

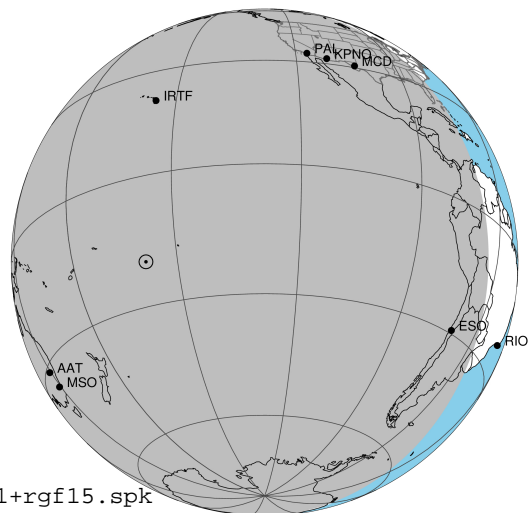
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-20T10:29:32.900
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068854349064610176
 2Mass ID (if available) : 17454458-2253040

Jupiter 2031-05-20T10:29:32 K9.81 G14.65 Pgt

ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s

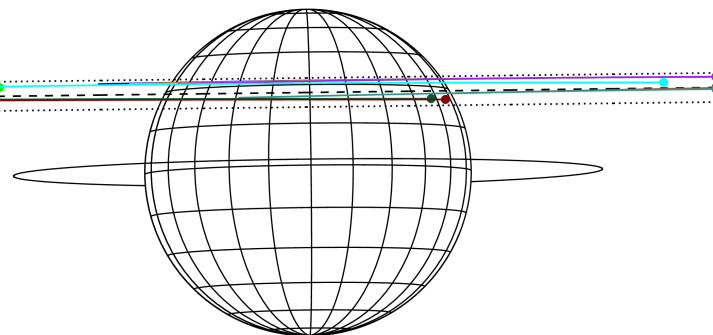
RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.815
 G magnitude : 14.649
 RP magnitude : 13.425
 BP magnitude : 16.300
 DUPflag : 0
 Distance (au) : 4.374
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -13.02
 Sun-Target sep (deg) : 152.08
 Sun-Moon sep (deg) : 142.31
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.70
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 11.046
 C/A sky separation (km) : 35041.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-20T10:29:32 K9.81 G14.65
 Pgt



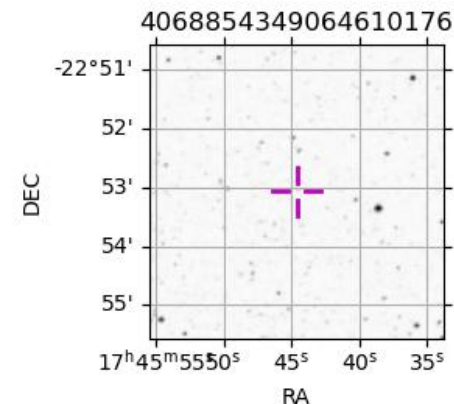
2031-05-20T10:29:32.9000 a: 17 45 44.5797 s: -22 53 04.196 C/A ***** PA 180.71 deg v_sky -13.02 km/s D 04.37 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 RIO
 ESO
 AAT
 MSO



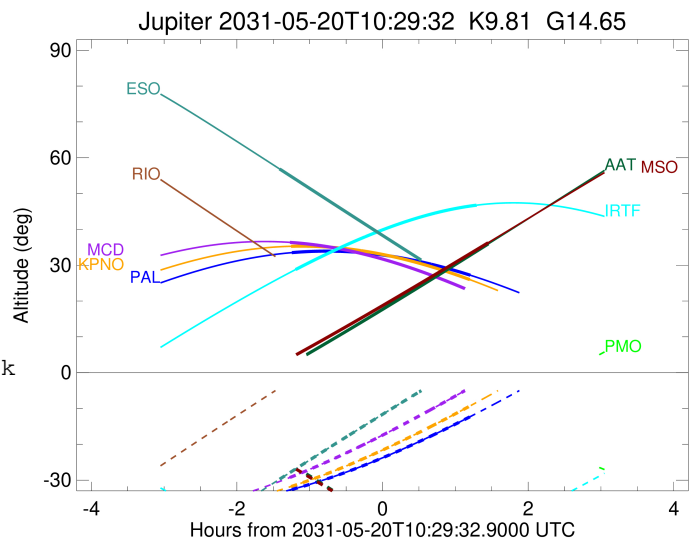
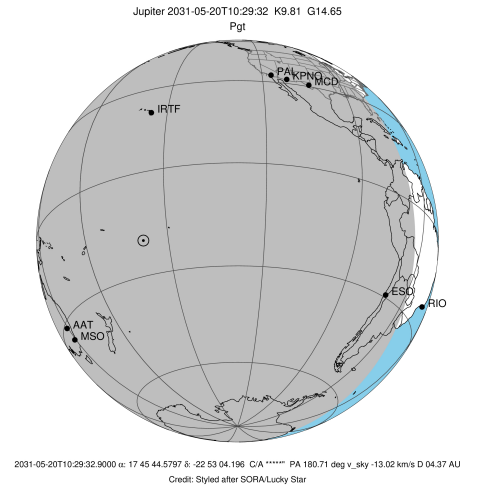
Observable events with sun below -5 deg and altitude above 5 deg

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 20 09:14 - MAY 20 11:41	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 20 09:14 - MAY 20 11:41	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 20 09:13 - MAY 20 09:13	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 20 09:18 - MAY 20 11:47	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 20 09:04 - MAY 20 09:04	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+	MAY 20 11:56 - MAY 20 11:56	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAY 20 11:56 - MAY 20 11:56	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-20T10:28:22.890
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        : 4068854349064610176
2Mass ID (if available) : 17454458-2253040
ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s
RUWE (>1.4 is poor) : 0.96
K magnitude           : 9.815
G magnitude           : 14.649
RP magnitude          : 13.425
BP magnitude          : 16.300
DUPflag              : 0
Distance (au)         : 4.374
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.02
Sun-Target sep (deg)  : 152.08
Sun-Moon sep (deg)    : 142.73
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.70
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 12.704
C/A sky separation (km) : 40299.4
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
    
```

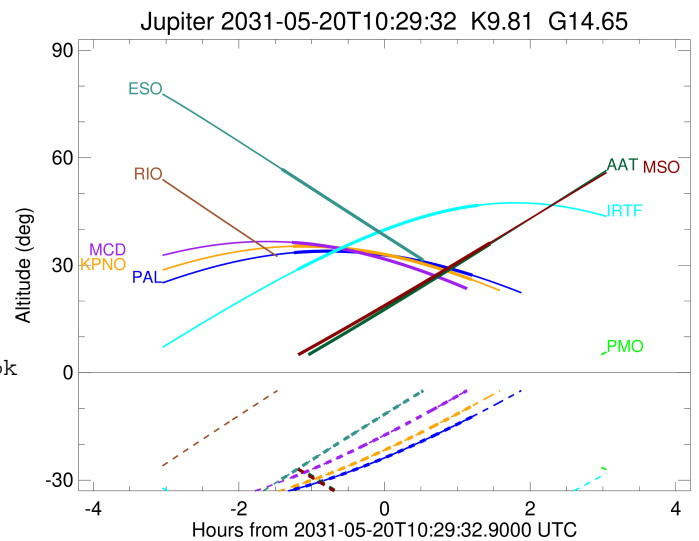
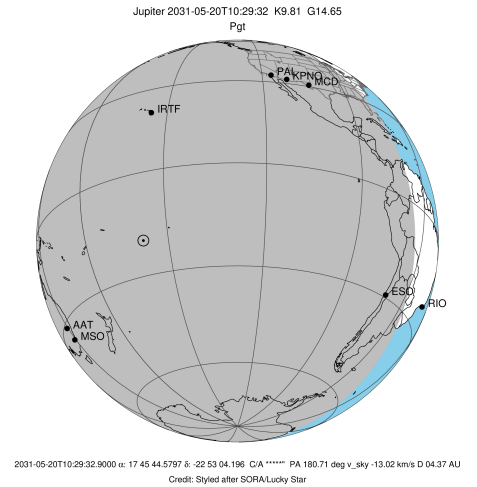


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-20T09:14:52.042	33.50	-32.59	71489.1	34.29	37.86
Jupiter	E	2031-05-20T11:41:57.427	27.20	-12.25	71489.1	34.05	37.62

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-20T10:27:48.610
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        : 4068854349064610176
2Mass ID (if available) : 17454458-2253040
ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s
RUWE (>1.4 is poor) : 0.96
K magnitude           : 9.815
G magnitude           : 14.649
RP magnitude          : 13.425
BP magnitude          : 16.300
DUPflag              : 0
Distance (au)         : 4.374
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.02
Sun-Target sep (deg) : 152.08
Sun-Moon sep (deg)   : 142.79
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.70
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 12.663
C/A sky separation (km) : 40171.4
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
    
```

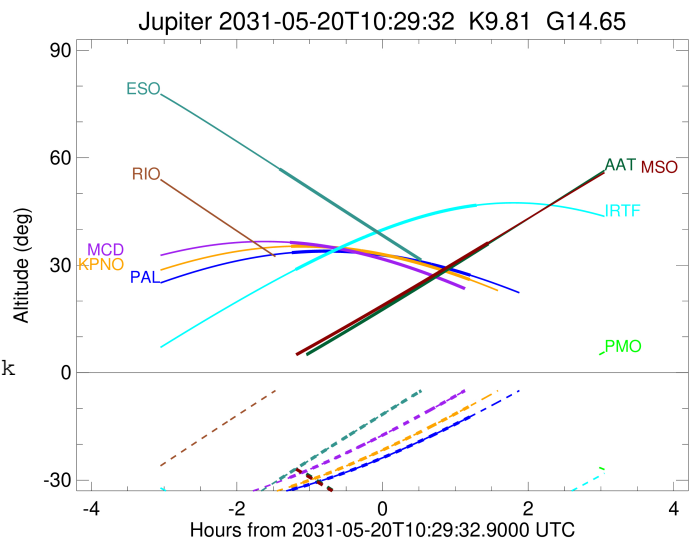
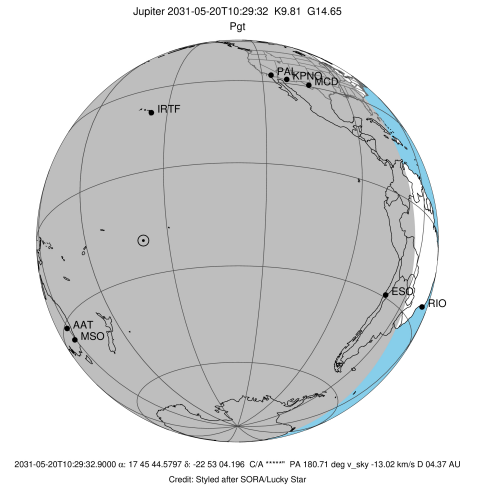


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-20T09:14:12.329	35.27	-31.78	71489.1	34.22	37.79
Jupiter	E	2031-05-20T11:41:32.226	25.97	-9.32	71489.1	33.87	37.43

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-20T10:27:00.350
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       : 4068854349064610176
2Mass ID (if available) : 17454458-2253040
ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s
RUWE (>1.4 is poor) : 0.96
K magnitude           : 9.815
G magnitude           : 14.649
RP magnitude          : 13.425
BP magnitude          : 16.300
DUPflag              : 0
Distance (au)        : 4.374
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.02
Sun-Target sep (deg) : 152.08
Sun-Moon sep (deg)   : 142.86
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.70
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 12.609
C/A sky separation (km) : 39998.7
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
    
```

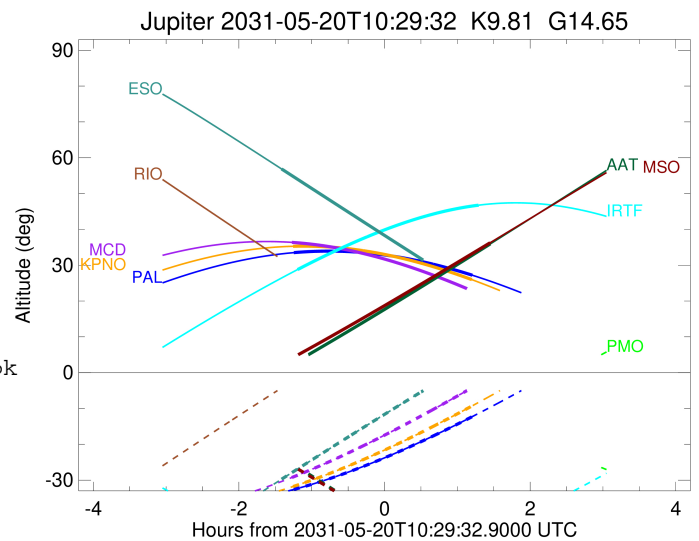
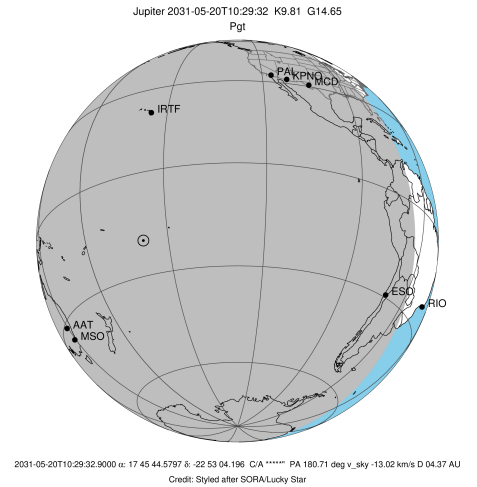


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-20T09:13:14.053	36.37	-29.26	71489.1	34.14	37.71
Jupiter	E	2031-05-20T11:40:59.179	22.95	-4.33x	71489.1	33.62	37.17

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-20T10:32:42.460
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      : 4068854349064610176
2Mass ID (if available) : 17454458-2253040
ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s
RUWE (>1.4 is poor) : 0.96
K magnitude          : 9.815
G magnitude          : 14.649
RP magnitude         : 13.425
BP magnitude         : 16.300
DUPflag             : 0
Distance (au)       : 4.374
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.02
Sun-Target sep (deg) : 152.08
Sun-Moon sep (deg)  : 142.36
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.70
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 12.324
C/A sky separation (km) : 39094.1
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
    
```

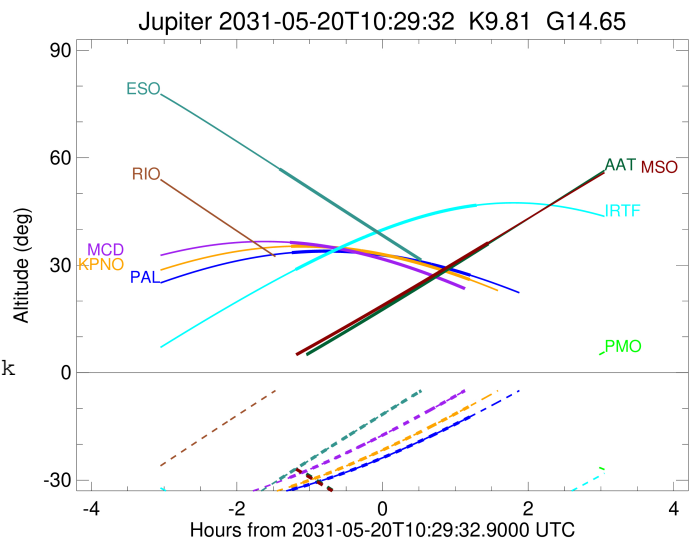
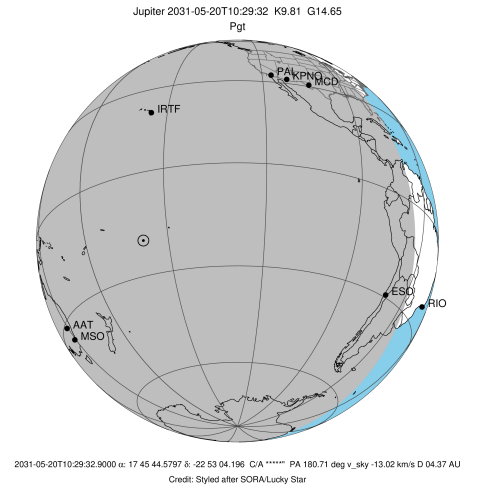


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-20T09:18:00.921	28.79	-47.66	71489.3	32.68	36.19
Jupiter	E	2031-05-20T11:46:59.527	46.74	-44.77	71489.2	33.33	36.86

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-20T10:24:01.140
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        : 4068854349064610176
2Mass ID (if available) : 17454458-2253040
ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s
RUWE (>1.4 is poor) : 0.96
K magnitude           : 9.815
G magnitude           : 14.649
RP magnitude          : 13.425
BP magnitude          : 16.300
DUPflag              : 0
Distance (au)         : 4.374
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.02
Sun-Target sep (deg)  : 152.08
Sun-Moon sep (deg)   : 143.19
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.70
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 10.539
C/A sky separation (km) : 33432.7
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
    
```

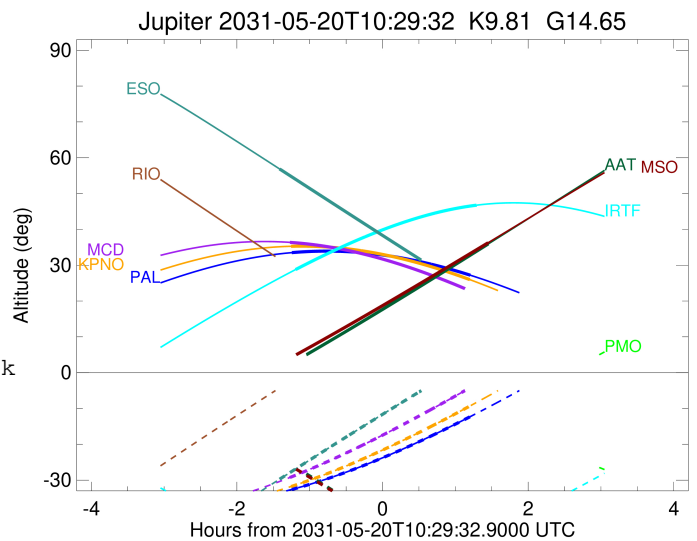
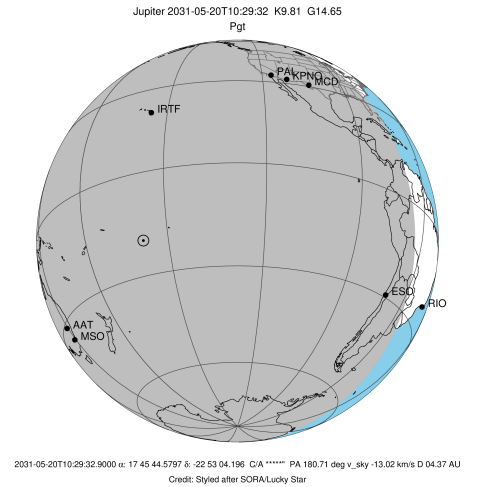


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-20T09:04:44.965	56.86	-29.73	71489.9	28.34	31.61
Jupiter	E	2031-05-20T11:43:53.547	22.34	3.52x	71490.1	27.22	30.42

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-20T10:35:55.770
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      : 4068854349064610176
2Mass ID (if available) : 17454458-2253040
ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s
RUWE (>1.4 is poor) : 0.96
K magnitude          : 9.815
G magnitude          : 14.649
RP magnitude         : 13.425
BP magnitude         : 16.300
DUPflag             : 0
Distance (au)       : 4.374
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.02
Sun-Target sep (deg) : 152.08
Sun-Moon sep (deg)  : 141.86
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.70
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 10.181
C/A sky separation (km) : 32295.2
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
    
```

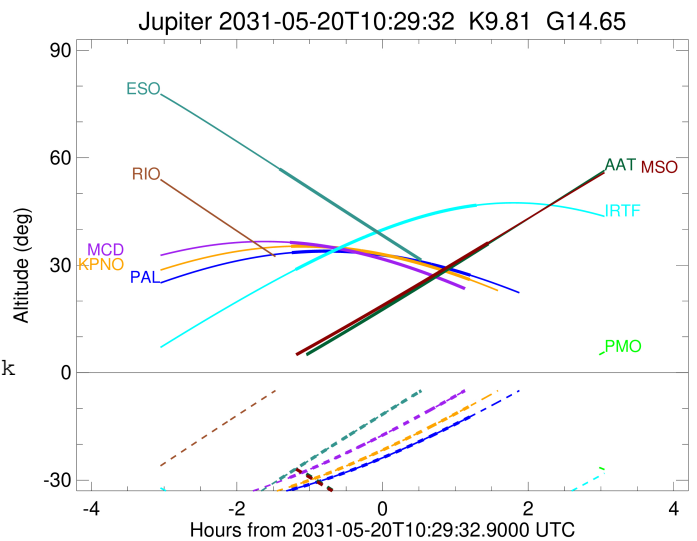
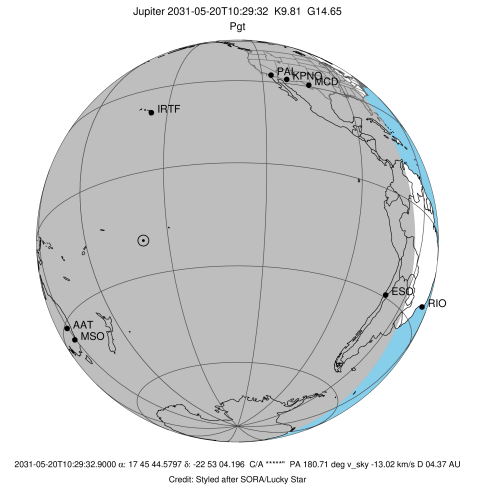


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-20T09:14:12.431	2.54x	-25.57	71490.2	26.16	29.27
Jupiter	E	2031-05-20T11:56:43.867	35.94	-60.13	71490.0	27.45	30.66

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-20T10:35:38.580
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      : 4068854349064610176
2Mass ID (if available) : 17454458-2253040
ICRS Star Coord at Epoch: 17h 45m 44.57971s -22:53:04.19560s
RUWE (>1.4 is poor) : 0.96
K magnitude          : 9.815
G magnitude          : 14.649
RP magnitude         : 13.425
BP magnitude         : 16.300
DUPflag             : 0
Distance (au)       : 4.374
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.02
Sun-Target sep (deg) : 152.08
Sun-Moon sep (deg)  : 141.90
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.70
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 10.066
C/A sky separation (km) : 31932.5
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	2031-05-20T09:13:40.965	4.12x	-25.97	71490.2	25.86	28.96
Jupiter	E	2031-05-20T11:56:42.849	36.29	-58.86	71490.1	27.10	30.28