

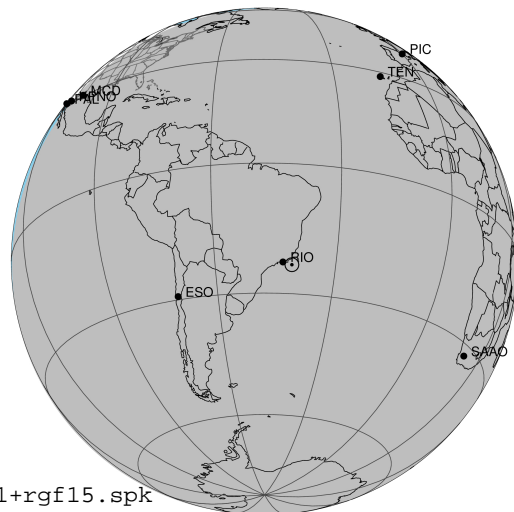
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-21T02:45:35.790  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4111500316251647232  
 2Mass ID (if available) : 17291957-2247429

Jupiter 2031-06-21T02:45:35 K8.51 G13.67 Pgt

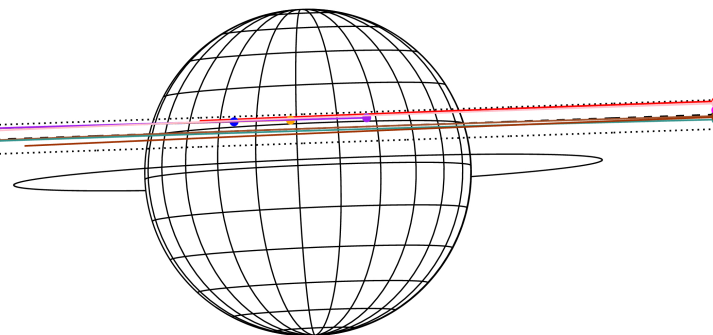
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s

RUWE (>1.4 is poor) : 0.92  
 K magnitude : 8.506  
 G magnitude : 13.675  
 RP magnitude : 12.383  
 BP magnitude : 15.585  
 DUPflag : 0  
 Distance (au) : 4.267  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.32  
 Sun-Target sep (deg) : 173.77  
 Sun-Moon sep (deg) : 160.68  
 B (ring opening deg) : -2.59  
 PA of pole (deg) : 2.46  
 Pole direction: RA (deg): 268.05691  
 Dec (deg): 64.49651  
 C/A sky separation (") : 6.209  
 C/A sky separation (km) : 19214.4  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-06-21T02:45:35 K8.51 G13.67  
 Pgt



Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 KAV  
 RIO  
 ESO  
 SAAO

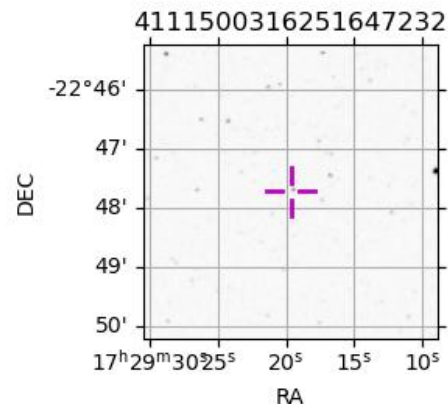


2031-06-21T02:45:35.7900 at: 17 29 19.56895 s: -22 47 43.113 C/A 6.196° PA 181.98 deg v\_sky -16.32 km/s D 04.27 AU

Credit: Styled after SORA/Lucky Star

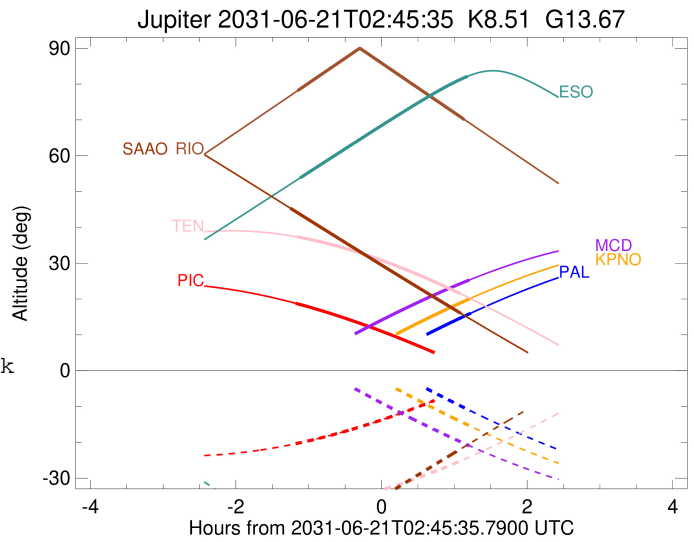
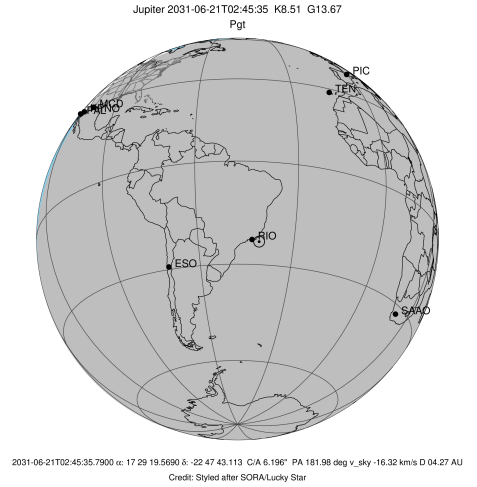
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+	JUN 21 01:34 - JUN 21 01:34	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 21 03:58 - JUN 21 03:58	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 21 03:58 - JUN 21 03:58	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 21 03:58 - JUN 21 03:58	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 21 01:35 - JUN 21 03:50	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 21 01:36 - JUN 21 03:53	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 21 01:38 - JUN 21 03:56	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUN 21 01:30 - JUN 21 03:51	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-21T02:42:24.140
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       : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.506
G magnitude           : 13.675
RP magnitude          : 12.383
BP magnitude          : 15.585
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg) : 173.77
Sun-Moon sep (deg)   : 160.19
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 7.930
C/A sky separation (km): 24541.3
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
    
```

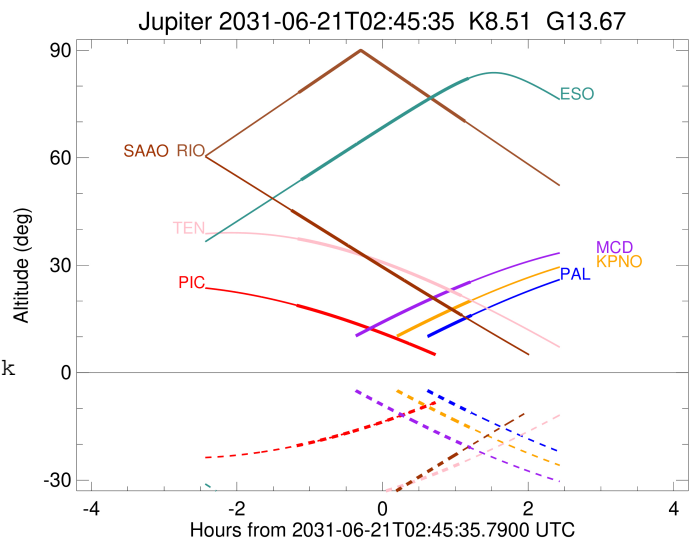
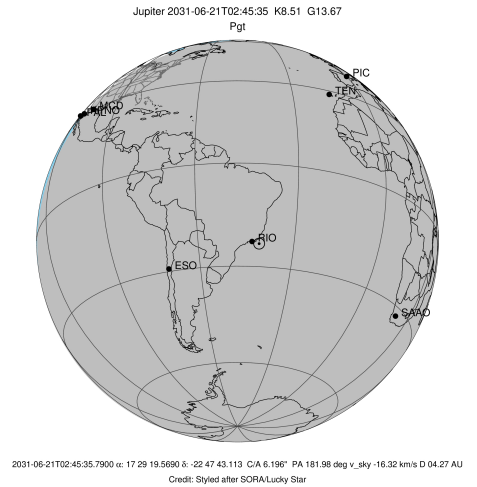


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T01:34:54.477	18.80	-20.38	71490.9	19.83	22.38
Jupiter	E	2031-06-21T03:50:11.977	1.89x	-5.42	71490.9	20.18	22.78

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-21T02:50:33.820
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      : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 8.506
G magnitude          : 13.675
RP magnitude         : 12.383
BP magnitude         : 15.585
DUPflag             : 0
Distance (au)        : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg) : 173.77
Sun-Moon sep (deg)   : 161.29
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 7.449
C/A sky separation (km): 23051.9
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
    
```

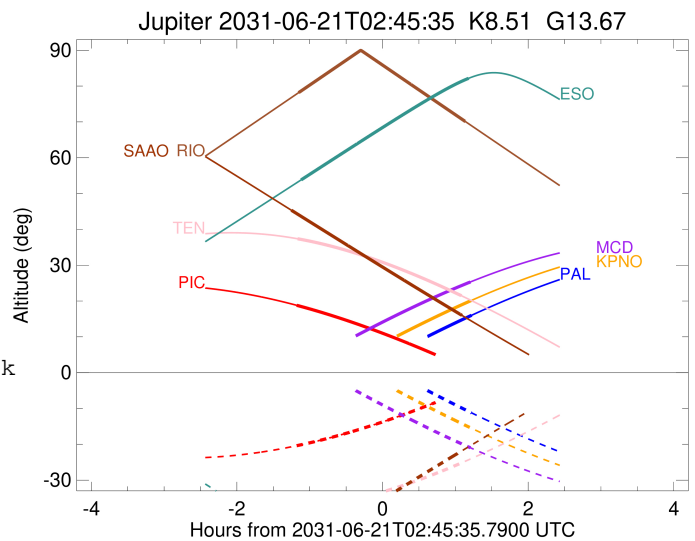
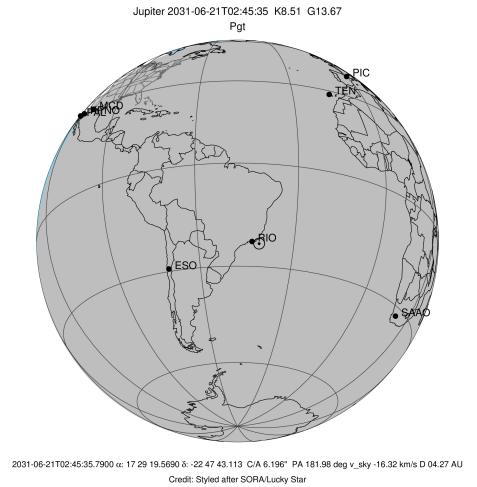


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T01:41:48.086	-8.46x	14.02x	71491.1	17.79	20.13
Jupiter	E	2031-06-21T03:58:53.657	16.00	-11.20	71491.0	19.74	22.29

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T02:50:26.250
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        : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.506
G magnitude           : 13.675
RP magnitude          : 12.383
BP magnitude          : 15.585
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg)  : 173.77
Sun-Moon sep (deg)   : 161.29
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 7.471
C/A sky separation (km) : 23122.6
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
    
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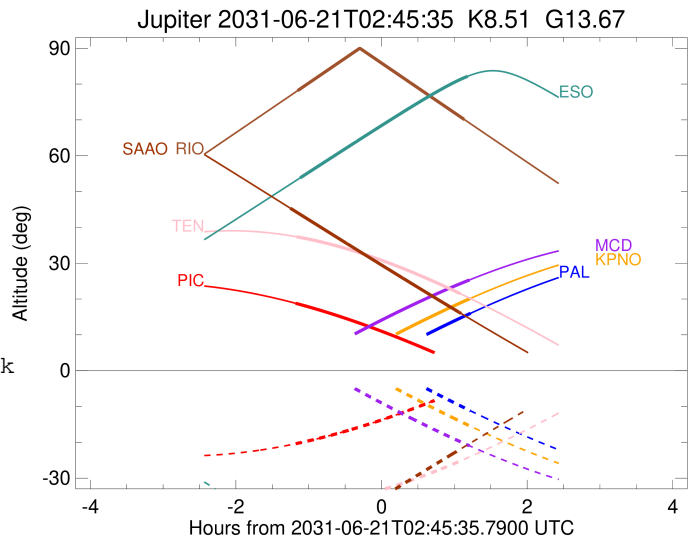
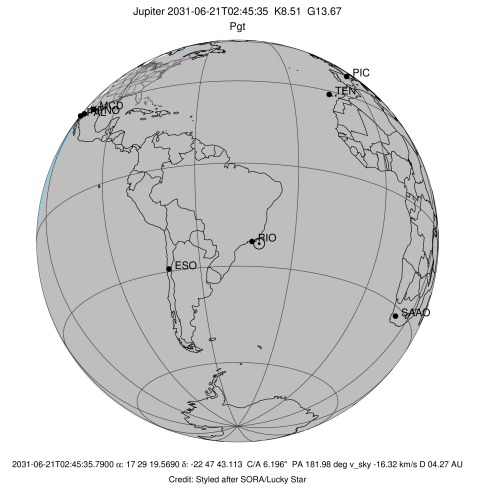


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T01:41:50.864	-3.82x	9.36x	71491.1	17.85	20.20
Jupiter	E	2031-06-21T03:58:36.571	20.12	-15.46	71490.9	19.79	22.34

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T02:50:08.420
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        : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.506
G magnitude           : 13.675
RP magnitude          : 12.383
BP magnitude          : 15.585
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg) : 173.77
Sun-Moon sep (deg)   : 161.28
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 7.519
C/A sky separation (km): 23271.1
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
    
```

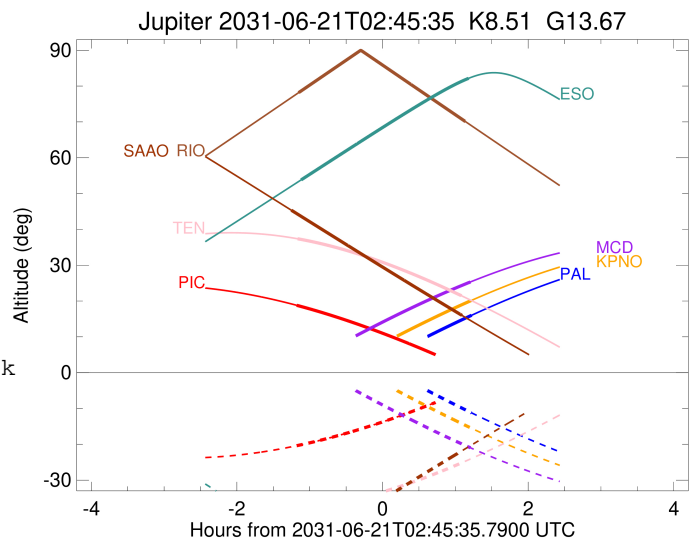
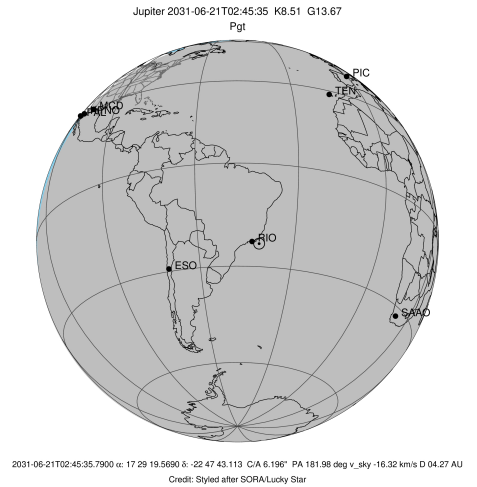


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T01:41:48.429	2.55x	2.92x	71491.1	17.99	20.36
Jupiter	E	2031-06-21T03:58:05.153	25.33	-20.97	71490.9	19.88	22.44

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T02:42:55.810
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        : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.506
G magnitude           : 13.675
RP magnitude          : 12.383
BP magnitude          : 15.585
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg)  : 173.77
Sun-Moon sep (deg)    : 160.37
B (ring opening deg) : -2.59
PA of pole (deg)      : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (" ) : 7.739
C/A sky separation (km) : 23950.3
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
    
```

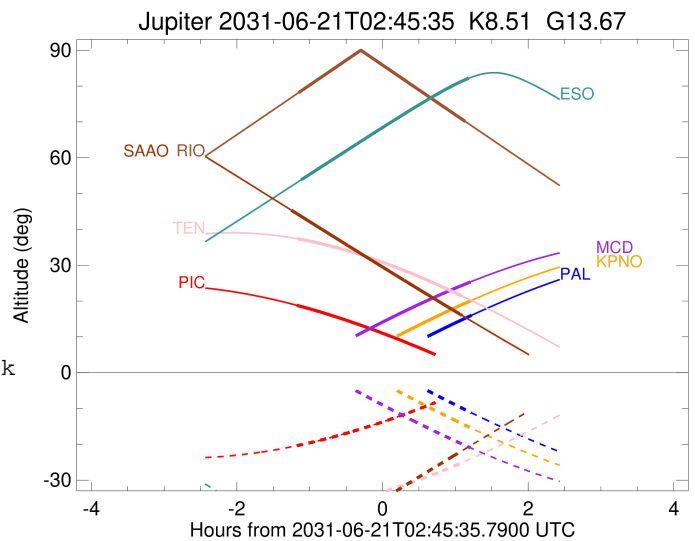
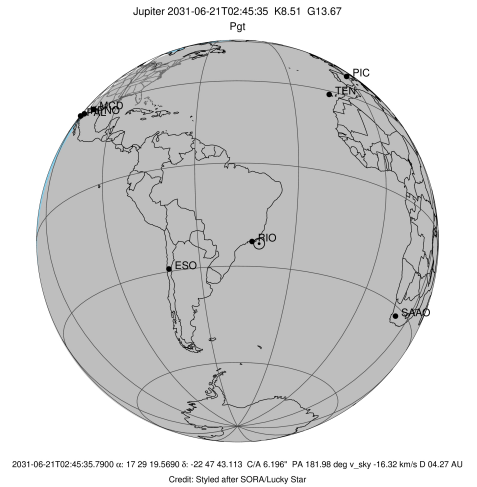


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T01:35:40.019	37.37	-38.00	71491.0	19.23	21.73
Jupiter	E	2031-06-21T03:50:26.514	21.50	-25.22	71490.9	19.73	22.27

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-21T02:45:08.320
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       : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 8.506
G magnitude          : 13.675
RP magnitude         : 12.383
BP magnitude         : 15.585
DUPflag             : 0
Distance (au)        : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg) : 173.77
Sun-Moon sep (deg)   : 160.92
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 6.213
C/A sky separation (km) : 19228.3
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
    
```

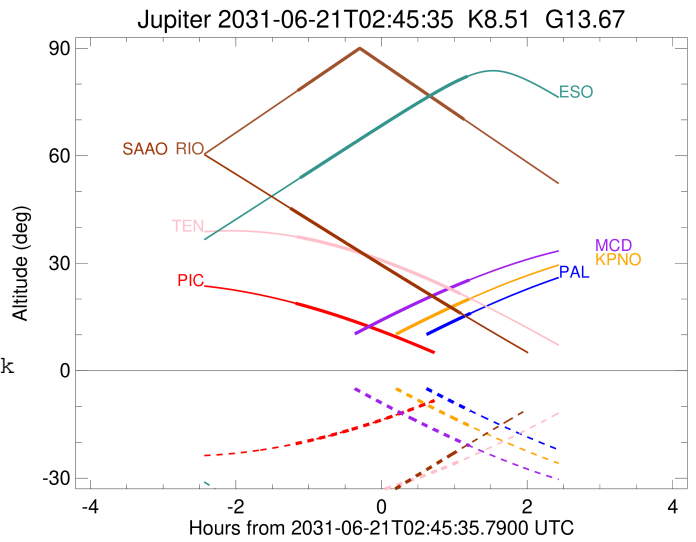
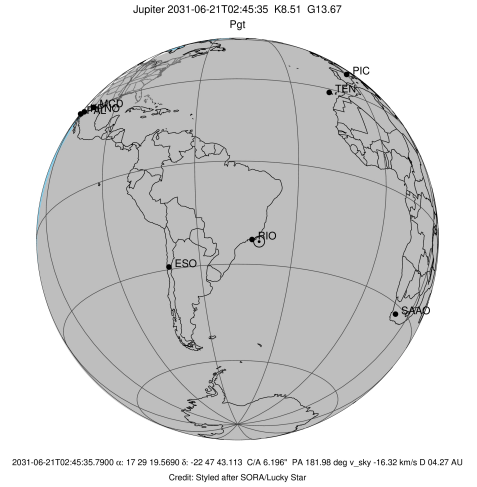


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T01:36:34.162	78.18	-72.06	71491.4	15.01	17.04
Jupiter	E	2031-06-21T03:53:45.133	70.12	-76.39	71491.3	15.99	18.13

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T02:47:39.940
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        : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 8.506
G magnitude           : 13.675
RP magnitude          : 12.383
BP magnitude          : 15.585
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg)  : 173.77
Sun-Moon sep (deg)   : 161.25
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 5.909
C/A sky separation (km) : 18286.4
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
    
```



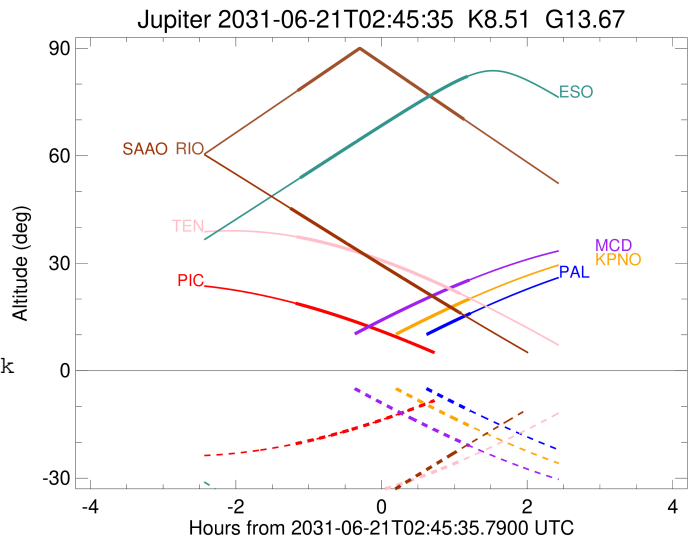
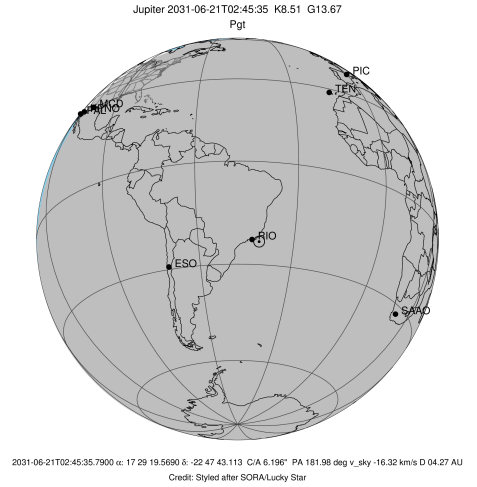
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T01:38:30.636	53.80	-48.16	71491.5	14.00	15.91
Jupiter	E	2031-06-21T03:56:38.151	82.17	-77.85	71491.3	15.46	17.54



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-21T02:40:35.280
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      : 4111500316251647232
2Mass ID (if available) : 17291957-2247429
ICRS Star Coord at Epoch: 17h 29m 19.56895s -22:47:43.11309s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 8.506
G magnitude          : 13.675
RP magnitude         : 12.383
BP magnitude         : 15.585
DUPflag             : 0
Distance (au)       : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.32
Sun-Target sep (deg) : 173.77
Sun-Moon sep (deg)  : 160.21
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.46
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 5.509
C/A sky separation (km): 17048.5
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	2031-06-21T01:30:33.663	45.33	-51.22	71491.5	13.72	15.59
Jupiter	E	2031-06-21T03:51:05.456	15.99	-21.80	71491.5	13.76	15.64