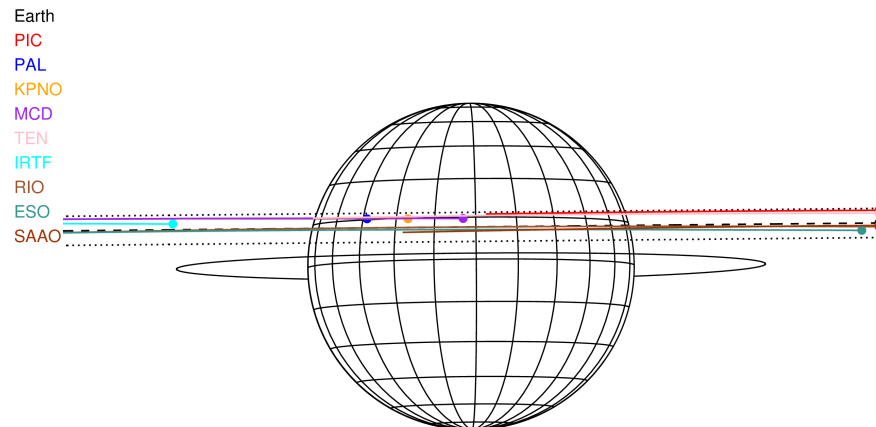


target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-05-16T04:22:51.990  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4068932929748903296  
 2Mass ID (if available) : 17472853-2253256

Jupiter 2031-05-16T04:22:51 K7.67 G12.84 Pgt

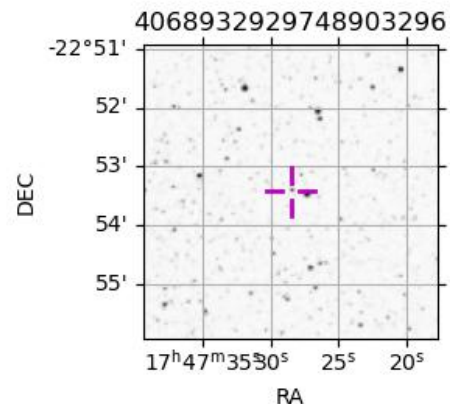
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s  
 RUWE (>1.4 is poor) : 0.75  
 K magnitude : 7.669  
 G magnitude : 12.837  
 RP magnitude : 11.499  
 BP magnitude : 14.938  
 DUPflag : 0  
 Distance (au) : 4.409  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -11.85  
 Sun-Target sep (deg) : 147.58  
 Sun-Moon sep (deg) : 87.67  
 B (ring opening deg) : -2.61  
 PA of pole (deg) : 0.51  
 Pole direction: RA (deg): 268.05694  
 Dec (deg): 64.49651  
 C/A sky separation (") : 5.422  
 C/A sky separation (km) : 17340.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk



2031-05-16T04:22:51.9900 at: 17 47 28.54111 s: -22 53 25.598 C/A 5.410" PA 180.56 deg v\_sky -11.85 km/s D 04.41 AU  
 Credit: Styled after SORA/Lucky Star

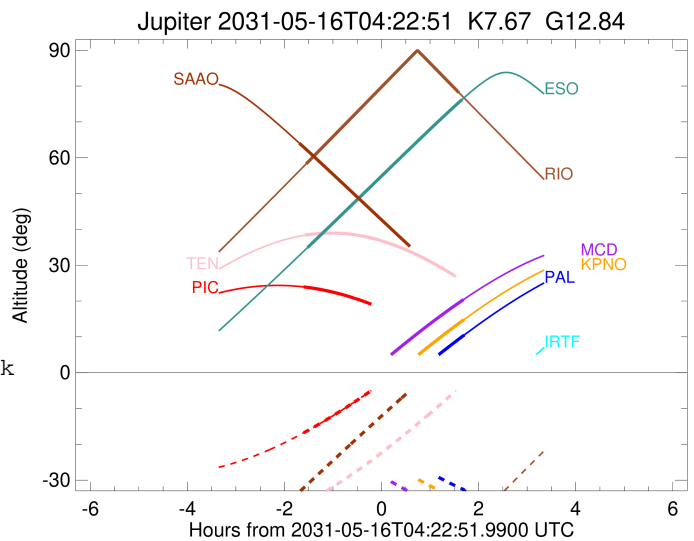
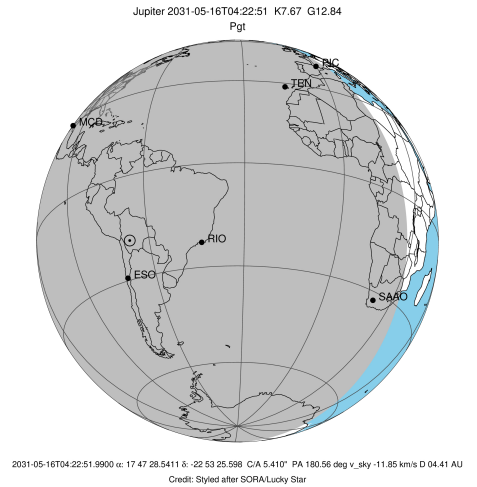
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	MAY 16 02:46 - MAY 16 02:46	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	MAY 16 06:05 - MAY 16 06:05	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 16 06:04 - MAY 16 06:04	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 16 06:04 - MAY 16 06:04	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	MAY 16 02:48 - MAY 16 05:53	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	MAY 16 02:49 - MAY 16 05:58	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	MAY 16 02:51 - MAY 16 06:02	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	MAY 16 02:41 - MAY 16 02:41	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-16T04:19:39.860
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : PIC
Location              : Pic du Midi
Latitude (deg)        : 42.93656
E. Longitude (deg)    : 0.14231
Altitude (km)         : 2.890
Gaia source ID        : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude           : 7.669
G magnitude           : 12.837
RP magnitude          : 11.499
BP magnitude          : 14.938
DUPflag              : 0
Distance (au)         : 4.409
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg)  : 147.58
Sun-Moon sep (deg)   : 87.95
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 7.159
C/A sky separation (km) : 22893.3
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
    
```

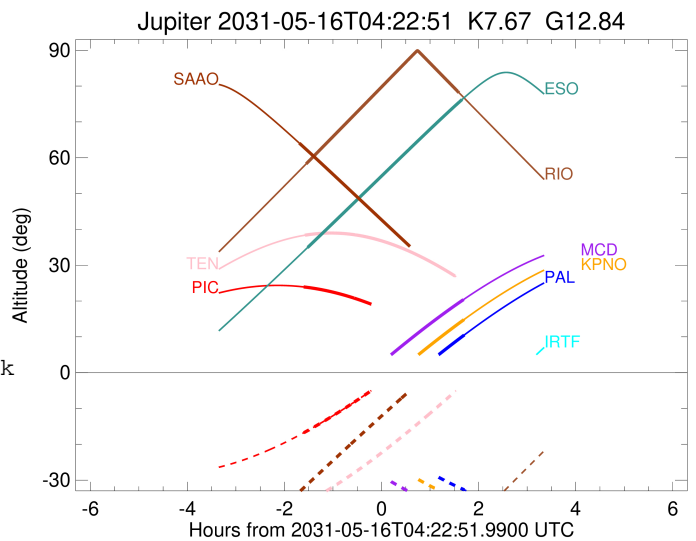
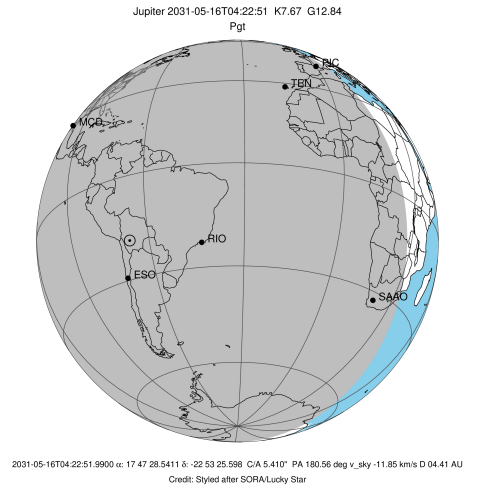


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-16T02:46:45.110	23.93	-16.78	71491.0	18.90	21.36
Jupiter	E	2031-05-16T05:52:58.685	7.22	12.30x	71491.1	18.19	20.58

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-16T04:29:58.530
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        : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude           : 7.669
G magnitude           : 12.837
RP magnitude          : 11.499
BP magnitude          : 14.938
DUPflag              : 0
Distance (au)         : 4.409
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg) : 147.58
Sun-Moon sep (deg)   : 87.57
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 6.496
C/A sky separation (km) : 20773.9
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
    
```

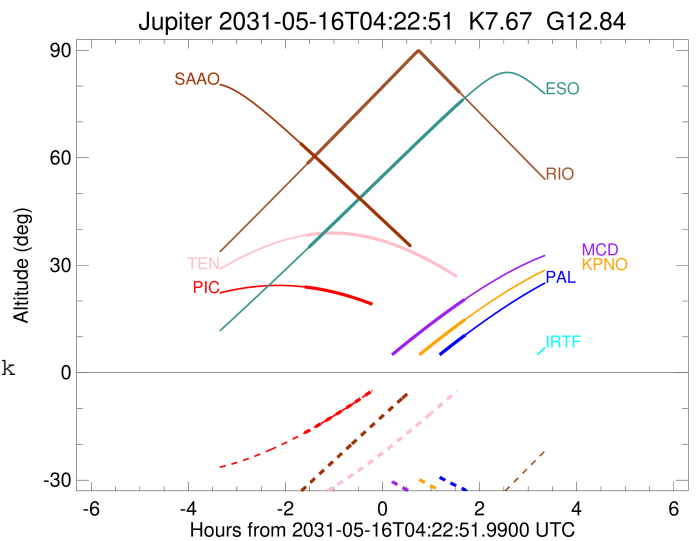
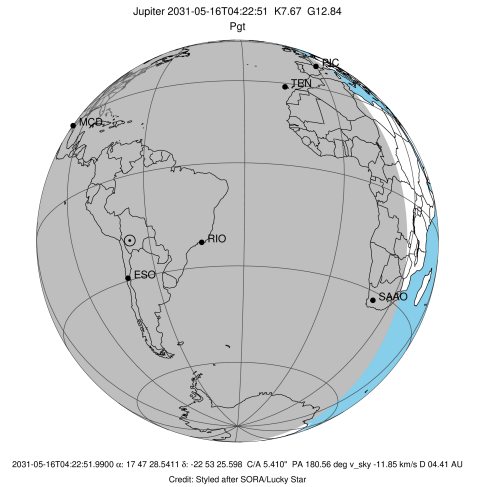


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-16T02:53:23.882	-26.19x	-3.33x	71491.3	16.19	18.36
Jupiter	E	2031-05-16T06:05:08.517	10.51	-32.69	71491.2	17.51	19.83

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-16T04:29:58.520
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      : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude         : 7.669
G magnitude         : 12.837
RP magnitude        : 11.499
BP magnitude        : 14.938
DUPflag            : 0
Distance (au)       : 4.409
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg) : 147.58
Sun-Moon sep (deg)  : 87.65
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 6.519
C/A sky separation (km) : 20849.2
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
    
```

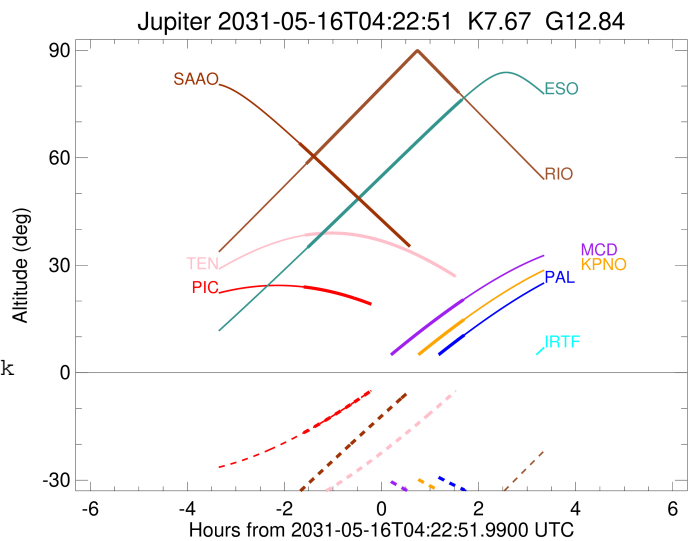
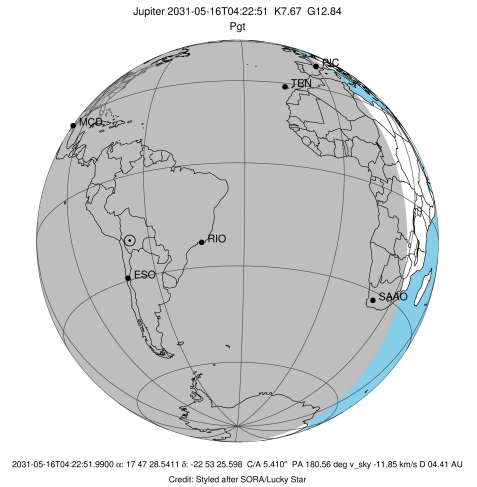


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-16T02:53:42.865	-21.48x	-7.98	71491.3	16.24	18.41
Jupiter	E	2031-05-16T06:04:50.293	14.81	-35.82	71491.2	17.56	19.88

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-16T04:29:48.340
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       : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude           : 7.669
G magnitude           : 12.837
RP magnitude          : 11.499
BP magnitude          : 14.938
DUPflag              : 0
Distance (au)        : 4.409
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg) : 147.58
Sun-Moon sep (deg)   : 87.75
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 6.571
C/A sky separation (km): 21013.2
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
    
```

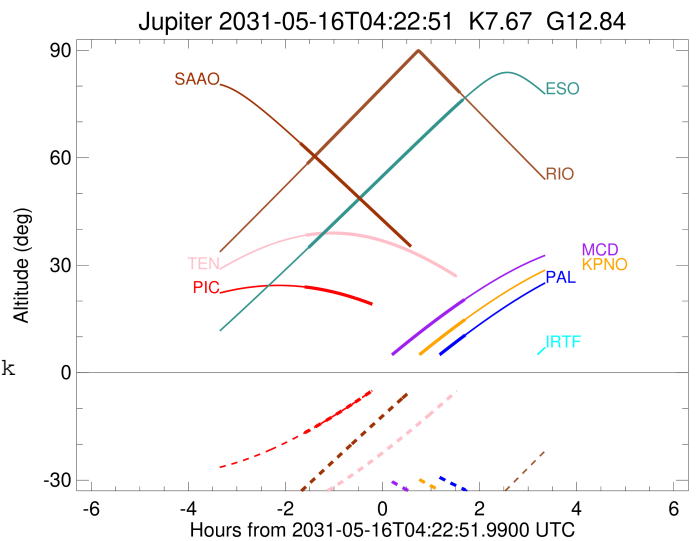
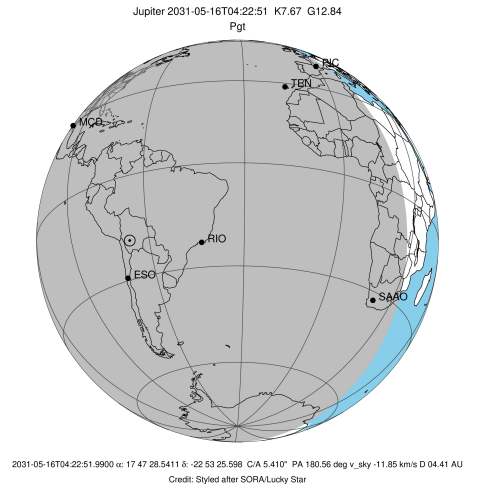


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-16T02:54:01.812	-14.83x	-14.27	71491.3	16.38	18.56
Jupiter	E	2031-05-16T06:04:13.886	20.40	-39.10	71491.1	17.66	19.99

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-16T04:20:57.010
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        : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude           : 7.669
G magnitude           : 12.837
RP magnitude          : 11.499
BP magnitude          : 14.938
DUPflag              : 0
Distance (au)         : 4.409
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg)  : 147.58
Sun-Moon sep (deg)    : 88.24
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 6.951
C/A sky separation (km) : 22231.1
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
    
```

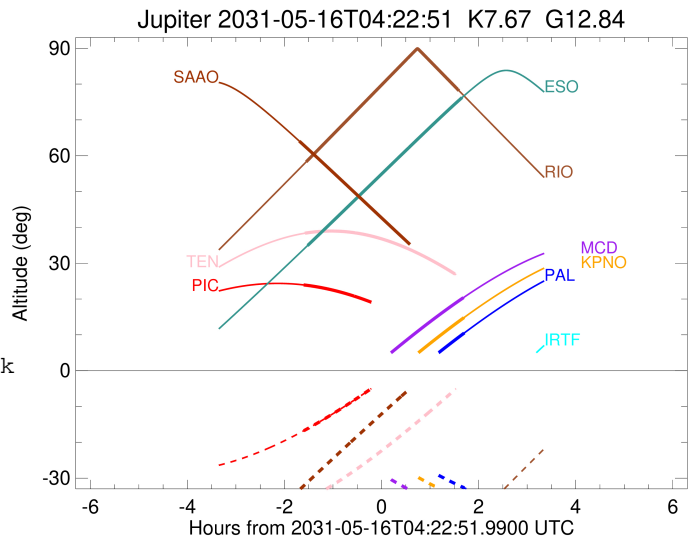
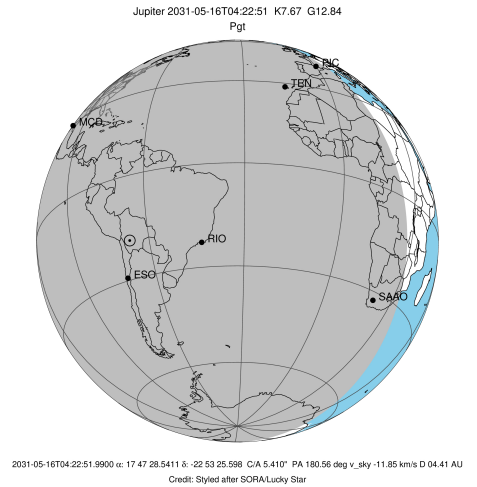


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-16T02:48:23.219	38.37	-36.32	71491.1	18.17	20.56
Jupiter	E	2031-05-16T05:53:41.744	26.97	-5.28	71491.1	17.73	20.07

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-16T04:24:20.770
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       : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude          : 7.669
G magnitude           : 12.837
RP magnitude         : 11.499
BP magnitude         : 14.938
DUPflag             : 0
Distance (au)        : 4.409
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg) : 147.58
Sun-Moon sep (deg)   : 88.62
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 5.412
C/A sky separation (km): 17308.7
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
    
```

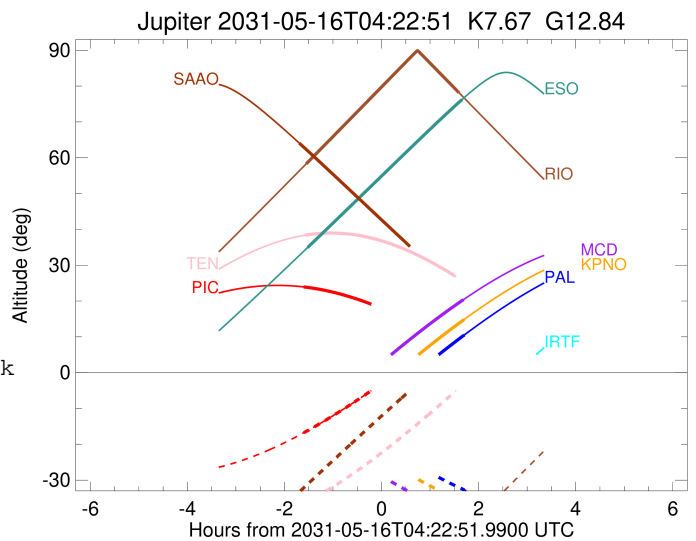
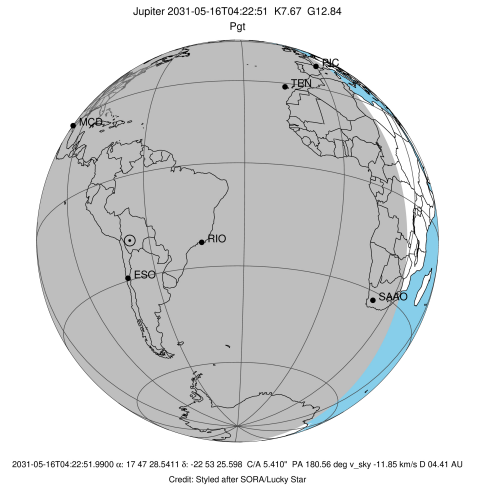


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-16T02:49:45.945	58.28	-86.27	71491.5	13.73	15.60
Jupiter	E	2031-05-16T05:58:32.314	78.17	-45.83	71491.5	13.95	15.85

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-16T04:27:26.680
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        : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude           : 7.669
G magnitude           : 12.837
RP magnitude          : 11.499
BP magnitude          : 14.938
DUPflag              : 0
Distance (au)         : 4.409
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg)  : 147.58
Sun-Moon sep (deg)    : 88.47
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 5.060
C/A sky separation (km) : 16182.6
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
    
```



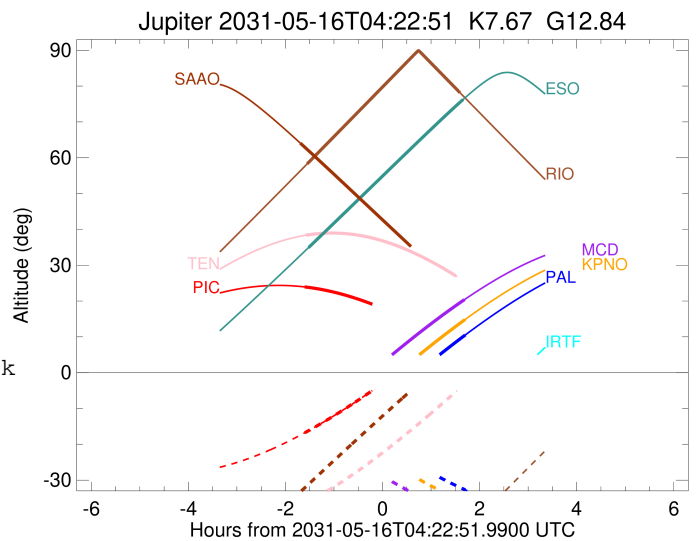
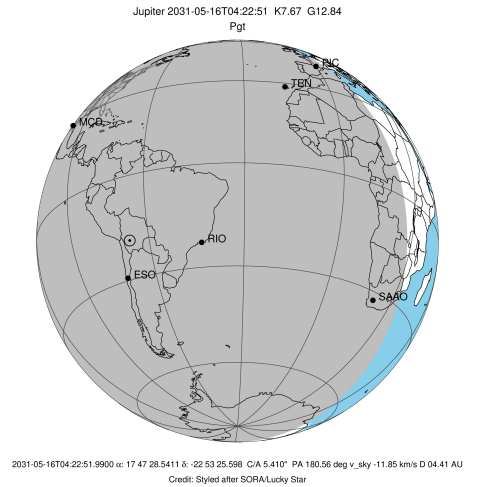
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-16T02:51:29.387	34.92	-63.49	71491.6	12.54	14.26
Jupiter	E	2031-05-16T06:02:28.005	76.24	-68.58	71491.5	13.35	15.18



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-16T04:17:07.850
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       : 4068932929748903296
2Mass ID (if available) : 17472853-2253256
ICRS Star Coord at Epoch: 17h 47m 28.54108s -22:53:25.59765s
RUWE (>1.4 is poor) : 0.75
K magnitude          : 7.669
G magnitude          : 12.837
RP magnitude         : 11.499
BP magnitude         : 14.938
DUPflag             : 0
Distance (au)        : 4.409
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.85
Sun-Target sep (deg) : 147.58
Sun-Moon sep (deg)   : 88.30
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.51
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 4.861
C/A sky separation (km) : 15546.5
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	2031-05-16T02:41:17.201	64.07	-33.29	71491.5	13.03	14.82
Jupiter	E	2031-05-16T05:53:49.913	23.58	5.84x	71491.6	11.86	13.50