

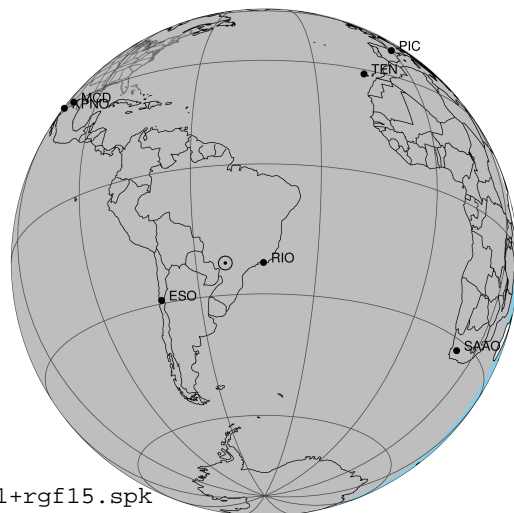
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-07T03:29:16.870  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4116744196452141952  
 2Mass ID (if available) : 17370118-2250449

Jupiter 2031-06-07T03:29:16 K8.65 G14.69 Pgt

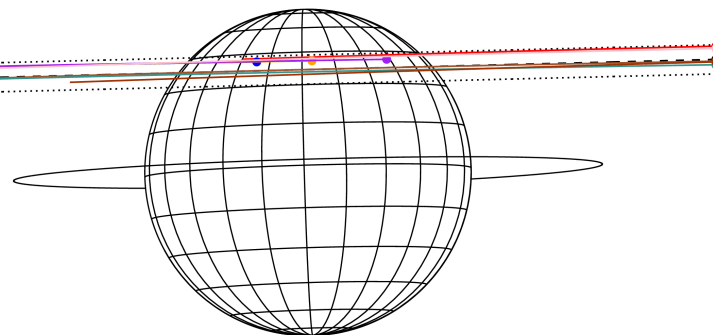
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s

RUWE (>1.4 is poor) : 0.93  
 K magnitude : 8.654  
 G magnitude : 14.693  
 RP magnitude : 13.213  
 BP magnitude : 17.789  
 DUPflag : 0  
 Distance (au) : 4.278  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.09  
 Sun-Target sep (deg) : 171.07  
 Sun-Moon sep (deg) : 14.64  
 B (ring opening deg) : -2.61  
 PA of pole (deg) : 1.64  
 Pole direction: RA (deg): 268.05693  
 Dec (deg): 64.49651  
 C/A sky separation (") : 14.527  
 C/A sky separation (km) : 45079.0  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-06-07T03:29:16 K8.65 G14.69  
 Pgt



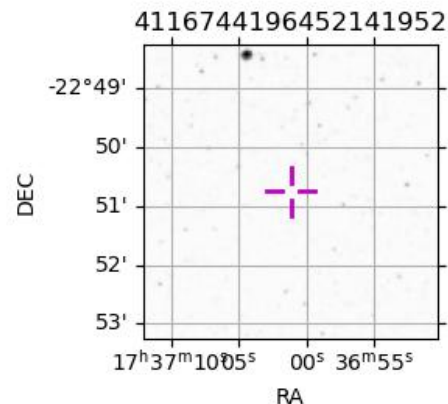
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 SAAO



2031-06-07T03:29:16.8700 a: 17 37 01.1843 d: -22 50 45.237 C/A \*\*\*\*\* PA 181.43 deg v\_sky -16.09 km/s D 04.28 AU  
 Credit: Styled after SORA/Lucky Star

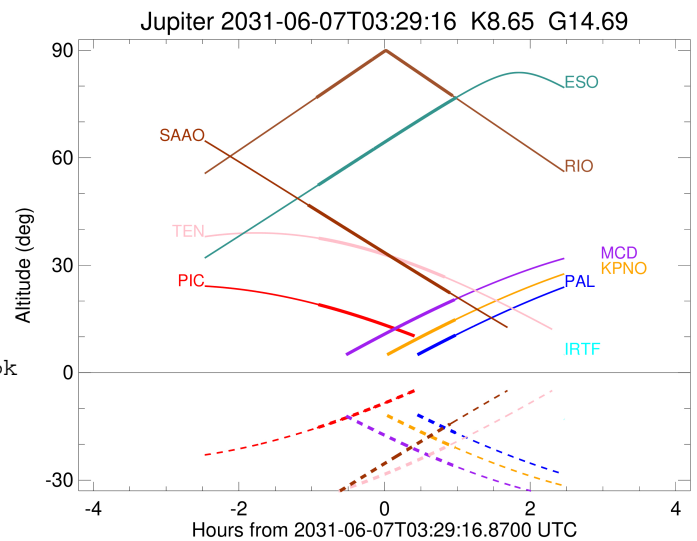
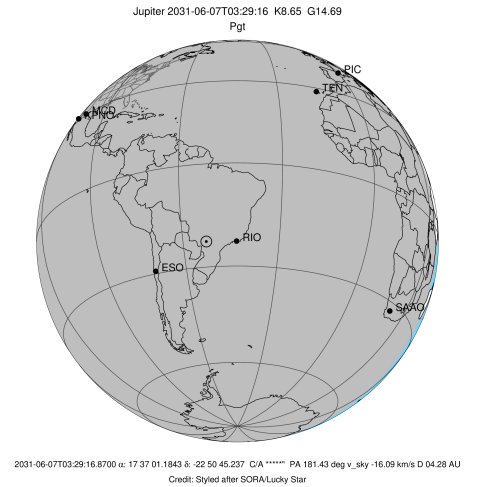
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 07 02:34 - JUN 07 02:34	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 07 04:27 - JUN 07 04:27	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 07 04:27 - JUN 07 04:27	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 07 04:27 - JUN 07 04:27	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 07 02:35 - JUN 07 04:19	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	+	JUN 07 02:33 - JUN 07 04:25	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 07 02:34 - JUN 07 04:28	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUN 07 02:26 - JUN 07 04:23	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-07T03:26:24.190
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        : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor)  : 0.93
K magnitude           : 8.654
G magnitude           : 14.693
RP magnitude          : 13.213
BP magnitude          : 17.789
DUPflag              : 0
Distance (au)         : 4.278
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg)  : 171.07
Sun-Moon sep (deg)    : 14.09
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 16.266
C/A sky separation (km) : 50474.3
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
    
```

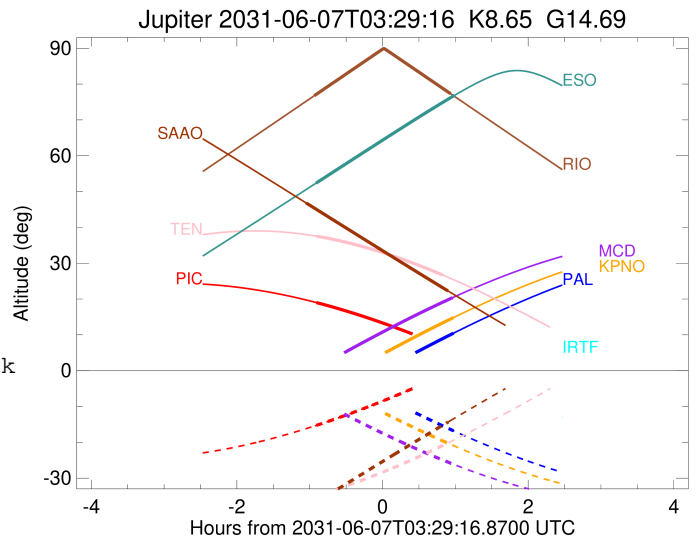
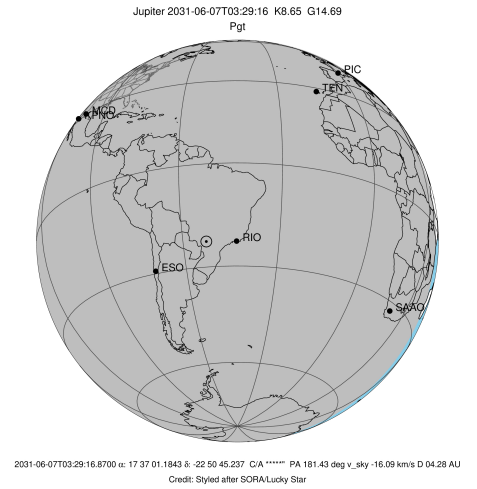


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-07T02:34:47.744	19.01	-15.27	71487.4	44.90	48.60
Jupiter	E	2031-06-07T04:18:09.585	6.96	-1.39x	71487.4	44.73	48.44

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-07T03:34:11.060
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        : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 8.654
G magnitude           : 14.693
RP magnitude          : 13.213
BP magnitude          : 17.789
DUPflag              : 0
Distance (au)         : 4.278
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg)  : 171.07
Sun-Moon sep (deg)    : 15.33
B (ring opening deg) : -2.61
PA of pole (deg)      : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 15.727
C/A sky separation (km) : 48800.5
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
    
```

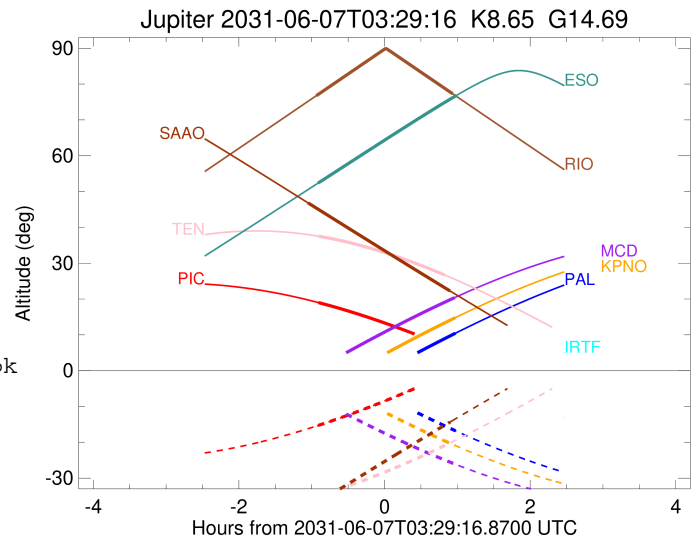
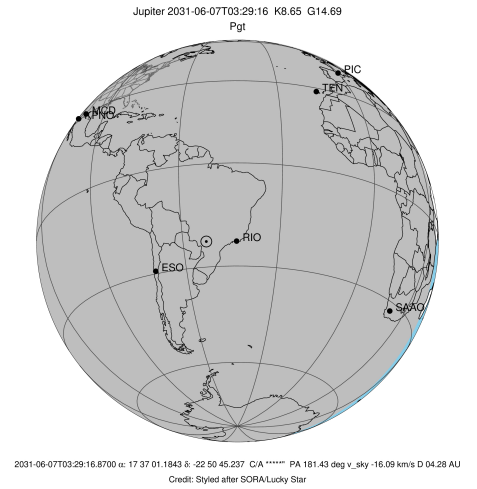


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-07T02:40:16.282	-9.31x	1.78x	71487.8	42.25	45.97
Jupiter	E	2031-06-07T04:27:48.402	10.47	-16.79	71487.6	43.70	47.41

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-07T03:34:05.970
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      : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor) : 0.93
K magnitude          : 8.654
G magnitude          : 14.693
RP magnitude         : 13.213
BP magnitude         : 17.789
DUPflag             : 0
Distance (au)       : 4.278
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 171.07
Sun-Moon sep (deg)  : 15.34
B (ring opening deg) : -2.61
PA of pole (deg)    : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 15.750
C/A sky separation (km) : 48873.4
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
    
```

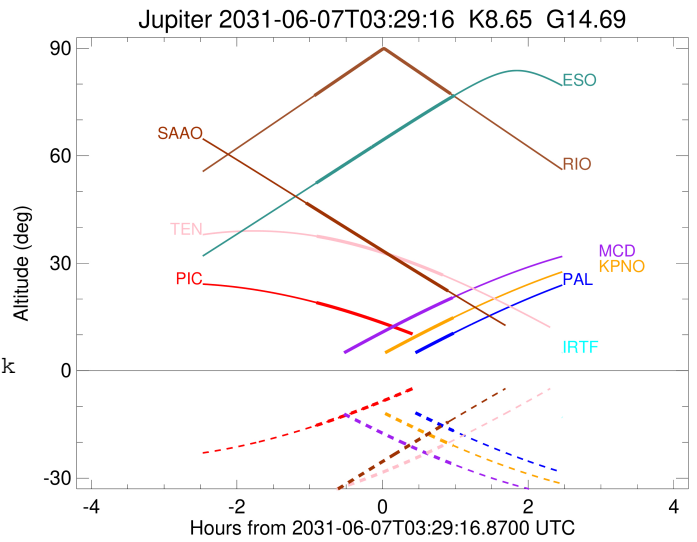
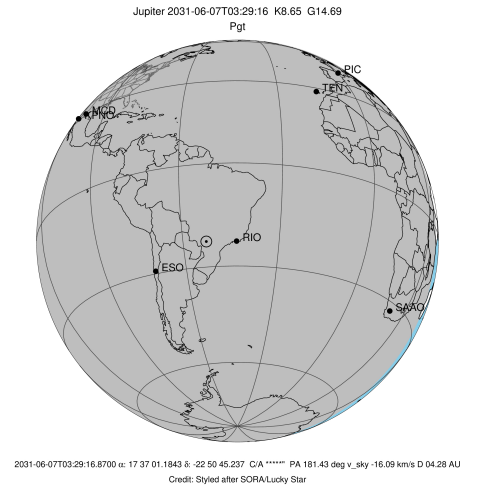


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-07T02:40:22.375	-4.66x	-2.82x	71487.8	42.34	46.05
Jupiter	E	2031-06-07T04:27:32.576	14.78	-20.88	71487.6	43.77	47.48

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-07T03:33:51.740
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        : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 8.654
G magnitude           : 14.693
RP magnitude          : 13.213
BP magnitude          : 17.789
DUPflag              : 0
Distance (au)         : 4.278
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg)  : 171.07
Sun-Moon sep (deg)    : 15.33
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 15.800
C/A sky separation (km) : 49027.7
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
    
```

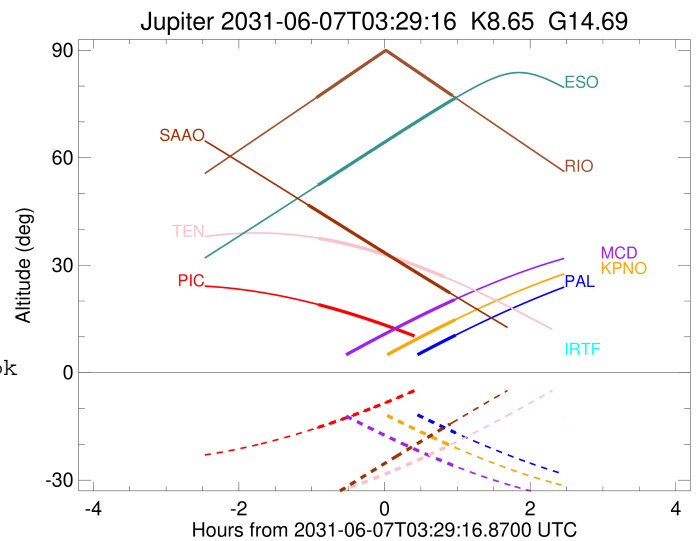
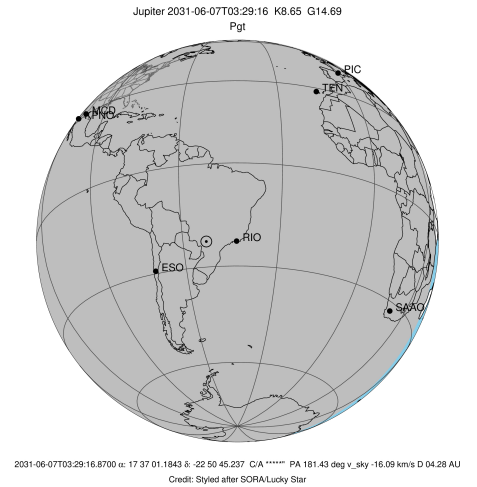


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-07T02:40:26.801	1.75x	-9.05	71487.8	42.52	46.24
Jupiter	E	2031-06-07T04:27:00.710	20.38	-26.03	71487.5	43.91	47.62

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-07T03:27:02.300
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        : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 8.654
G magnitude           : 14.693
RP magnitude          : 13.213
BP magnitude          : 17.789
DUPflag              : 0
Distance (au)         : 4.278
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg)  : 171.07
Sun-Moon sep (deg)    : 14.29
B (ring opening deg) : -2.61
PA of pole (deg)      : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 16.070
C/A sky separation (km) : 49866.5
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
    
```

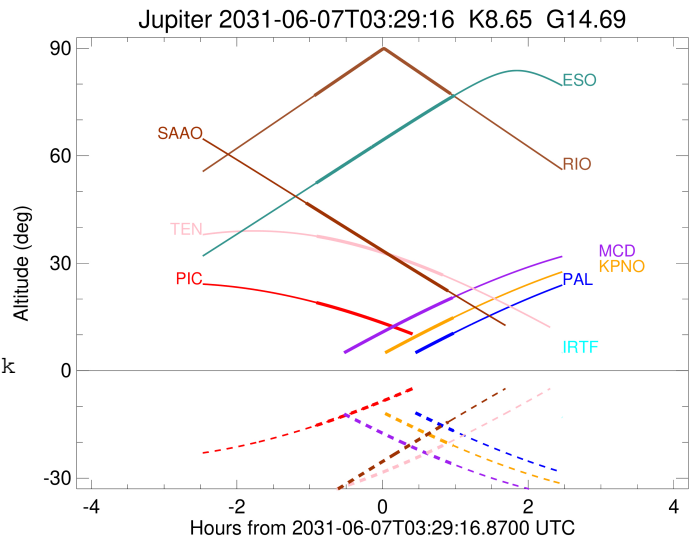
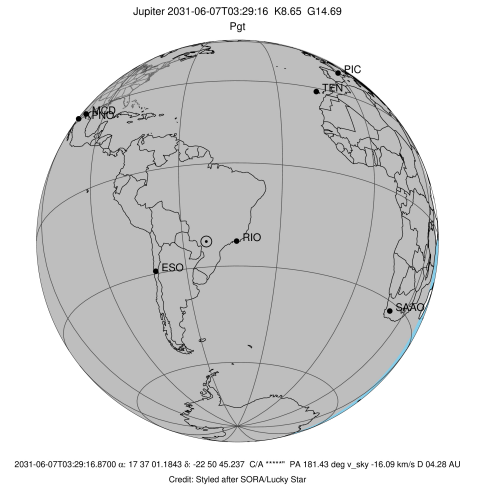


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-07T02:35:09.231	37.51	-34.68	71487.5	44.12	47.83
Jupiter	E	2031-06-07T04:19:02.195	26.68	-20.87	71487.5	44.11	47.82

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-07T03:29:17.010
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       : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 8.654
G magnitude           : 14.693
RP magnitude         : 13.213
BP magnitude         : 17.789
DUPflag              : 0
Distance (au)        : 4.278
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg) : 171.07
Sun-Moon sep (deg)  : 14.91
B (ring opening deg) : -2.61
PA of pole (deg)    : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 14.531
C/A sky separation (km) : 45089.9
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
    
```

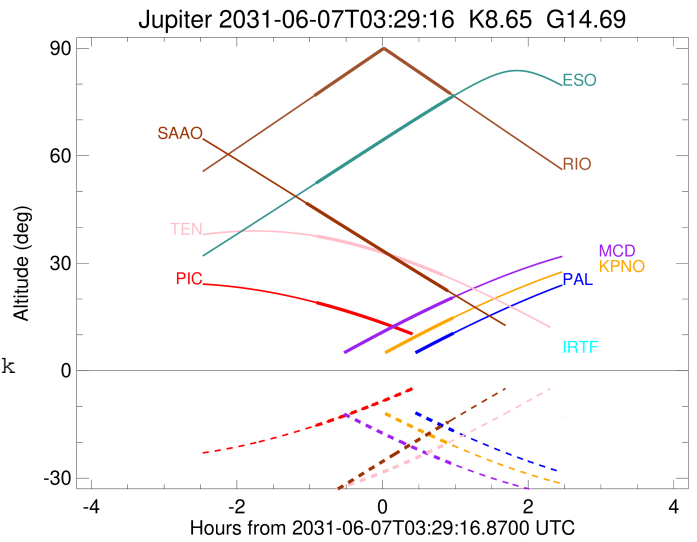
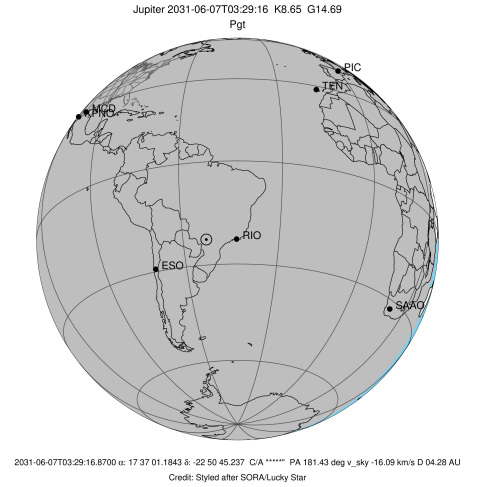


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-07T02:33:13.056	76.78	-85.74	71488.4	38.74	42.43
Jupiter	E	2031-06-07T04:25:20.110	77.31	-68.44	71488.3	39.23	42.93

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-07T03:31:40.550
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        : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 8.654
G magnitude           : 14.693
RP magnitude          : 13.213
BP magnitude          : 17.789
DUPflag              : 0
Distance (au)         : 4.278
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg)  : 171.07
Sun-Moon sep (deg)   : 15.30
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 14.210
C/A sky separation (km) : 44093.0
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
    
```



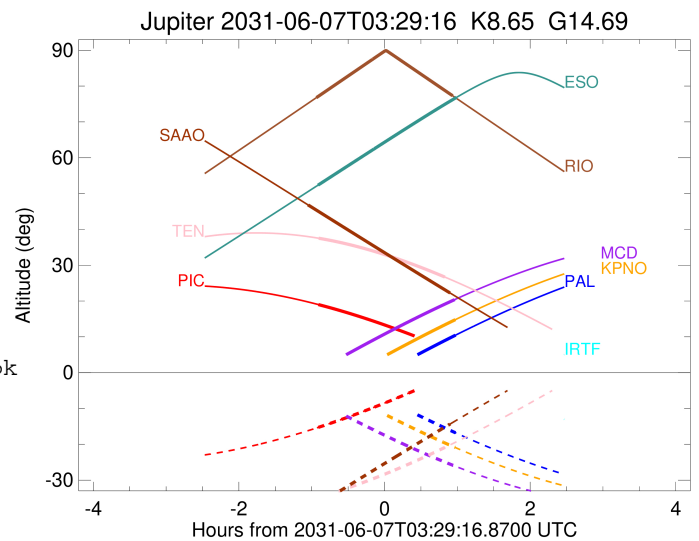
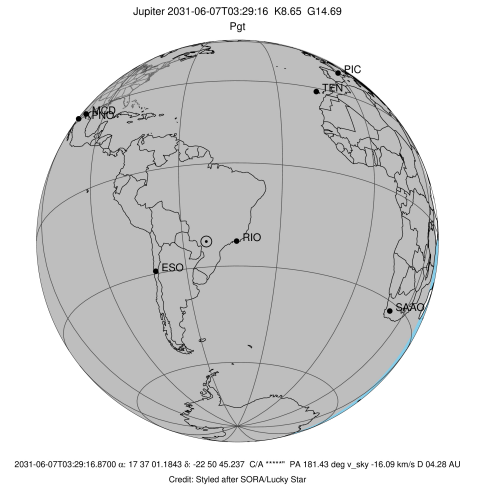
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-07T02:34:30.228	52.34	-60.79	71488.6	37.49	41.16
Jupiter	E	2031-06-07T04:28:40.754	76.85	-82.99	71488.4	38.46	42.15



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-07T03:24:38.070
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        : 4116744196452141952
2Mass ID (if available) : 17370118-2250449
ICRS Star Coord at Epoch: 17h 37m 01.18426s -22:50:45.23676s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 8.654
G magnitude           : 14.693
RP magnitude          : 13.213
BP magnitude          : 17.789
DUPflag              : 0
Distance (au)         : 4.278
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.09
Sun-Target sep (deg)  : 171.07
Sun-Moon sep (deg)   : 14.11
B (ring opening deg) : -2.61
PA of pole (deg)     : 1.64
Pole direction: RA (deg): 268.05693
Dec (deg): 64.49651
C/A sky separation (") : 13.863
C/A sky separation (km) : 43018.8
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	2031-06-07T02:26:15.518	46.83	-38.55	71488.6	37.16	40.82
Jupiter	E	2031-06-07T04:23:18.594	22.24	-14.34	71488.7	36.67	40.31