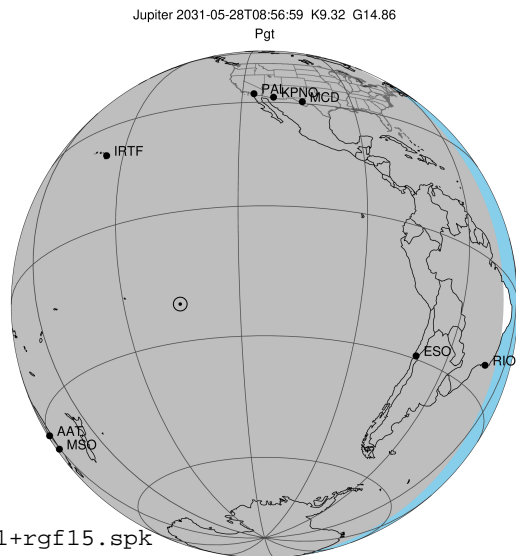


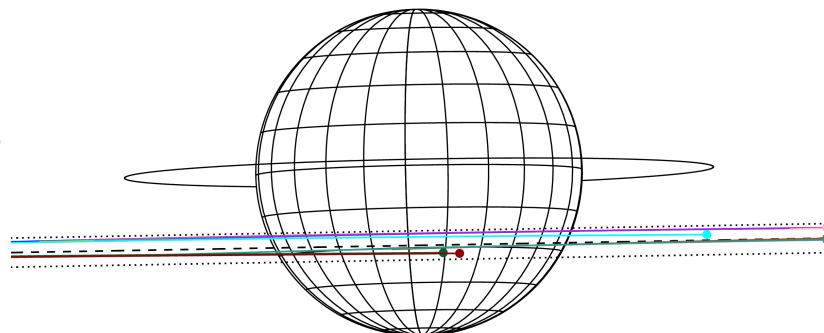
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-28T08:56:59.680
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116925680219170432
 2Mass ID (if available) : 17420503-2252395

Jupiter 2031-05-28T08:56:59 K9.32 G14.86 Pgt

ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
 RUWE (>1.4 is poor) : 0.92
 K magnitude : 9.325
 G magnitude : 14.865
 RP magnitude : 13.444
 BP magnitude : 17.454
 DUPflag : 0
 Distance (au) : 4.320
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -14.77
 Sun-Target sep (deg) : 160.55
 Sun-Moon sep (deg) : 121.78
 B (ring opening deg) : -2.60
 PA of pole (deg) : 1.09
 Pole direction: RA (deg): 268.05693
 Dec (deg): 64.49651
 C/A sky separation (") : 10.185
 C/A sky separation (km) : 31914.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 naif0012.tls
 nep097.bsp
 nep101.bsp
 sat4401.bsp



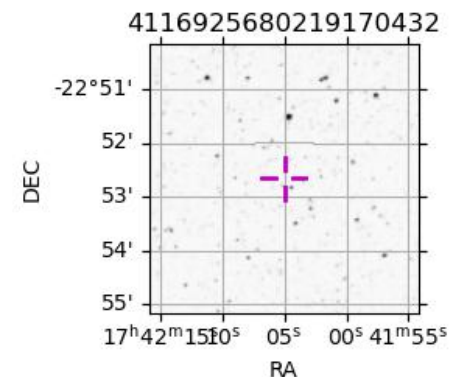
Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 MSO



2031-05-28T08:56:59.6800 α: 17 42 05.0215 δ: -22 52 39.783 C/A ***** PA 1.02 deg v_sky -14.77 km/s D 04.32 AU
 Credit: Styled after SORA/Lucky Star

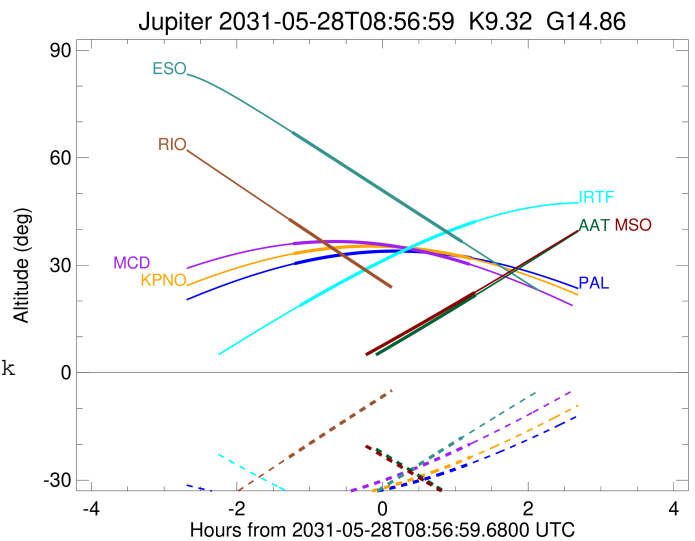
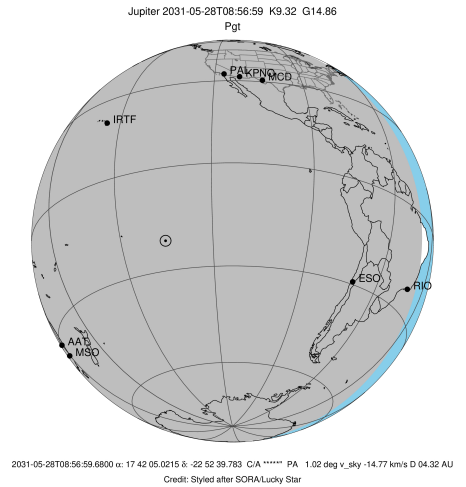
Observable events with sun below -5 deg and altitude above 5 deg

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 28 07:44 - MAY 28 10:10	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 28 07:43 - MAY 28 10:09	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	MAY 28 07:43 - MAY 28 10:08	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 28 07:48 - MAY 28 10:13	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	MAY 28 07:40 - MAY 28 07:40	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 28 07:42 - MAY 28 10:02	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	MAY 28 10:13 - MAY 28 10:13	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAY 28 10:13 - MAY 28 10:13	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:57:23.990
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      : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 9.325
G magnitude          : 14.865
RP magnitude         : 13.444
BP magnitude         : 17.454
DUPflag             : 0
Distance (au)       : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.55
Sun-Moon sep (deg)   : 122.20
B (ring opening deg) : -2.60
PA of pole (deg)     : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 8.500
C/A sky separation (km) : 26632.7
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
    
```

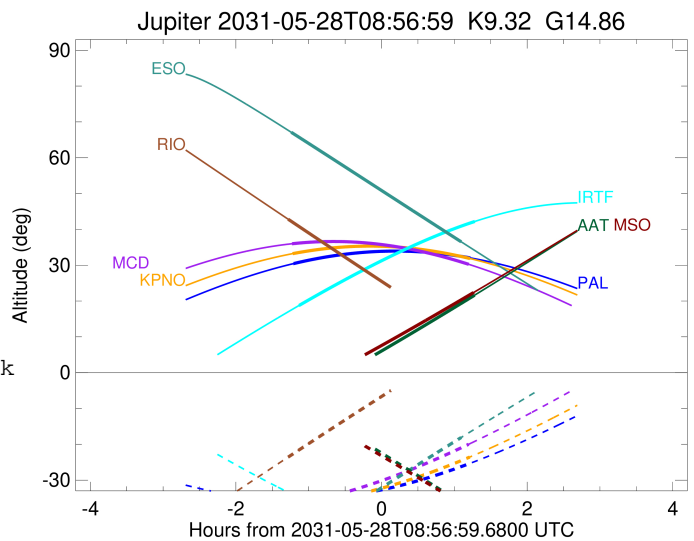
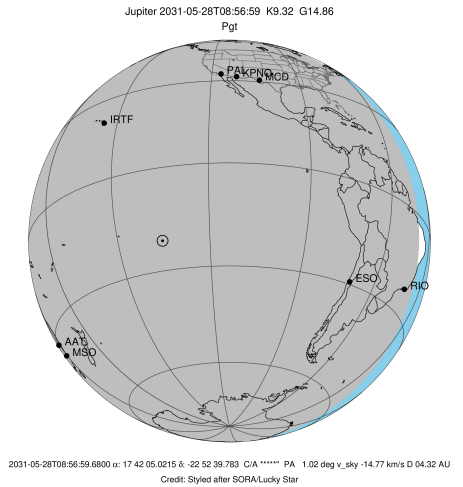


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:44:26.208	30.44	-35.38	71490.7	-22.06	-24.84
Jupiter	E	2031-05-28T10:10:17.385	32.02	-25.27	71490.7	-21.81	-24.57

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:56:49.800
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      : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor) : 0.92
K magnitude         : 9.325
G magnitude         : 14.865
RP magnitude        : 13.444
BP magnitude        : 17.454
DUPflag            : 0
Distance (au)       : 4.320
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.55
Sun-Moon sep (deg)  : 122.18
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 8.525
C/A sky separation (km) : 26712.2
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
    
```

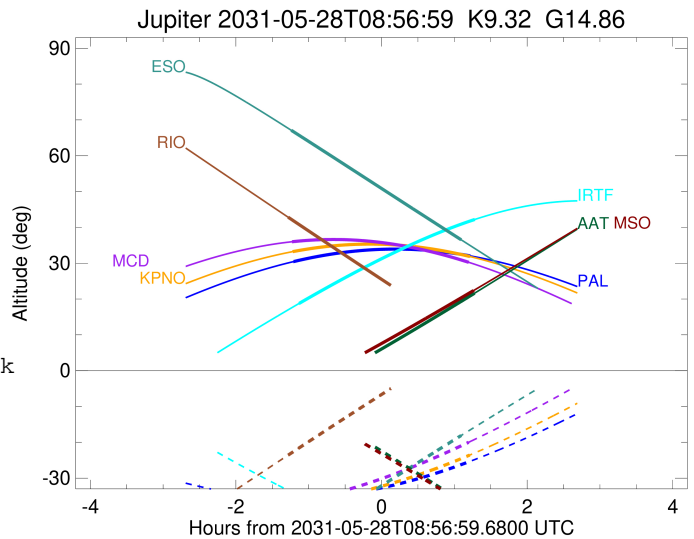
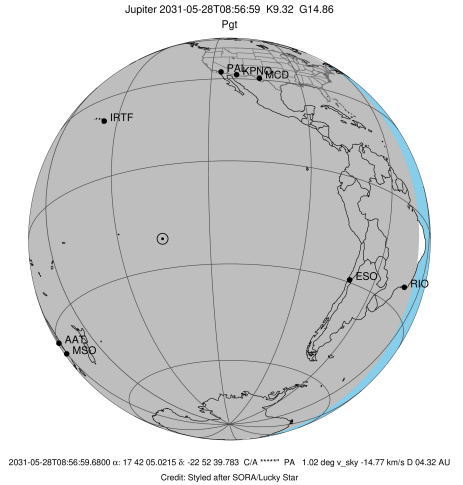


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:43:57.616	33.23	-36.55	71490.7	-22.08	-24.86
Jupiter	E	2031-05-28T10:09:40.838	31.88	-23.56	71490.7	-21.93	-24.70

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:55:59.570
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        : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 9.325
G magnitude           : 14.865
RP magnitude          : 13.444
BP magnitude          : 17.454
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg)  : 160.55
Sun-Moon sep (deg)    : 122.13
B (ring opening deg) : -2.60
PA of pole (deg)      : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 8.558
C/A sky separation (km) : 26814.6
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
    
```

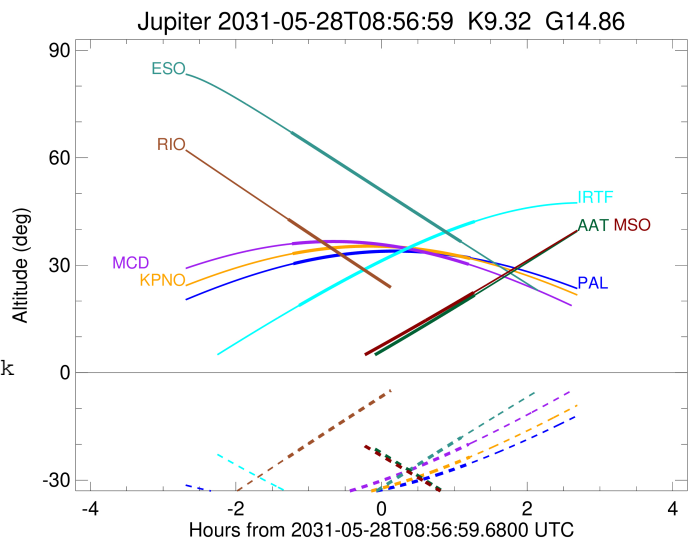
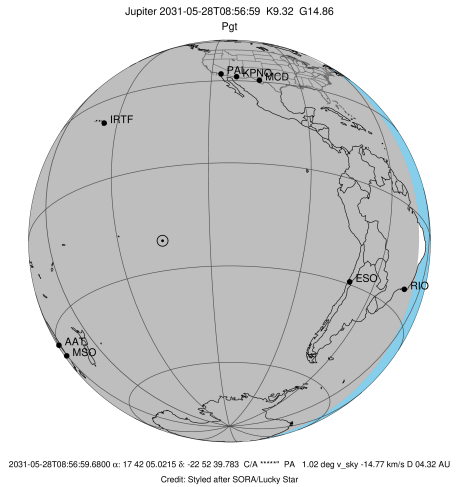


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:43:12.578	35.98	-36.69	71490.7	-22.10	-24.88
Jupiter	E	2031-05-28T10:08:50.156	30.25	-19.99	71490.7	-22.10	-24.87

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T09:01:41.030
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     : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor) : 0.92
K magnitude         : 9.325
G magnitude         : 14.865
RP magnitude        : 13.444
BP magnitude        : 17.454
DUPflag            : 0
Distance (au)      : 4.320
f0 (km)            : 0.00
g0 (km)            : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.55
Sun-Moon sep (deg)  : 122.47
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (" ) : 9.003
C/A sky separation (km) : 28208.7
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
    
```

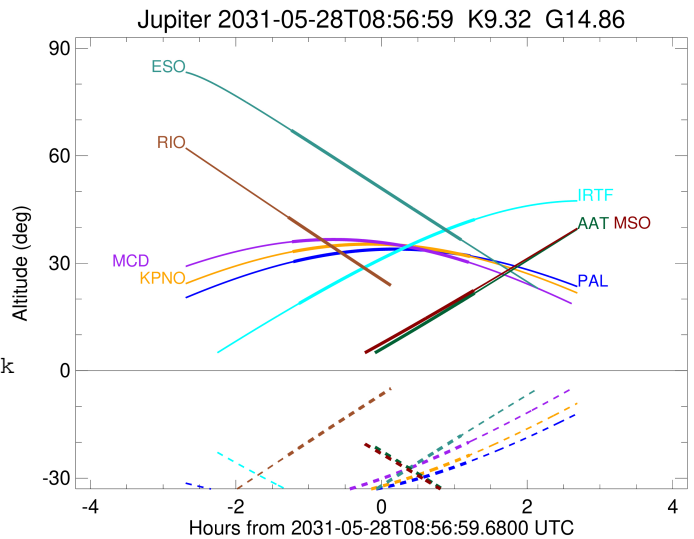
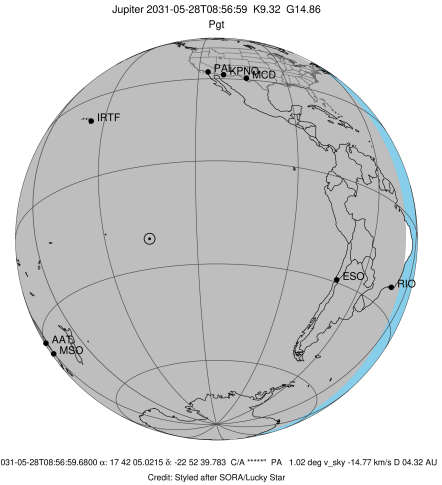


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:48:58.431	18.74	-34.86	71490.5	-23.80	-26.73
Jupiter	E	2031-05-28T10:13:55.040	42.21	-48.82	71490.6	-22.79	-25.63

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:50:23.330
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      : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 9.325
G magnitude          : 14.865
RP magnitude         : 13.444
BP magnitude         : 17.454
DUPflag             : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.55
Sun-Moon sep (deg)  : 121.71
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 10.625
C/A sky separation (km) : 33292.3
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
    
```

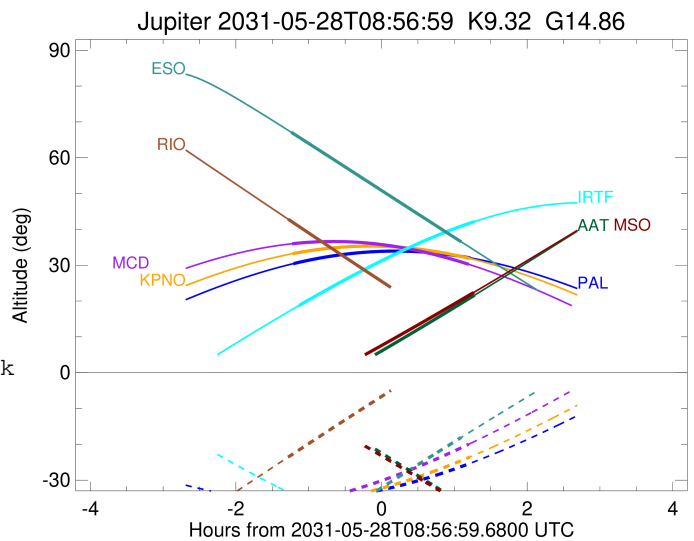
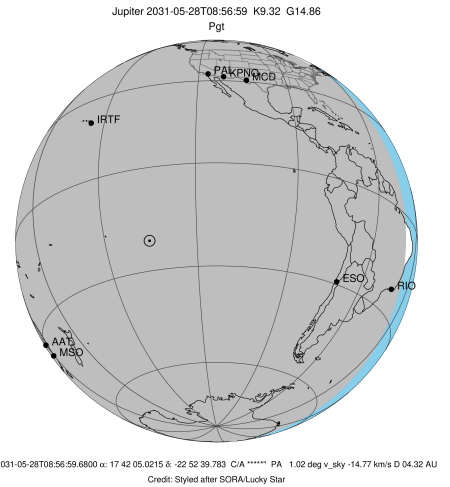


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:40:02.160	42.84	-23.58	71490.1	-27.26	-30.46
Jupiter	E	2031-05-28T10:01:17.619	11.35	6.92x	71489.9	-28.27	-31.53

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:52:30.480
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      : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 9.325
G magnitude          : 14.865
RP magnitude         : 13.444
BP magnitude         : 17.454
DUPflag             : 0
Distance (au)       : 4.320
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.55
Sun-Moon sep (deg)  : 122.10
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 10.567
C/A sky separation (km) : 33109.7
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
    
```

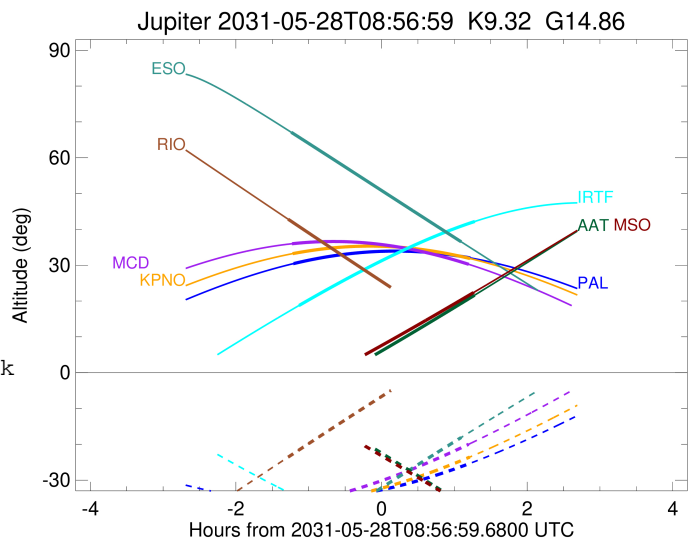
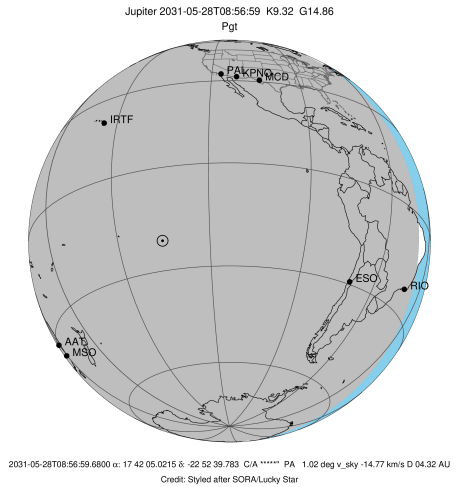


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:42:38.982	67.09	-48.31	71490.0	-27.33	-30.53
Jupiter	E	2031-05-28T10:02:43.045	36.52	-18.08	71490.0	-27.93	-31.18


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T09:03:29.180
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      : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 9.325
G magnitude          : 14.865
RP magnitude         : 13.444
BP magnitude         : 17.454
DUPflag             : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.55
Sun-Moon sep (deg)  : 122.30
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation ("): 11.242
C/A sky separation (km): 35224.9
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
    
```

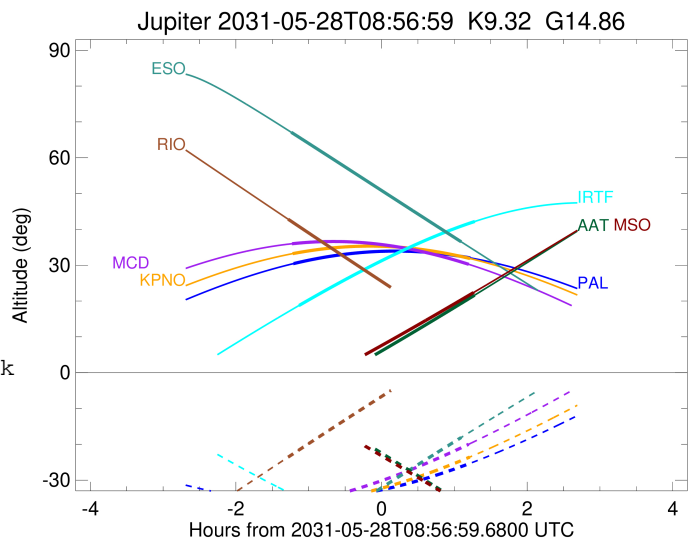
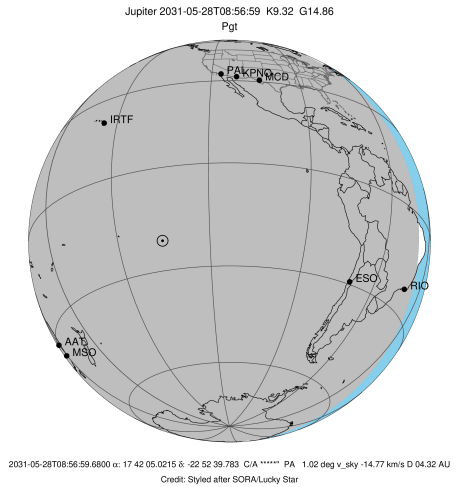


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:52:47.556	-6.21x	-9.23	71489.6	-30.14	-33.52
Jupiter	E	2031-05-28T10:13:33.037	21.59	-38.65	71489.8	-28.81	-32.11


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T09:03:11.260
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        : 4116925680219170432
2Mass ID (if available) : 17420503-2252395
ICRS Star Coord at Epoch: 17h 42m 05.02146s -22:52:39.78283s
RUWE (>1.4 is poor)  : 0.92
K magnitude           : 9.325
G magnitude           : 14.865
RP magnitude          : 13.444
BP magnitude          : 17.454
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg)  : 160.55
Sun-Moon sep (deg)    : 122.30
B (ring opening deg) : -2.60
PA of pole (deg)      : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 11.349
C/A sky separation (km) : 35562.0
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	2031-05-28T07:52:43.824	-4.14x	-10.50	71489.6	-30.43	-33.82
Jupiter	E	2031-05-28T10:13:02.747	22.40	-38.65	71489.8	-29.15	-32.47