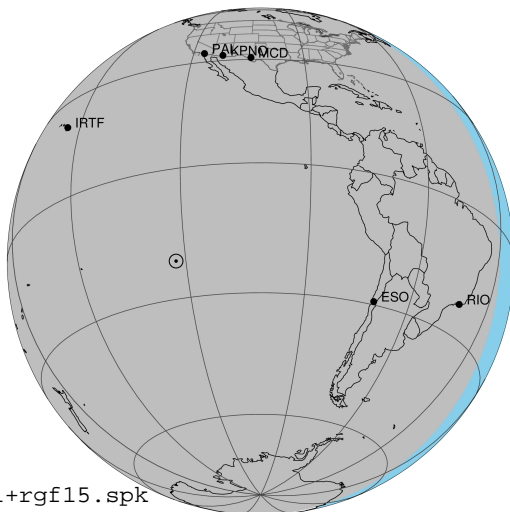


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-28T08:07:13.080
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116925787646728064
 2Mass ID (if available) : 17420607-2252208

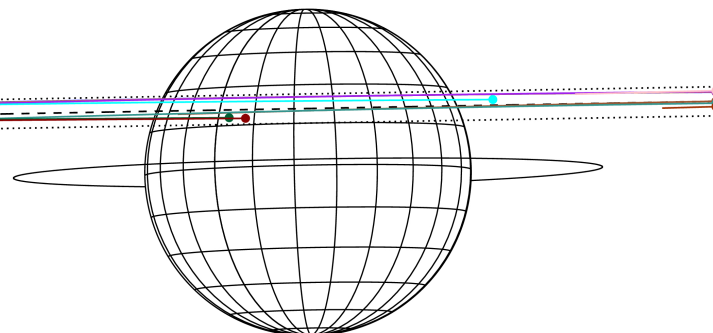
Jupiter 2031-05-28T08:07:13 K8.98 G14.93 Pgt

ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 8.984
 G magnitude : 14.932
 RP magnitude : 13.453
 BP magnitude : 17.952
 DUPflag : 0
 Distance (au) : 4.321
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -14.76
 Sun-Target sep (deg) : 160.51
 Sun-Moon sep (deg) : 122.21
 B (ring opening deg) : -2.61
 PA of pole (deg) : 1.09
 Pole direction: RA (deg): 268.05693
 Dec (deg): 64.49651
 C/A sky separation (") : 8.944
 C/A sky separation (km) : 28026.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.spk
 naif0012.tls
 nep097.bsp
 nep101.bsp
 sat4401.bsp



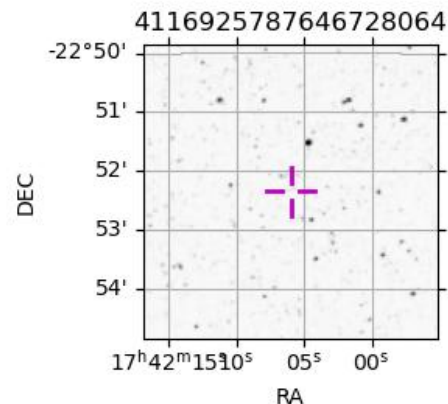
2031-05-28T08:07:13.0800 at: 17 42 06.0643 s: -22 52 20.907 C/A 8.932° PA 181.02 deg v_sky -14.76 km/s D 04.32 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO



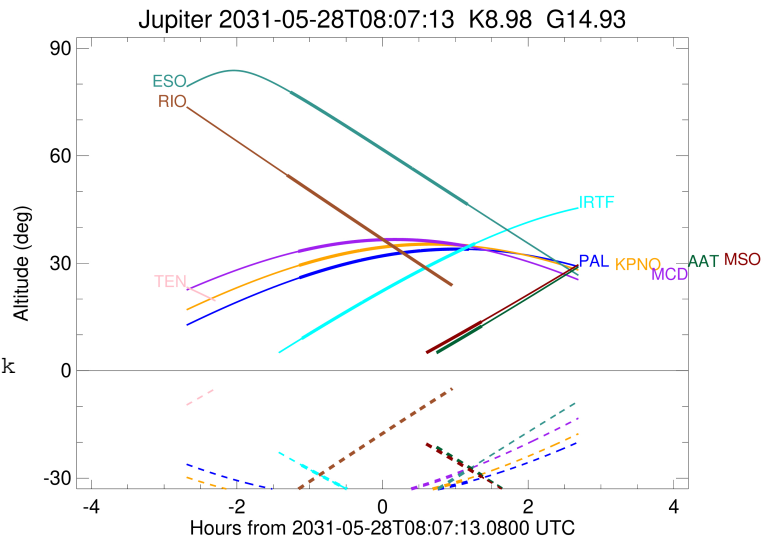
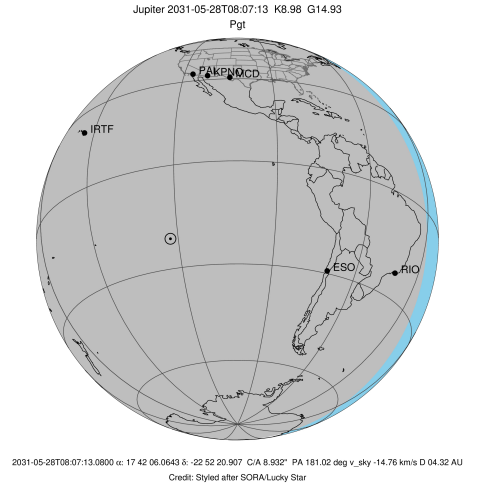
Observable events with sun below -5 deg and altitude above 5 deg

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 28 06:58 - MAY 28 09:18	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 28 06:58 - MAY 28 09:17	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	MAY 28 06:57 - MAY 28 09:17	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 28 07:00 - MAY 28 09:23	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	MAY 28 06:48 - MAY 28 06:48	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 28 06:51 - MAY 28 09:17	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	MAY 28 09:28 - MAY 28 09:28	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAY 28 09:28 - MAY 28 09:28	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:08:45.040
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      : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude         : 8.984
G magnitude         : 14.932
RP magnitude        : 13.453
BP magnitude        : 17.952
DUPflag            : 0
Distance (au)       : 4.320
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg) : 160.51
Sun-Moon sep (deg)  : 122.69
B (ring opening deg) : -2.61
PA of pole (deg)    : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 10.602
C/A sky separation (km) : 33223.0
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
    
```

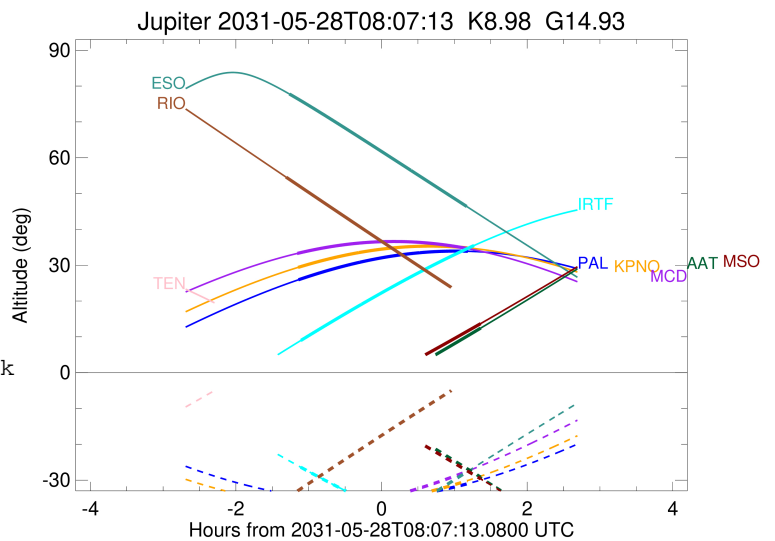
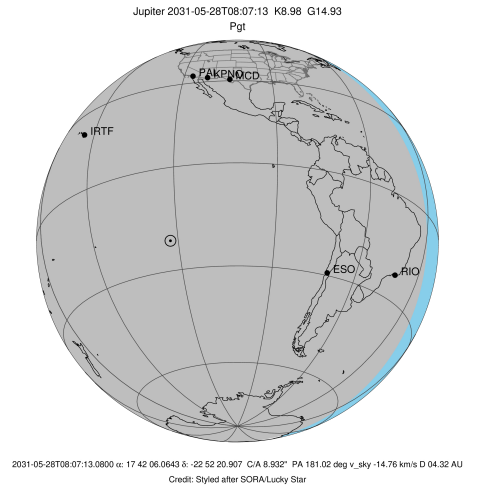


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T06:58:53.791	25.94	-34.30	71490.0	27.34	30.54
Jupiter	E	2031-05-28T09:18:25.663	33.88	-30.97	71490.0	27.82	31.05

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:08:16.190
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        : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude           : 8.984
G magnitude           : 14.932
RP magnitude          : 13.453
BP magnitude          : 17.952
DUPflag              : 0
Distance (au)         : 4.321
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg)  : 160.51
Sun-Moon sep (deg)   : 122.68
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (" ) : 10.589
C/A sky separation (km) : 33182.0
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
    
```

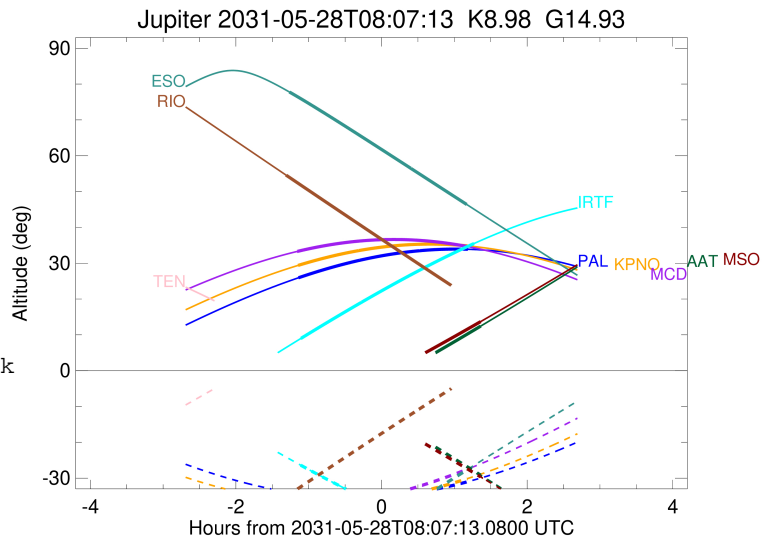
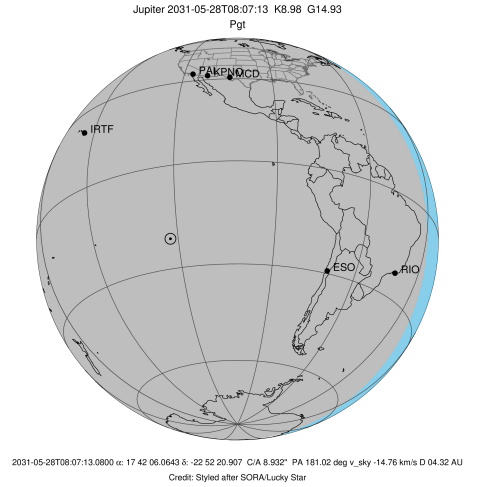


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T06:58:28.486	29.38	-36.43	71490.0	27.35	30.55
Jupiter	E	2031-05-28T09:17:55.998	34.84	-30.14	71490.0	27.73	30.96

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:07:32.200
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       : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude           : 8.984
G magnitude           : 14.932
RP magnitude          : 13.453
BP magnitude          : 17.952
DUPflag              : 0
Distance (au)        : 4.321
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg) : 160.51
Sun-Moon sep (deg)   : 122.65
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 10.575
C/A sky separation (km) : 33137.2
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
    
```

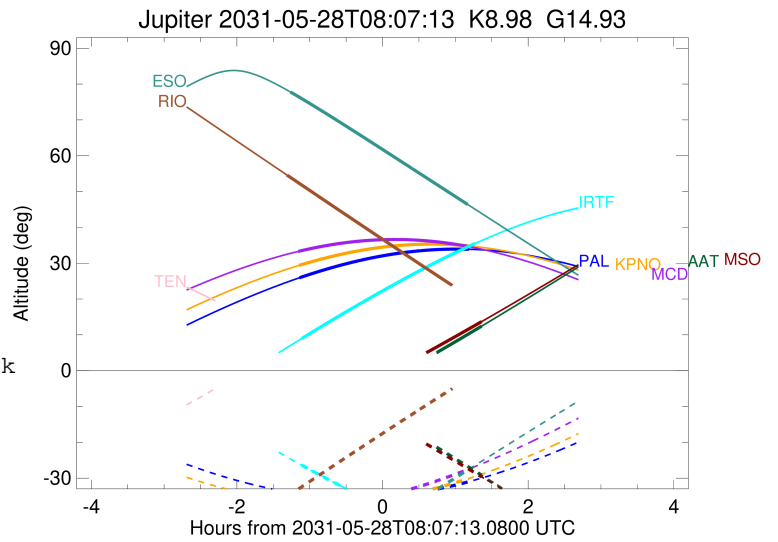
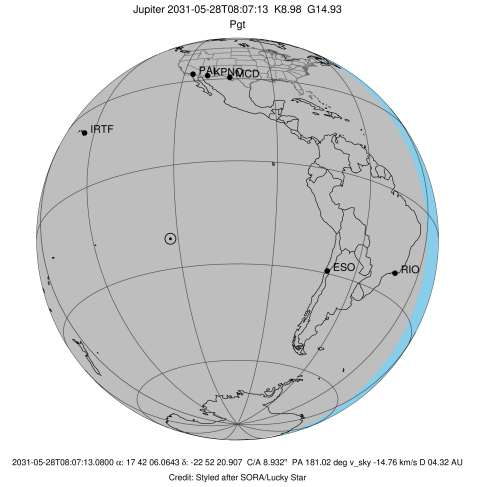


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T06:57:47.917	33.28	-38.05	71490.0	27.37	30.58
Jupiter	E	2031-05-28T09:17:12.697	34.70	-27.61	71490.0	27.61	30.83

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:12:20.310
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        : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude           : 8.984
G magnitude           : 14.932
RP magnitude          : 13.453
BP magnitude          : 17.952
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg)  : 160.51
Sun-Moon sep (deg)    : 122.85
B (ring opening deg) : -2.61
PA of pole (deg)      : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (" ) : 10.006
C/A sky separation (km) : 31355.2
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
    
```

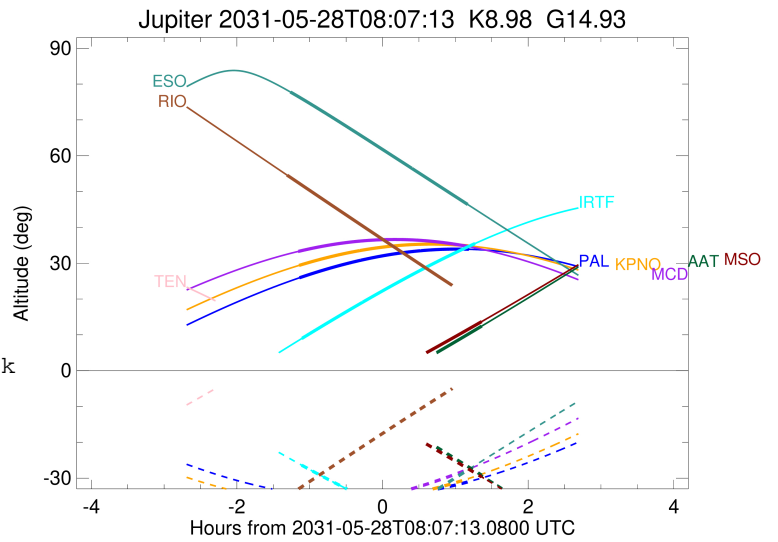
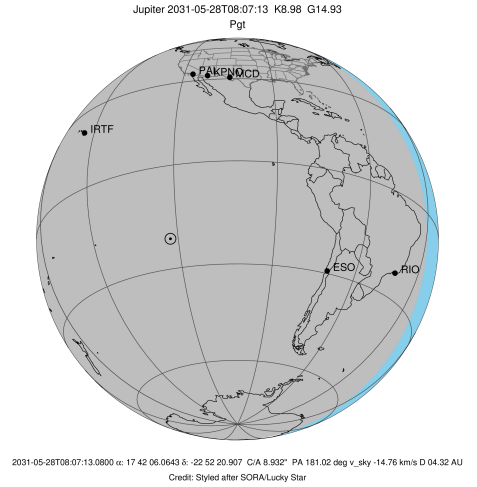


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T07:00:45.636	8.99	-26.41	71490.3	25.33	28.38
Jupiter	E	2031-05-28T09:23:22.442	35.47	-46.64	71490.1	26.52	29.66

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:01:55.110
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       : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude          : 8.984
G magnitude          : 14.932
RP magnitude         : 13.453
BP magnitude         : 17.952
DUPflag             : 0
Distance (au)        : 4.321
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg) : 160.51
Sun-Moon sep (deg)   : 122.29
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 8.640
C/A sky separation (km) : 27073.9
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
    
```

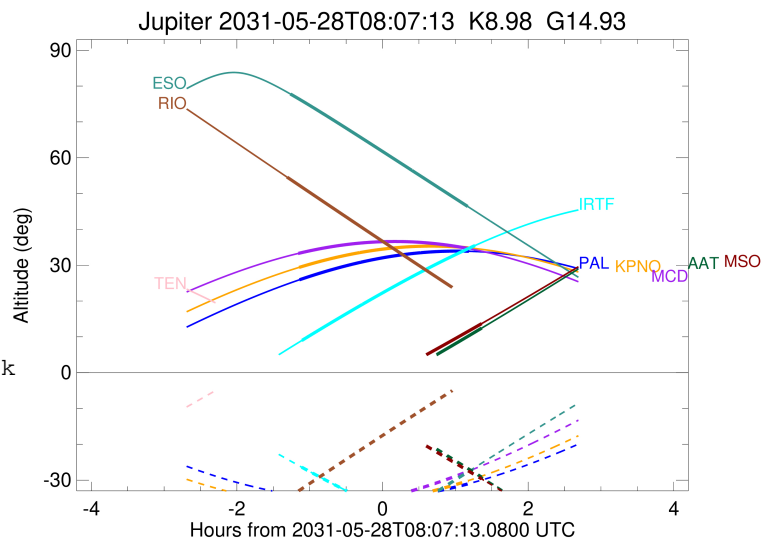
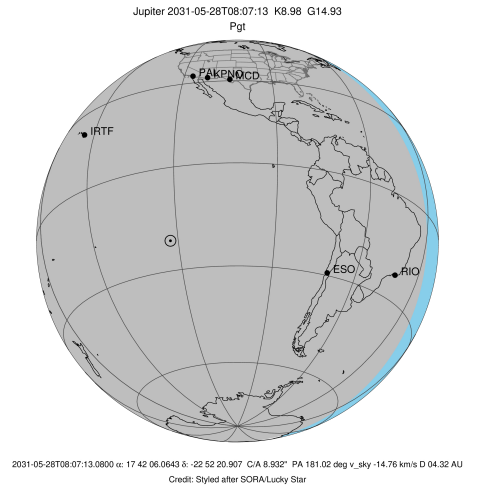


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T06:48:36.205	54.57	-35.14	71490.6	22.61	25.43
Jupiter	E	2031-05-28T09:15:44.555	21.34	-2.64x	71490.7	21.73	24.47

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T08:04:12.480
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      : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude         : 8.984
G magnitude         : 14.932
RP magnitude        : 13.453
BP magnitude        : 17.952
DUPflag            : 0
Distance (au)       : 4.321
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg) : 160.51
Sun-Moon sep (deg)  : 122.67
B (ring opening deg) : -2.61
PA of pole (deg)    : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 8.644
C/A sky separation (km) : 27086.6
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
    
```

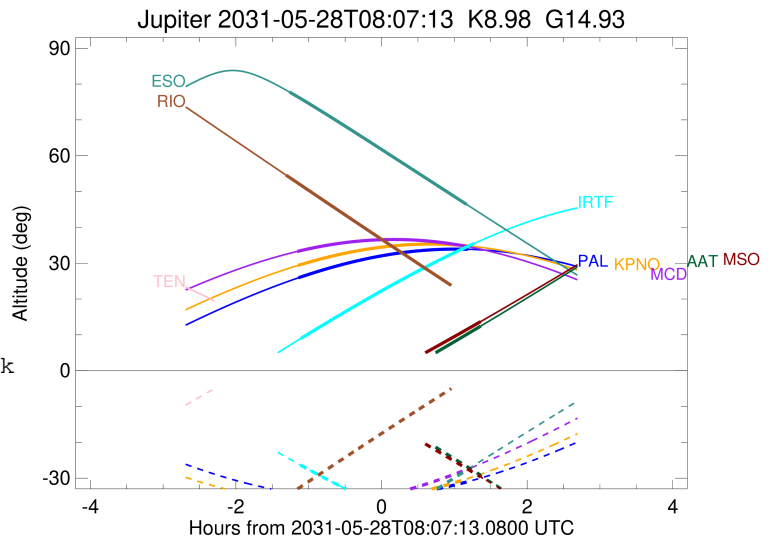
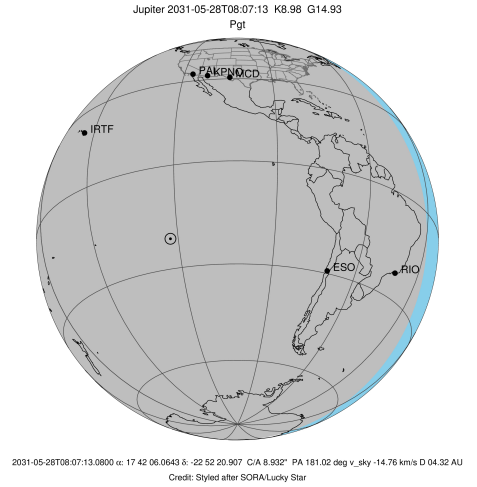


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T06:51:19.408	77.78	-59.49	71490.7	22.36	25.16
Jupiter	E	2031-05-28T09:17:21.263	46.40	-27.75	71490.7	21.95	24.72


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:12:44.510
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       : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude           : 8.984
G magnitude           : 14.932
RP magnitude          : 13.453
BP magnitude          : 17.952
DUPflag              : 0
Distance (au)        : 4.320
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg) : 160.51
Sun-Moon sep (deg)   : 122.57
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation ("): 7.742
C/A sky separation (km): 24261.2
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
    
```

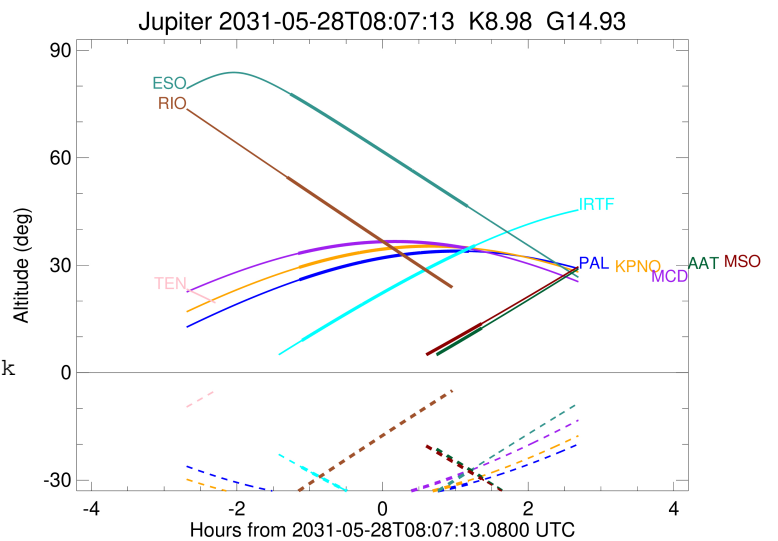
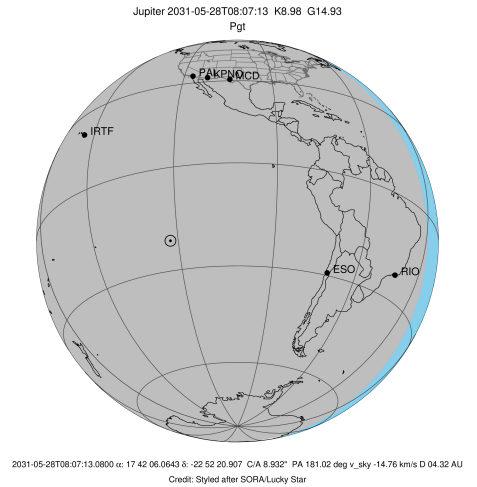


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T06:55:51.855	-16.11x	1.98x	71491.0	19.22	21.71
Jupiter	E	2031-05-28T09:28:55.711	12.43	-29.16	71490.9	20.48	23.10


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T08:12:29.050
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        : 4116925787646728064
2Mass ID (if available) : 17420607-2252208
ICRS Star Coord at Epoch: 17h 42m 06.06433s -22:52:20.90661s
RUWE (>1.4 is poor) : 0.97
K magnitude           : 8.984
G magnitude           : 14.932
RP magnitude          : 13.453
BP magnitude          : 17.952
DUPflag              : 0
Distance (au)         : 4.320
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.76
Sun-Target sep (deg)  : 160.51
Sun-Moon sep (deg)   : 122.58
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.09
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 7.642
C/A sky separation (km) : 23945.1
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	2031-05-28T06:55:30.953	-13.57x	0.28x	71491.0	18.97	21.44
Jupiter	E	2031-05-28T09:28:47.367	13.67	-29.62	71490.9	20.18	22.77