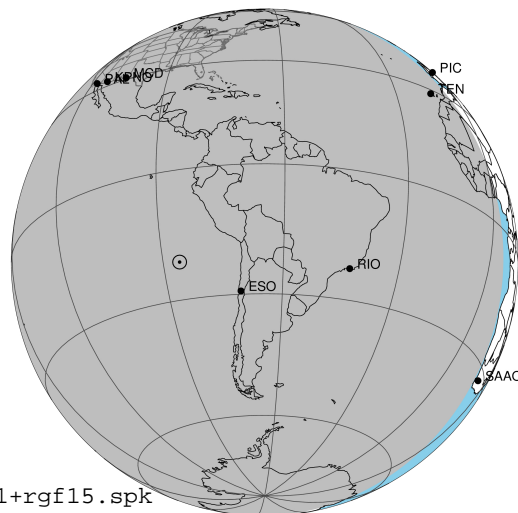


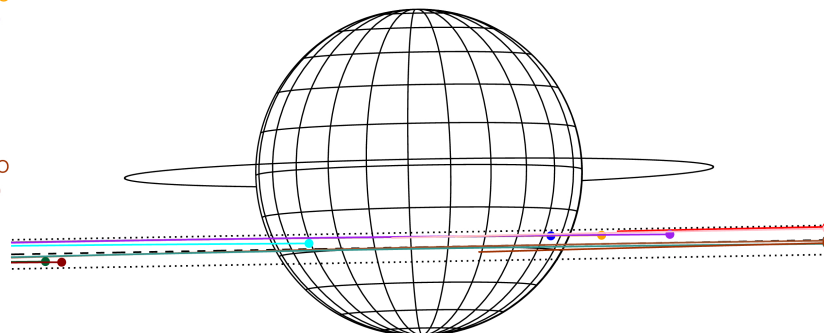
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-28T05:40:07.340
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116925714578936832
 2Mass ID (if available) : 17420905-2252408

Jupiter 2031-05-28T05:40:07 K8.98 G14.09 Pgt

ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 8.982
 G magnitude : 14.089
 RP magnitude : 12.771
 BP magnitude : 16.056
 DUPflag : 0
 Distance (au) : 4.321
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -14.75
 Sun-Target sep (deg) : 160.41
 Sun-Moon sep (deg) : 123.45
 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 (") : 10.436
 C/A sky separation (km) : 32705.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



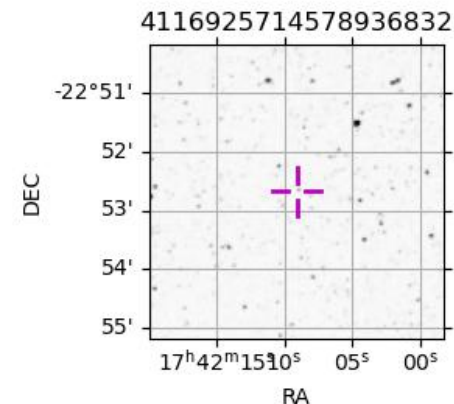
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO



2031-05-28T05:40:07.3400 α: 17 42 09.0459 δ: -22 52 41.019 C/A ***** PA 1.01 deg v_sky -14.75 km/s D 04.32 AU
 Credit: Styled after SORA/Lucky Star

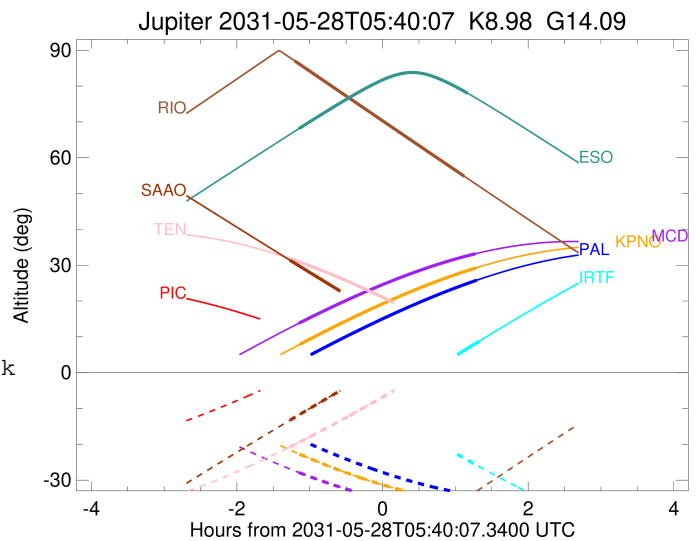
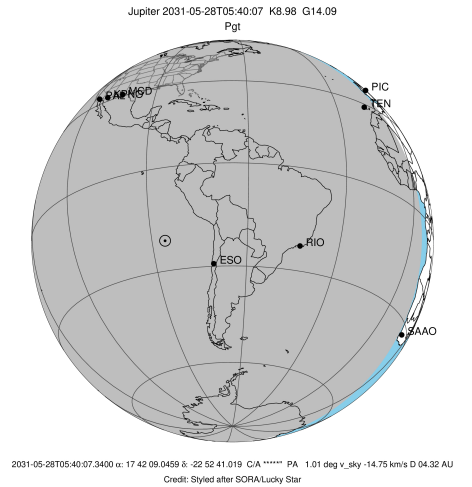
Observable events with sun below -5 deg and altitude above 5 deg

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 06:57	- MAY 28 06:57	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8				Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 28 04:31	- MAY 28 06:57	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 28 04:31	- MAY 28 06:56	Pie
TEN	Teide Obs./Tenerife	28.3	343.5	+	MAY 28 04:22	- MAY 28 04:22	Pin
IRTF	Mauna Kea/IRTF	19.8	204.5	+	MAY 28 06:59	- MAY 28 06:59	Pne
KAV	Kavalur Observatory	12.6	78.8				Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	MAY 28 04:27	- MAY 28 06:47	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	MAY 28 04:31	- MAY 28 06:50	Pie
AAT	Siding Spring (AAT)	-31.3	149.1				Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	MAY 28 04:23	- MAY 28 04:23	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0				Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T05:45:08.340
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        : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor)  : 1.00
K magnitude           : 8.982
G magnitude           : 14.089
RP magnitude          : 12.771
BP magnitude          : 16.056
DUPflag              : 0
Distance (au)         : 4.321
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg)  : 160.41
Sun-Moon sep (deg)    : 123.95
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 (") : 9.013
C/A sky separation (km) : 28247.4
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
    
```

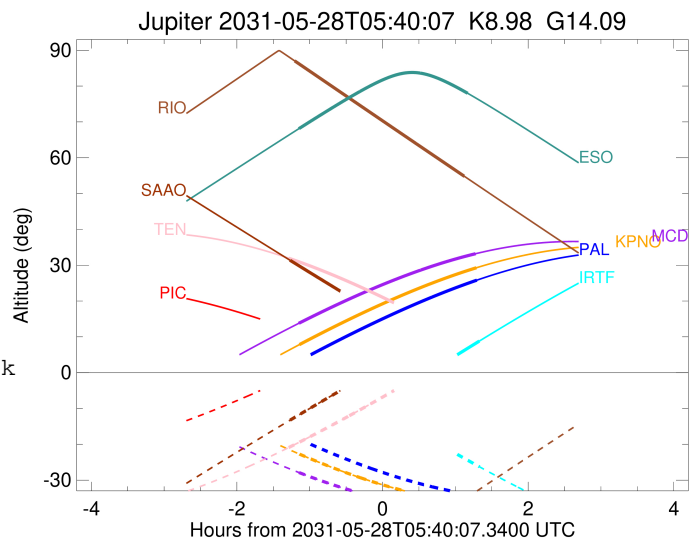
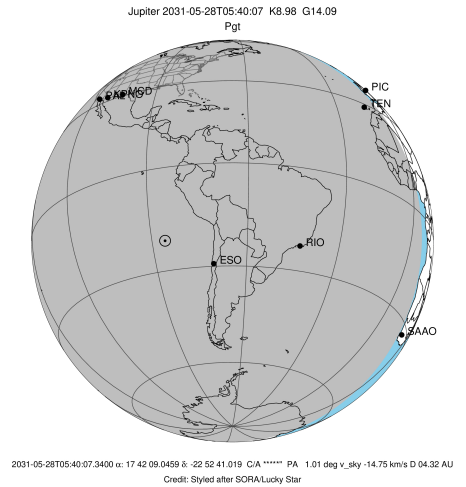


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T04:31:52.203	3.36x	-18.62	71490.5	-23.84	-26.77
Jupiter	E	2031-05-28T06:57:53.477	25.82	-34.25	71490.6	-22.78	-25.61

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T05:44:49.780
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        : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 8.982
G magnitude           : 14.089
RP magnitude          : 12.771
BP magnitude          : 16.056
DUPflag              : 0
Distance (au)         : 4.321
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg)  : 160.41
Sun-Moon sep (deg)    : 123.98
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 (") : 8.998
C/A sky separation (km) : 28200.1
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
    
```

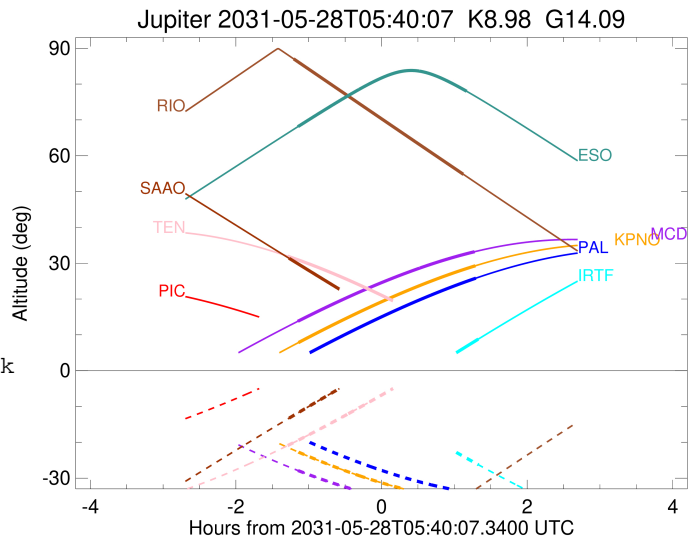
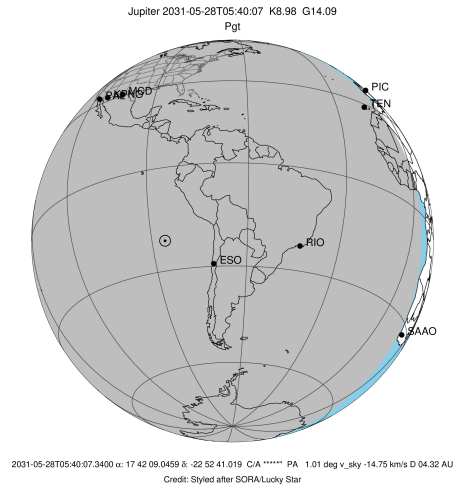


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T04:31:42.284	7.84	-22.73	71490.5	-23.77	-26.70
Jupiter	E	2031-05-28T06:57:28.232	29.28	-36.40	71490.6	-22.77	-25.61

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T05:44:15.930
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       : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 8.982
G magnitude           : 14.089
RP magnitude          : 12.771
BP magnitude          : 16.056
DUPflag              : 0
Distance (au)         : 4.321
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg) : 160.41
Sun-Moon sep (deg)   : 124.01
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 ("): 8.966
C/A sky separation (km): 28099.9
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
    
```

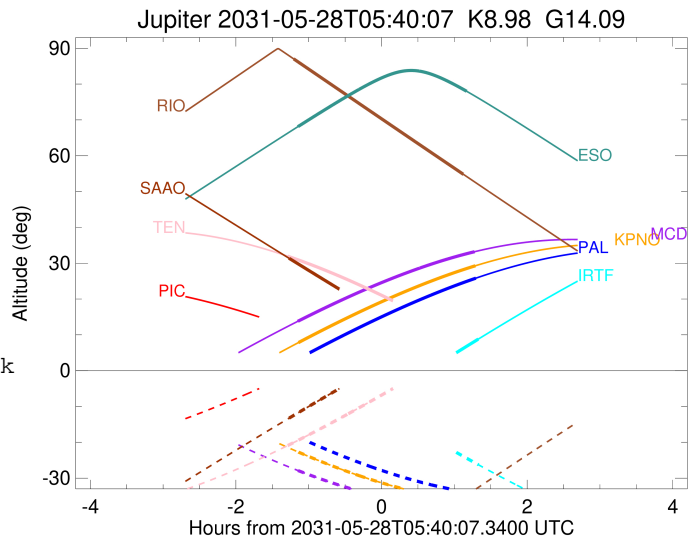
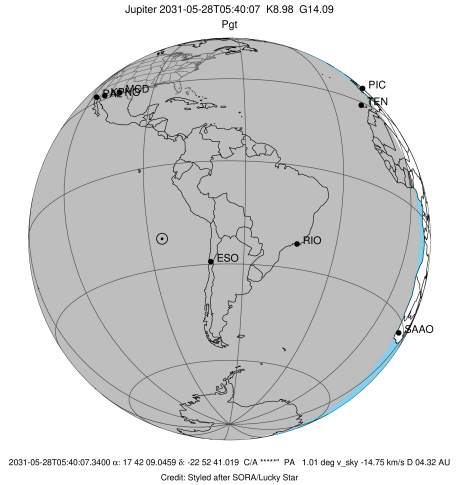


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T04:31:18.617	13.81	-27.88	71490.5	-23.65	-26.56
Jupiter	E	2031-05-28T06:56:47.584	33.20	-38.05	71490.6	-22.74	-25.57

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T05:35:18.710
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : TEN
Location            : Teide Obs./Tenerife
Latitude (deg)      : 28.30050
E. Longitude (deg)  : 343.48909
Altitude (km)       : 2.395
Gaia source ID      : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 8.982
G magnitude          : 14.089
RP magnitude         : 12.771
BP magnitude         : 16.056
DUPflag             : 0
Distance (au)       : 4.321
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg) : 160.41
Sun-Moon sep (deg)  : 123.37
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 (") : 9.057
C/A sky separation (km) : 28384.2
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
    
```

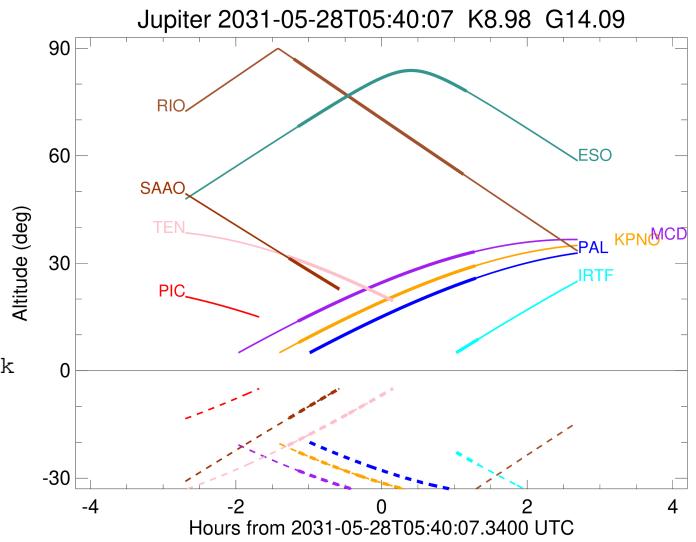
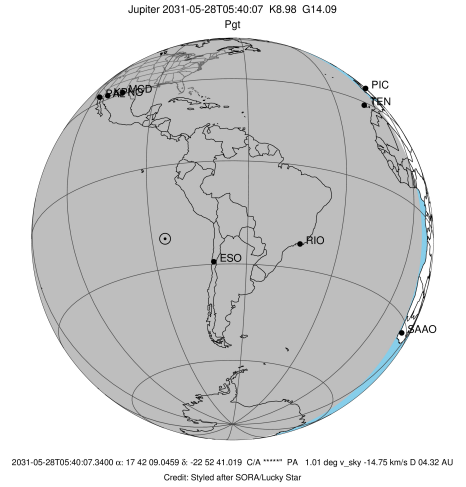


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T04:22:45.877	31.95	-20.91	71490.6	-23.09	-25.96
Jupiter	E	2031-05-28T06:48:16.797	9.06	6.82x	71490.5	-23.78	-26.71

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T05:47:20.630
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      : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 8.982
G magnitude          : 14.089
RP magnitude         : 12.771
BP magnitude         : 16.056
DUPflag             : 0
Distance (au)       : 4.321
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg) : 160.41
Sun-Moon sep (deg)  : 123.80
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 ("): 9.820
C/A sky separation (km) : 30773.8
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
    
```

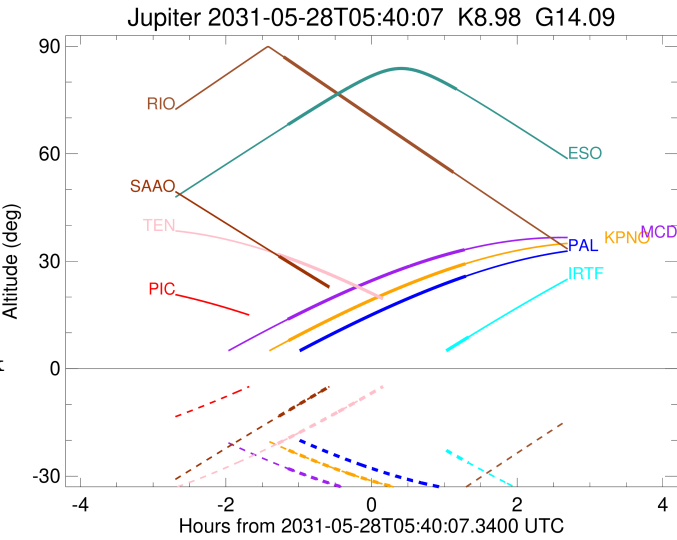
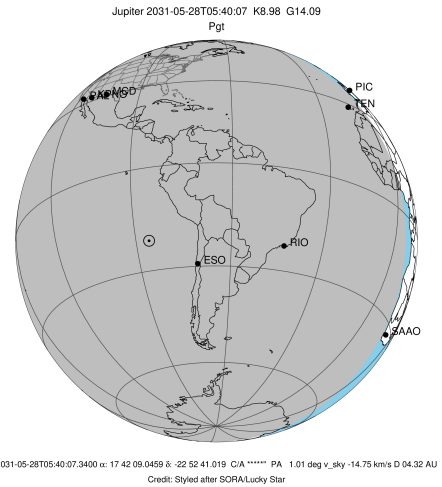


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T04:34:04.145	-23.02x	3.79x	71490.2	-26.20	-29.31
Jupiter	E	2031-05-28T06:59:52.753	8.80	-26.24	71490.4	-24.75	-27.75

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T05:37:38.150
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       : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 8.982
G magnitude          : 14.089
RP magnitude         : 12.771
BP magnitude         : 16.056
DUPflag             : 0
Distance (au)        : 4.321
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg) : 160.41
Sun-Moon sep (deg)   : 123.99
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 (") : 10.469
C/A sky separation (km) : 32809.6
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
    
```

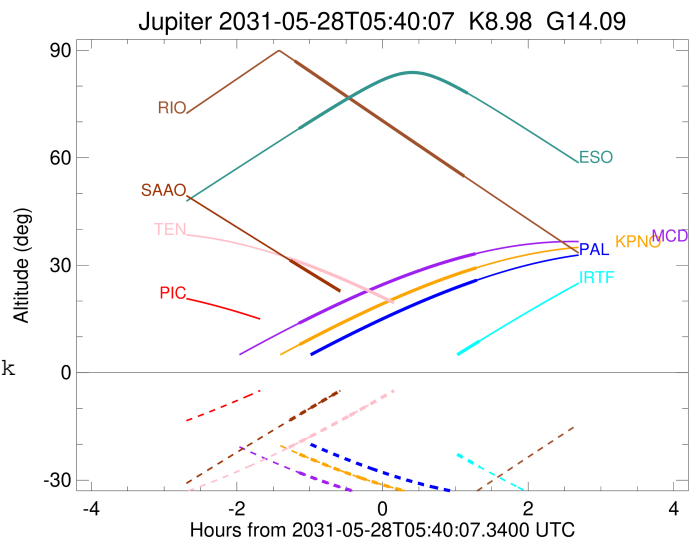
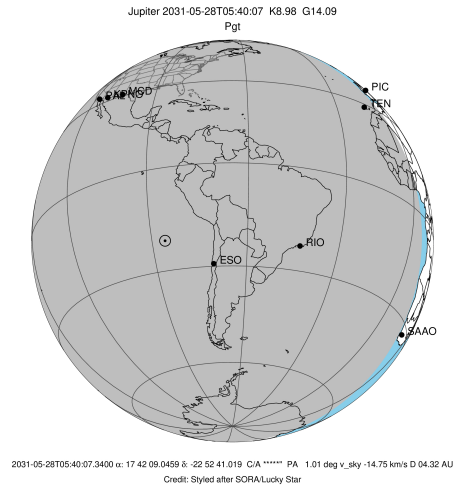


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T04:27:51.838	87.00	-67.35	71490.0	-27.26	-30.45
Jupiter	E	2031-05-28T06:47:34.972	54.81	-35.37	71490.0	-27.50	-30.72

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-28T05:40:49.210
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      : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 8.982
G magnitude          : 14.089
RP magnitude         : 12.771
BP magnitude         : 16.056
DUPflag             : 0
Distance (au)       : 4.321
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg) : 160.41
Sun-Moon sep (deg)  : 124.25
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 (") : 10.662
C/A sky separation (km) : 33414.8
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
    
```

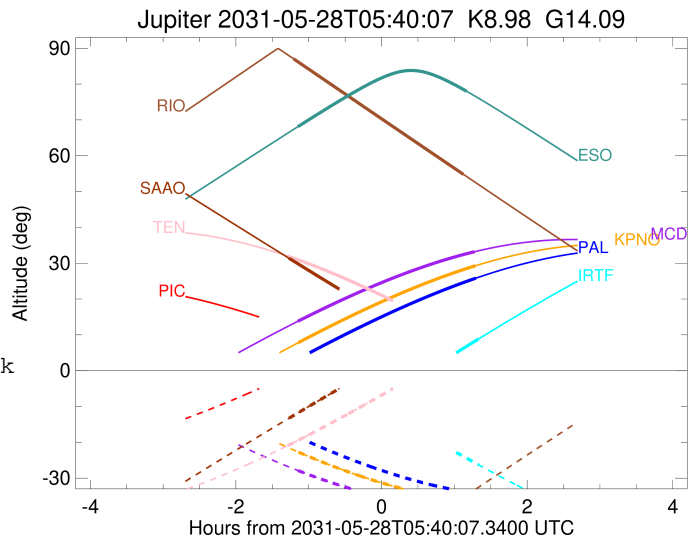
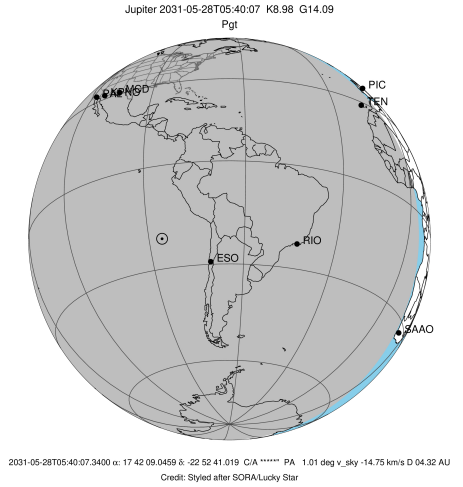


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-28T04:31:16.239	68.11	-82.07	71489.9	-28.08	-31.34
Jupiter	E	2031-05-28T06:50:16.226	77.98	-59.72	71490.0	-27.77	-31.00


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-28T05:33:36.300
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : SAAO
Location              : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)        : -32.37953
E. Longitude (deg)    : 20.81070
Altitude (km)         : 1.768
Gaia source ID        : 4116925714578936832
2Mass ID (if available) : 17420905-2252408
ICRS Star Coord at Epoch: 17h 42m 09.04589s -22:52:41.01899s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 8.982
G magnitude           : 14.089
RP magnitude          : 12.771
BP magnitude          : 16.056
DUPflag              : 0
Distance (au)         : 4.321
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -14.75
Sun-Target sep (deg) : 160.41
Sun-Moon sep (deg)   : 123.25
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 (") : 11.338
C/A sky separation (km) : 35532.5
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	2031-05-28T04:23:58.498	31.36	-13.25	71489.8	-29.28	-32.61
Jupiter	E	2031-05-28T06:43:46.158	3.07x	13.16x	71489.6	-30.29	-33.67