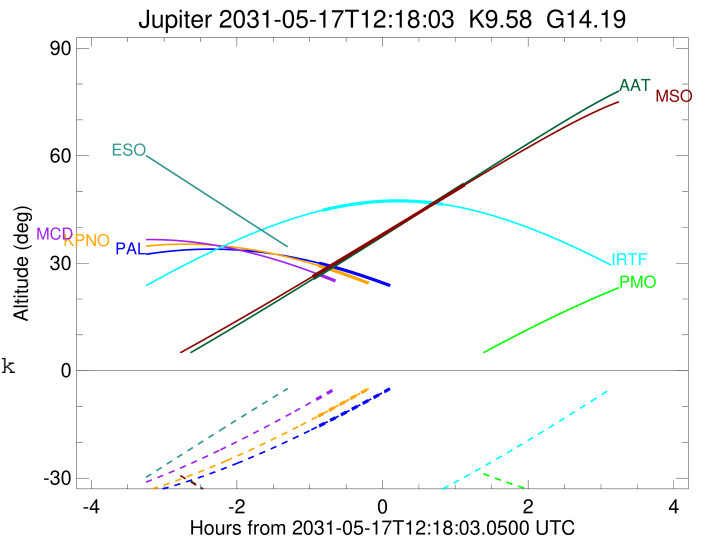
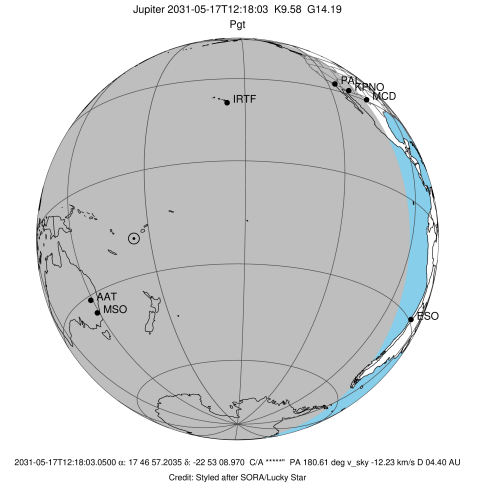


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T11:21:15.349	25.68	-52.42	71486.7	49.02	52.63
Jupiter	E	2031-05-17T13:25:15.474	52.12	-75.86	71486.5	50.14	53.72

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-17T12:23:15.700
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        : 4068936361499921152
2Mass ID (if available) : 17465719-2253088
ICRS Star Coord at Epoch: 17h 46m 57.20346s -22:53:08.96989s
RUWE (>1.4 is poor) : 5.20
K magnitude           : 9.579
G magnitude           : 14.191
RP magnitude          : 12.882
BP magnitude          : 15.496
DUPflag              : 0
Distance (au)         : 4.398
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.23
Sun-Target sep (deg)  : 148.99
Sun-Moon sep (deg)    : 105.54
B (ring opening deg)  : -2.61
PA of pole (deg)      : 0.57
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 16.968
C/A sky separation (km) : 54122.4
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	2031-05-17T11:20:20.791	26.25	-51.41	71486.8	48.55	52.18
Jupiter	E	2031-05-17T13:25:41.834	51.84	-72.46	71486.6	49.62	53.22