

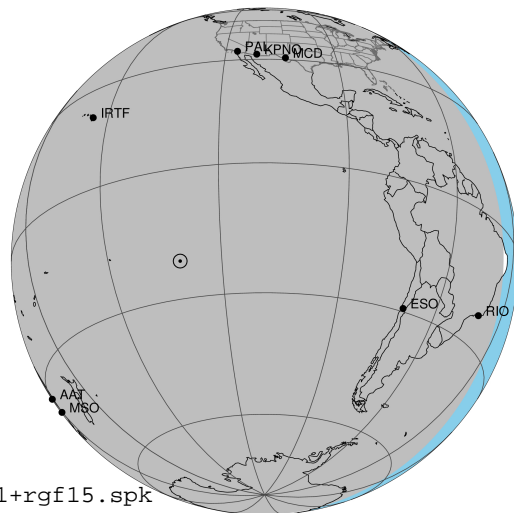
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-28T08:39:09.930
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116925684619289088
 2Mass ID (if available) : 17420537-2252481

Jupiter 2031-05-28T08:39:09 K7.53 G14.52 Pgt

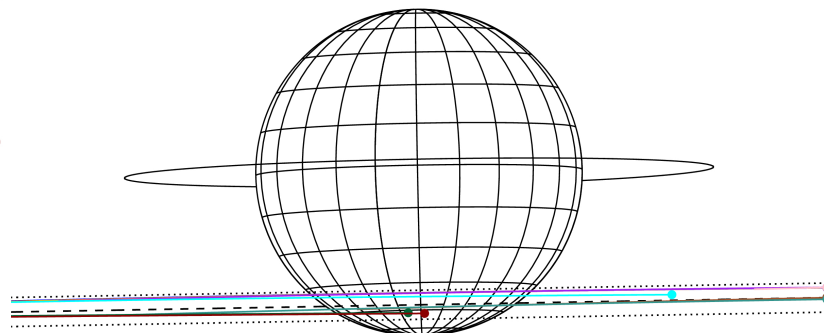
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s

RUWE (>1.4 is poor) : 0.92
 K magnitude : 7.525
 G magnitude : 14.518
 RP magnitude : 12.941
 BP magnitude : 18.100
 DUPflag : 0
 Distance (au) : 4.320
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -14.77
 Sun-Target sep (deg) : 160.54
 Sun-Moon sep (deg) : 121.94
 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 (") : 18.492
 C/A sky separation (km) : 57944.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-28T08:39:09 K7.53 G14.52
 Pgt



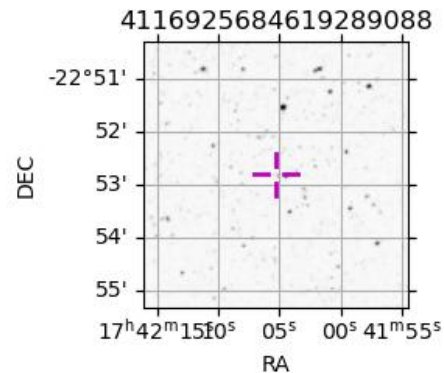
Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 MSO



2031-05-28T08:39:09.9300 α: 17 42 05.3756 & -22 52 48.178 C/A ***** PA 1.01 deg v_sky -14.77 km/s D 04.32 AU
 Credit: Styled after SORA/Lucky Star

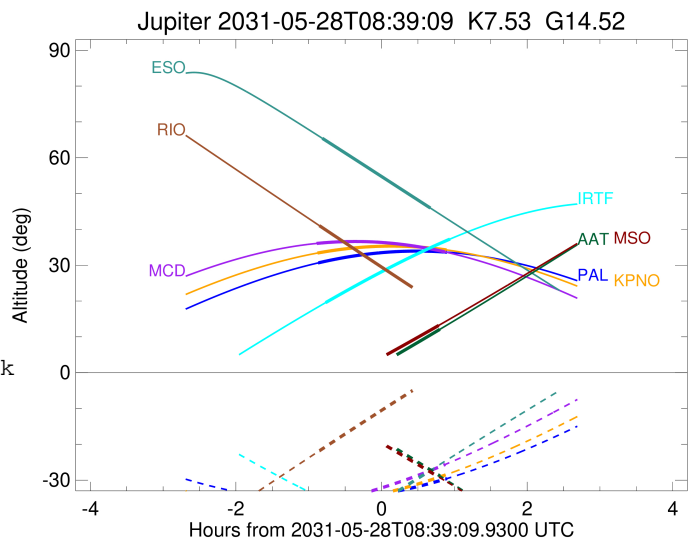
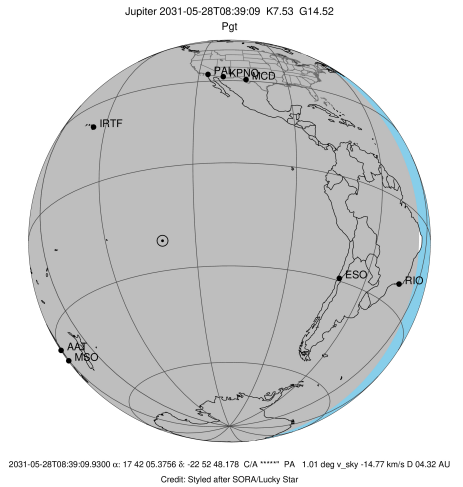
Observable events with sun below -5 deg and altitude above 5 deg

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 07:46 - MAY 28 09:33	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 28 07:46 - MAY 28 09:32	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	MAY 28 07:45 - MAY 28 09:31	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 28 07:53 - MAY 28 09:35	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	MAY 28 07:47 - MAY 28 07:47	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 28 07:50 - MAY 28 09:19	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	MAY 28 09:27 - MAY 28 09:27	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAY 28 09:26 - MAY 28 09:26	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:40:05.650
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       : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 7.525
G magnitude           : 14.518
RP magnitude          : 12.941
BP magnitude          : 18.100
DUPflag              : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)   : 122.38
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 (") : 16.813
C/A sky separation (km) : 52682.6
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
    
```

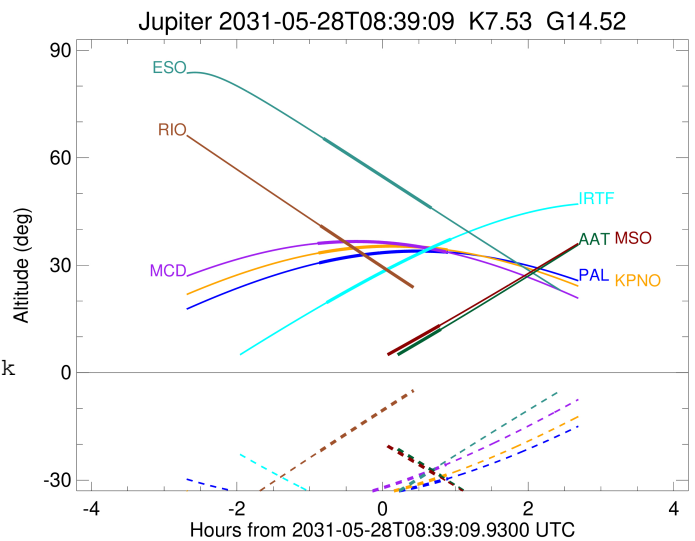
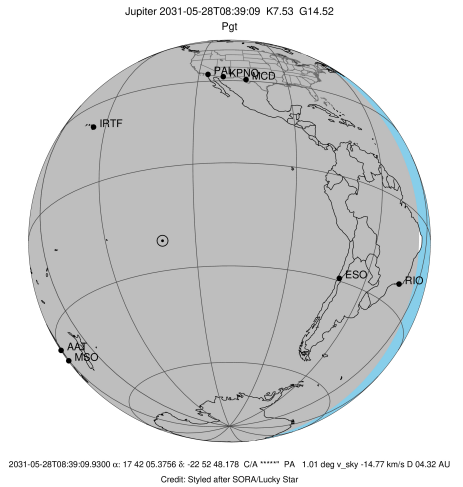


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:46:58.445	30.64	-35.37	71486.9	-47.64	-51.30
Jupiter	E	2031-05-28T09:33:09.054	33.63	-29.55	71487.0	-47.30	-50.97

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:39:30.520
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       : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 7.525
G magnitude           : 14.518
RP magnitude         : 12.941
BP magnitude         : 18.100
DUPflag              : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)   : 122.36
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 (") : 16.834
C/A sky separation (km) : 52748.0
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
    
```

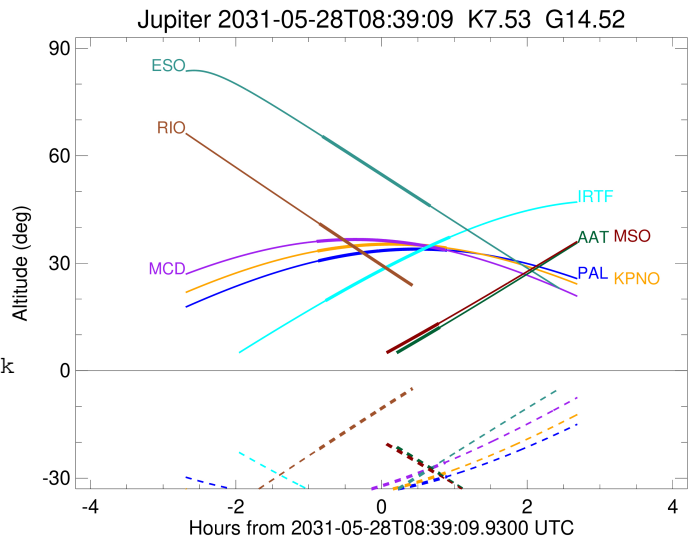
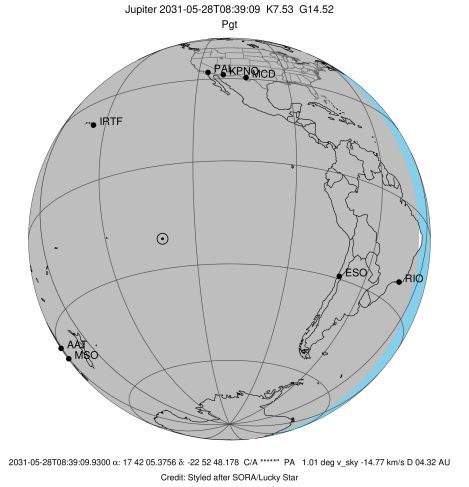


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:46:30.863	33.39	-36.49	71486.9	-47.67	-51.33
Jupiter	E	2031-05-28T09:32:28.098	34.27	-28.47	71487.0	-47.43	-51.09

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:38:38.220
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        : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 7.525
G magnitude           : 14.518
RP magnitude          : 12.941
BP magnitude          : 18.100
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)   : 122.32
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 ("): 16.860
C/A sky separation (km): 52829.7
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
    
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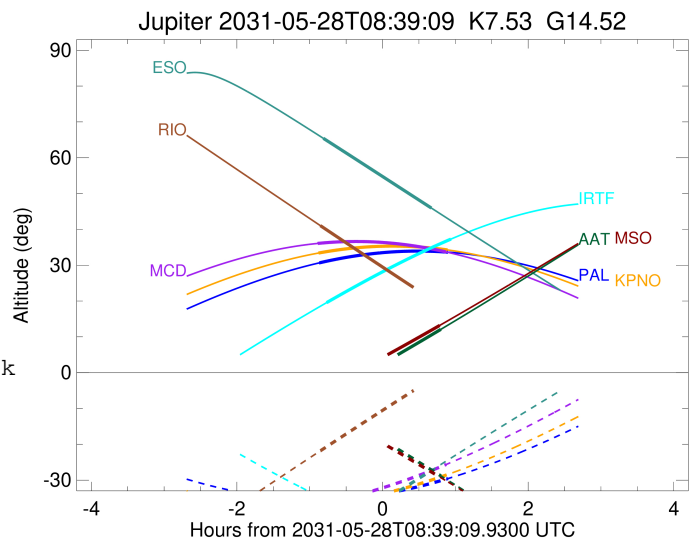
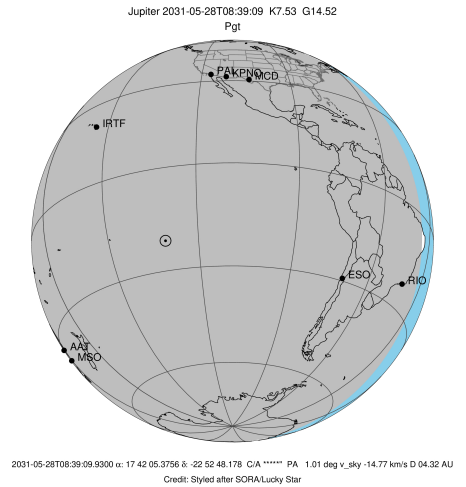


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:45:46.641	36.07	-36.55	71486.9	-47.70	-51.35
Jupiter	E	2031-05-28T09:31:30.243	33.70	-25.65	71486.9	-47.61	-51.26

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:44:29.530
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      : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.3756s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 7.525
G magnitude          : 14.518
RP magnitude         : 12.941
BP magnitude         : 18.100
DUPflag             : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)  : 122.61
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 (" ) : 17.349
C/A sky separation (km) : 54363.4
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
    
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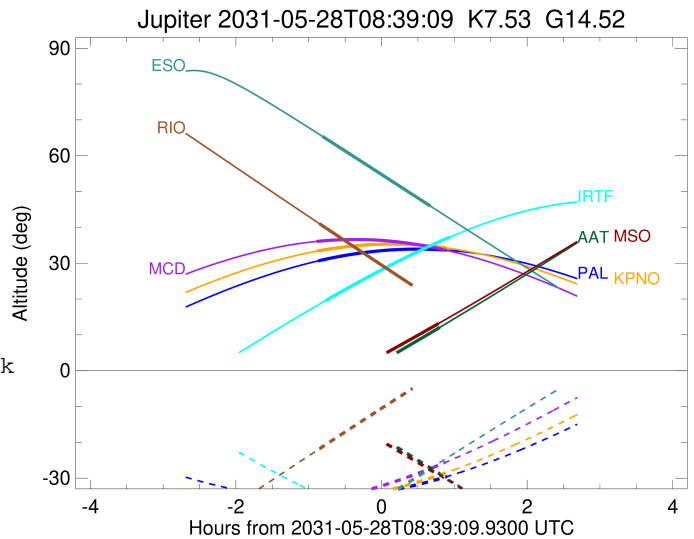
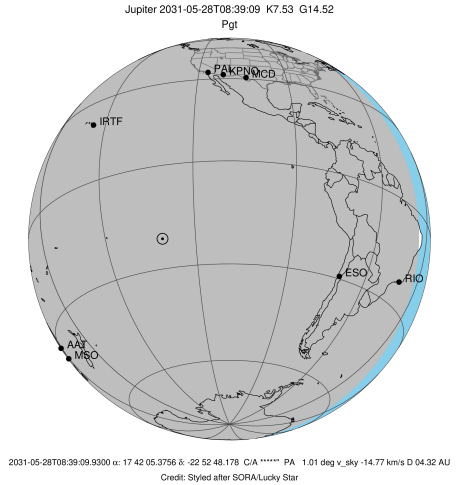


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:53:05.916	19.54	-35.52	71486.5	-50.03	-53.62
Jupiter	E	2031-05-28T09:35:37.439	37.29	-47.49	71486.7	-48.94	-52.56

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:32:29.500
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       : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 7.525
G magnitude           : 14.518
RP magnitude          : 12.941
BP magnitude          : 18.100
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)   : 121.92
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 ("): 18.881
C/A sky separation (km): 59162.1
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
    
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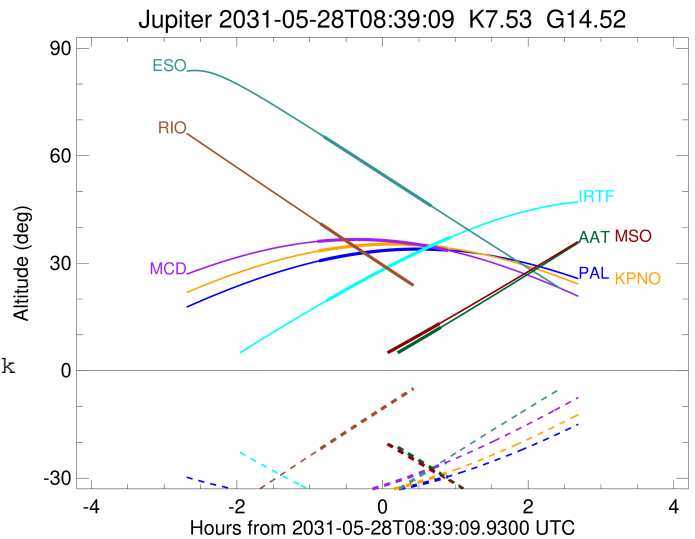
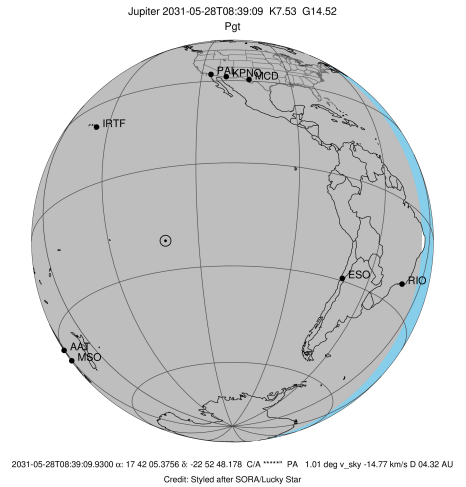


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:47:54.731	41.05	-21.82	71485.7	-55.31	-58.67
Jupiter	E	2031-05-28T09:17:17.268	21.00	-2.31x	71485.6	-56.28	-59.58

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:34:53.840
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      : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 7.525
G magnitude          : 14.518
RP magnitude         : 12.941
BP magnitude         : 18.100
DUPflag             : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)  : 122.31
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 ("): 18.841
C/A sky separation (km): 59038.1
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
    
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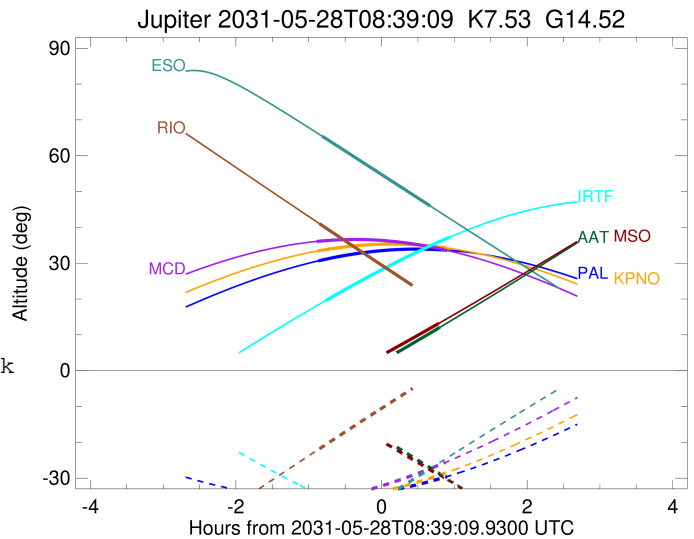
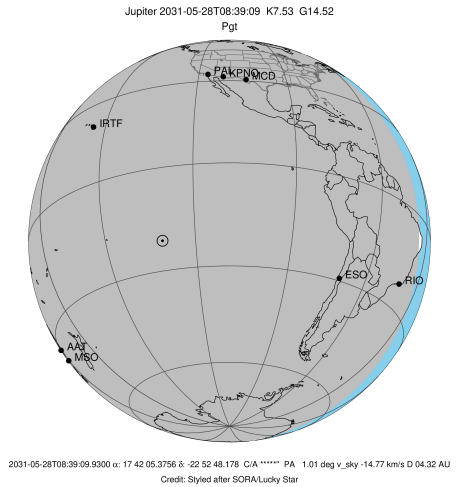


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:50:29.745	65.39	-46.59	71485.7	-55.37	-58.72
Jupiter	E	2031-05-28T09:19:25.730	45.95	-27.30	71485.6	-55.91	-59.23

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:45:53.640
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      : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 7.525
G magnitude          : 14.518
RP magnitude         : 12.941
BP magnitude         : 18.100
DUPflag             : 0
Distance (au)       : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)  : 122.40
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 (") : 19.601
C/A sky separation (km) : 61417.8
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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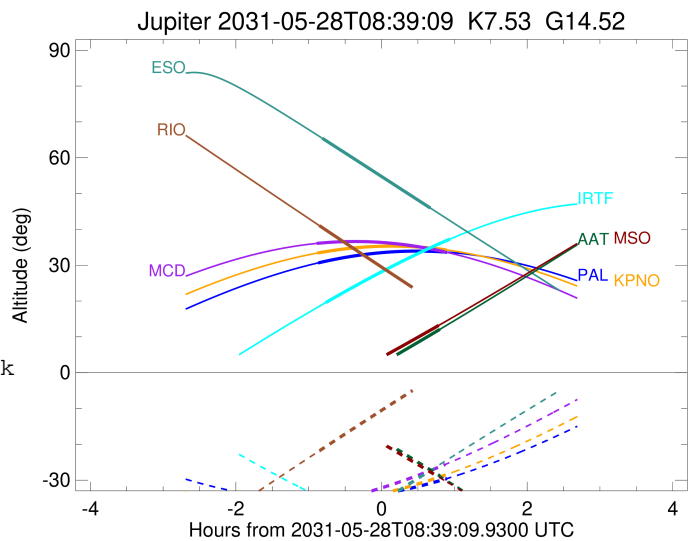
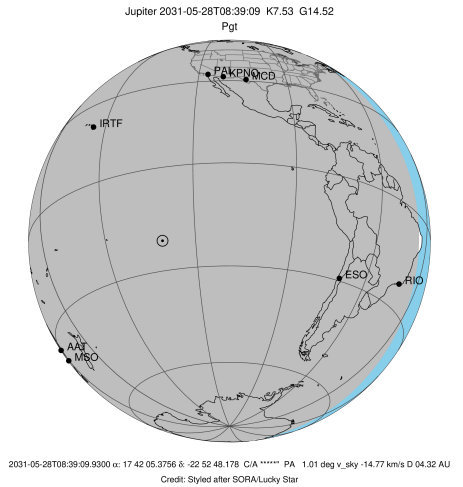


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T08:04:18.122	-4.08x	-11.56	71485.1	-59.78	-62.86
Jupiter	E	2031-05-28T09:27:15.872	12.09	-28.81	71485.3	-58.45	-61.62


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:45:34.980
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       : 4116925684619289088
2Mass ID (if available) : 17420537-2252481
ICRS Star Coord at Epoch: 17h 42m 05.37565s -22:52:48.17825s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 7.525
G magnitude           : 14.518
RP magnitude         : 12.941
BP magnitude         : 18.100
DUPflag              : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.77
Sun-Target sep (deg) : 160.54
Sun-Moon sep (deg)   : 122.40
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 (") : 19.706
C/A sky separation (km) : 61747.5
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	2031-05-28T08:04:38.389	-2.05x	-12.81	71485.0	-60.27	-63.31
Jupiter	E	2031-05-28T09:26:19.249	13.19	-29.12	71485.2	-59.00	-62.13