

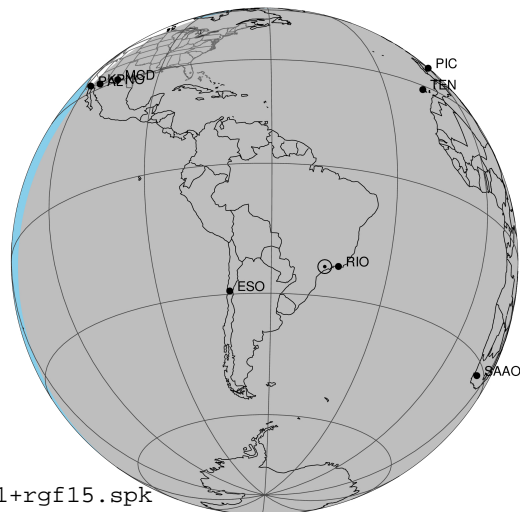
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-28T03:09:55.740
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4111725402536603904
 2Mass ID (if available) : 17253310-2246005

Jupiter 2031-06-28T03:09:55 K7.63 G14.92 Pgt

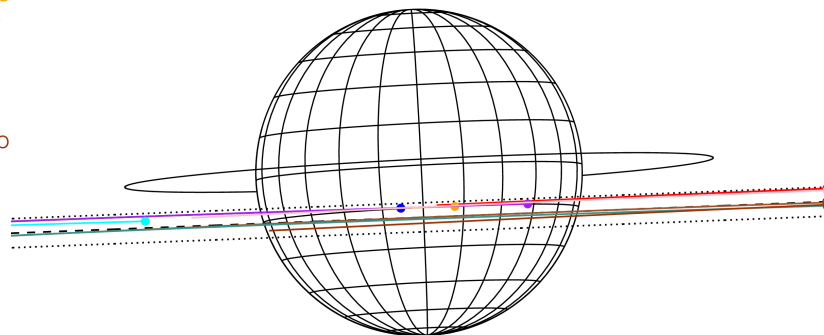
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s

RUWE (>1.4 is poor) : 1.16
 K magnitude : 7.634
 G magnitude : 14.917
 RP magnitude : 13.309
 BP magnitude : 19.114
 DUPflag : 0
 Distance (au) : 4.283
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -15.64
 Sun-Target sep (deg) : 166.22
 Sun-Moon sep (deg) : 74.88
 B (ring opening deg) : -2.58
 PA of pole (deg) : 2.87
 Pole direction: RA (deg): 268.05691
 Dec (deg): 64.49651
 C/A sky separation (") : 6.333
 C/A sky separation (km) : 19672.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-28T03:09:55 K7.63 G14.92
 Pgt



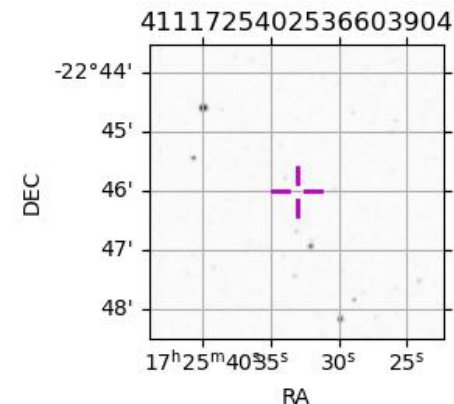
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 SAAO



2031-06-28T03:09:55.7400 a: 17 25 33.0971 s: -22 46 00.793 C/A 6.344" PA 2.21 deg v_sky -15.64 km/s D 04.28 AU
 Credit: Styled after SORA/Lucky Star

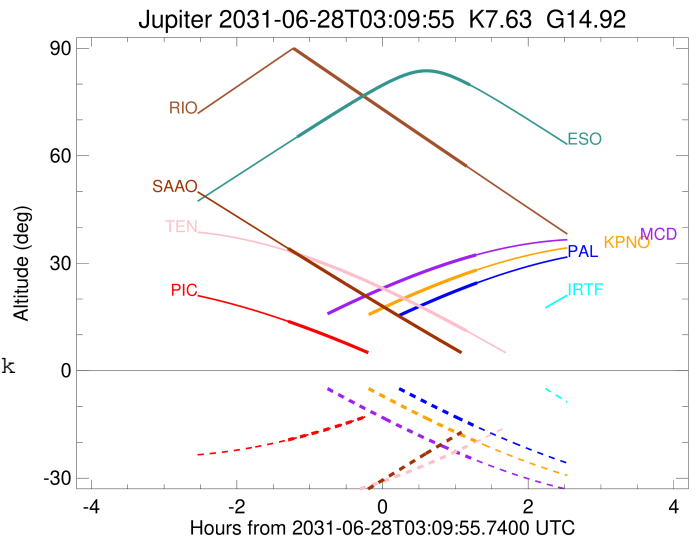
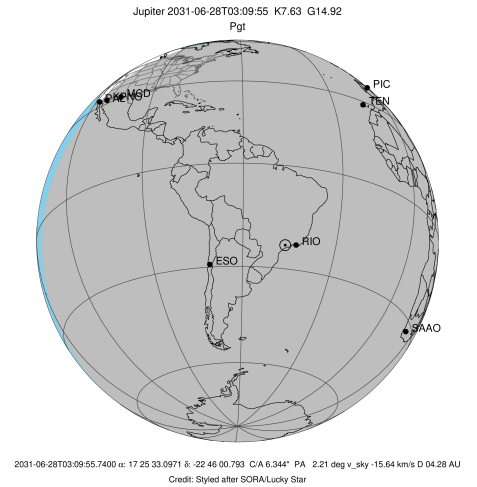
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 28 01:52 - JUN 28 01:52	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 28 04:27 - JUN 28 04:27	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 28 04:27 - JUN 28 04:27	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 28 04:26 - JUN 28 04:26	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 28 01:53 - JUN 28 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 28 01:56 - JUN 28 04:19	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 28 01:59 - JUN 28 04:22	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUN 28 01:52 - JUN 28 01:52	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)    : 71492.00
C/A epoch             : 2031-06-28T03:05:39.530
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        : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor)  : 1.16
K magnitude           : 7.634
G magnitude           : 14.917
RP magnitude          : 13.309
BP magnitude          : 19.114
DUPflag              : 0
Distance (au)         : 4.283
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg)  : 166.22
Sun-Moon sep (deg)   : 75.10
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 4.719
C/A sky separation (km) : 14658.6
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
    
```

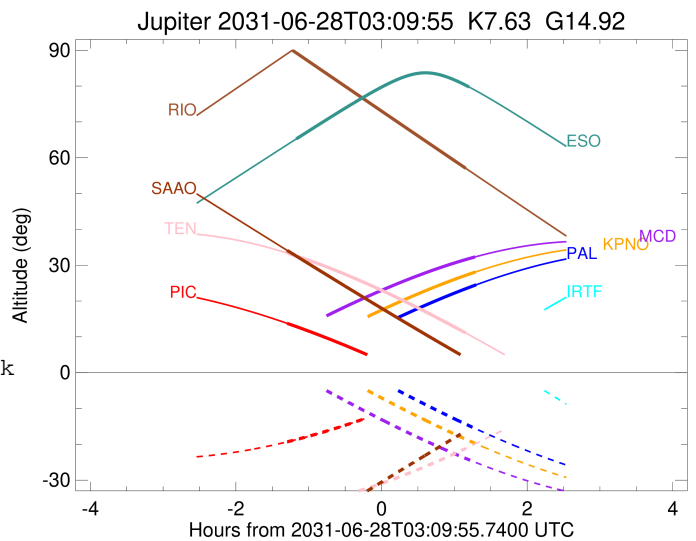
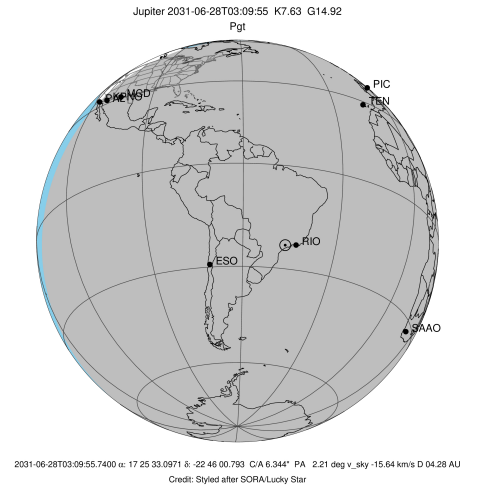


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T01:52:08.893	13.77	-19.31	71491.6	-12.13	-13.80
Jupiter	E	2031-06-28T04:19:38.480	-7.87x	-1.43x	71491.6	-11.60	-13.20

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-28T03:14:49.460
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        : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor) : 1.16
K magnitude           : 7.634
G magnitude           : 14.917
RP magnitude          : 13.309
BP magnitude          : 19.114
DUPflag              : 0
Distance (au)         : 4.283
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg) : 166.22
Sun-Moon sep (deg)   : 74.93
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 4.956
C/A sky separation (km): 15397.4
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
    
```

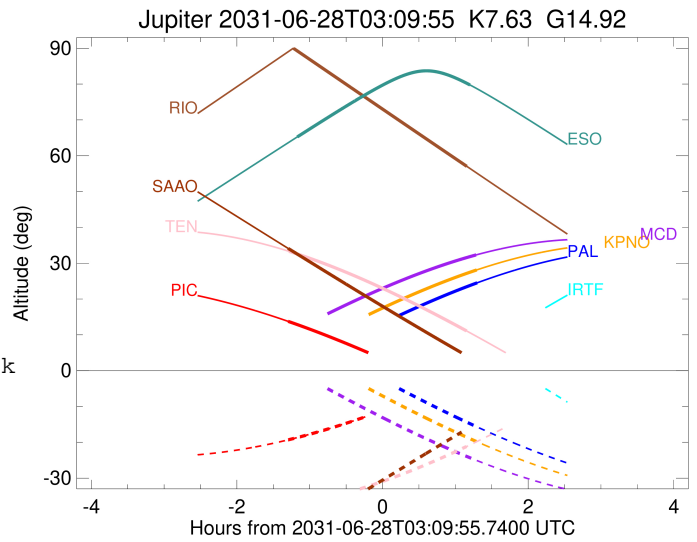
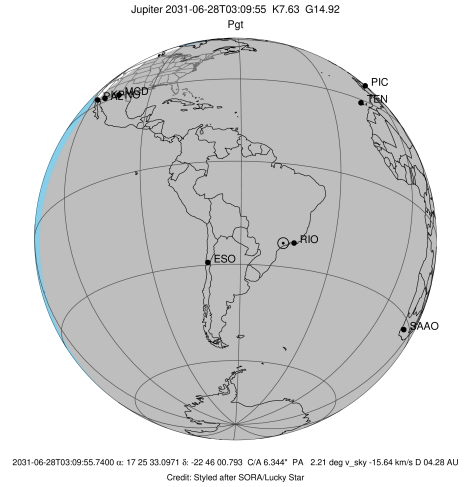


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T02:01:15.972	1.20x	10.41x	71491.5	-13.59	-15.44
Jupiter	E	2031-06-28T04:27:56.425	24.52	-15.71	71491.6	-11.36	-12.93

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T03:14:33.910
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       : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor) : 1.16
K magnitude           : 7.634
G magnitude           : 14.917
RP magnitude         : 13.309
BP magnitude         : 19.114
DUPflag              : 0
Distance (au)        : 4.283
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg) : 166.22
Sun-Moon sep (deg)   : 75.00
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 4.938
C/A sky separation (km) : 15340.8
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
    
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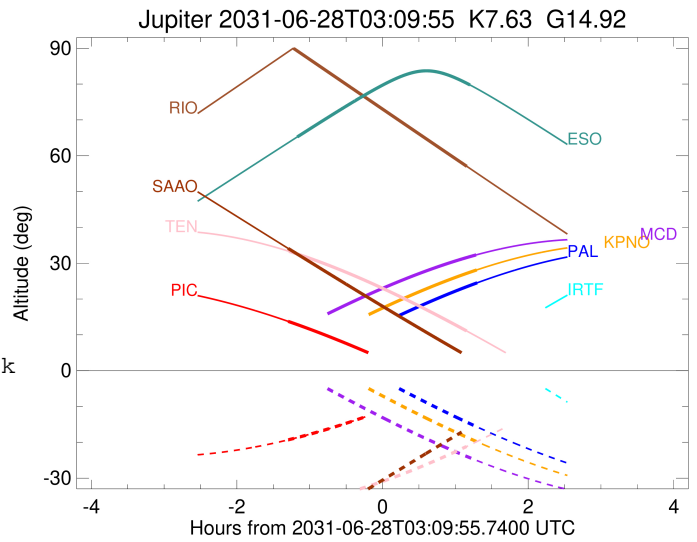
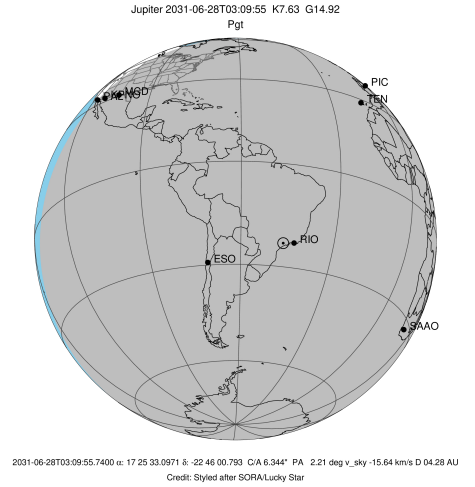


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T02:01:09.246	5.72	5.80x	71491.5	-13.53	-15.37
Jupiter	E	2031-06-28T04:27:33.706	28.12	-19.81	71491.6	-11.34	-12.91

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-28T03:14:04.720
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       : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor) : 1.16
K magnitude           : 7.634
G magnitude           : 14.917
RP magnitude         : 13.309
BP magnitude         : 19.114
DUPflag              : 0
Distance (au)        : 4.283
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg) : 166.22
Sun-Moon sep (deg)   : 75.10
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 4.900
C/A sky separation (km): 15223.0
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
    
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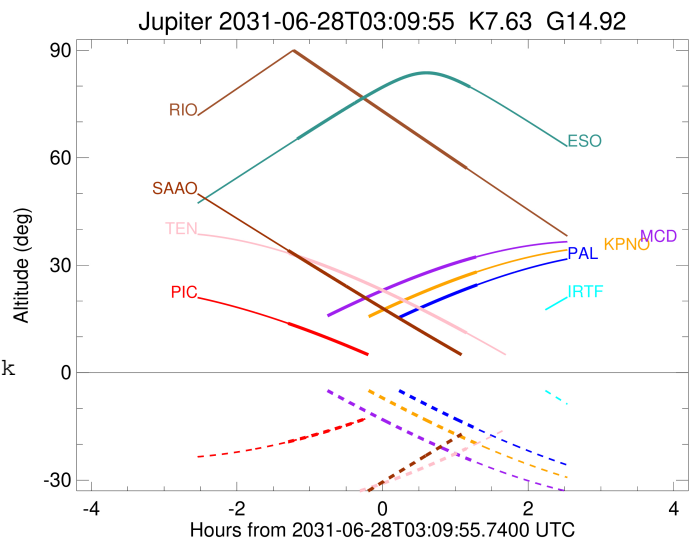
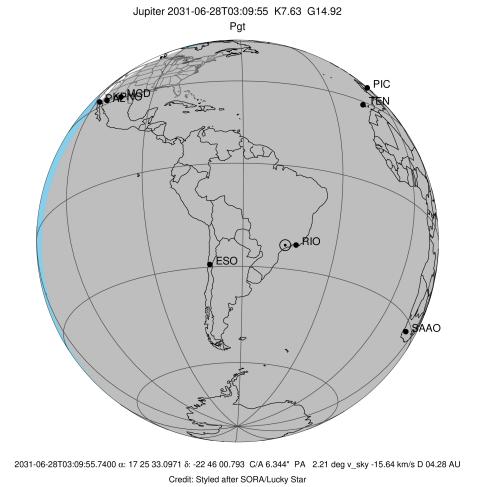


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T02:00:51.164	11.78	-0.54x	71491.5	-13.40	-15.23
Jupiter	E	2031-06-28T04:26:56.405	32.29	-24.98	71491.6	-11.29	-12.86

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-28T03:05:49.340
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        : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor) : 1.16
K magnitude           : 7.634
G magnitude           : 14.917
RP magnitude          : 13.309
BP magnitude          : 19.114
DUPflag              : 0
Distance (au)         : 4.283
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg) : 166.22
Sun-Moon sep (deg)   : 75.39
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 4.894
C/A sky separation (km) : 15202.2
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
    
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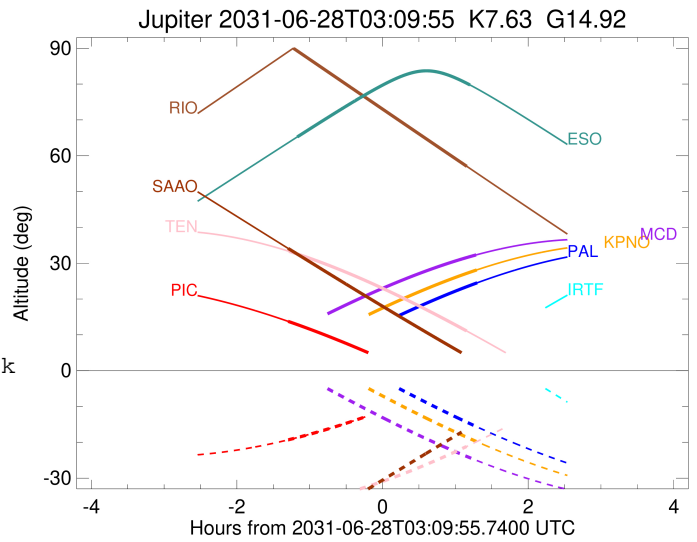
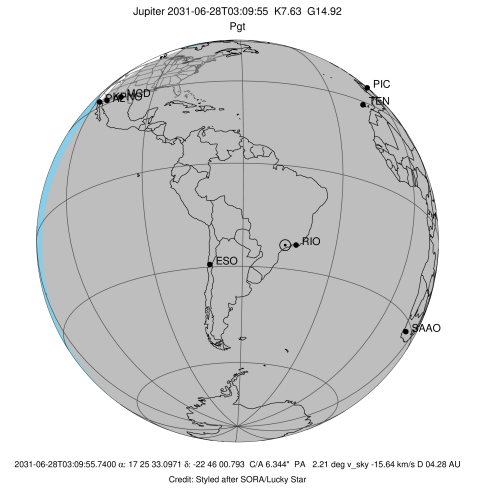


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T01:53:00.197	33.29	-37.51	71491.6	-12.64	-14.37
Jupiter	E	2031-06-28T04:19:04.797	11.12	-21.18	71491.6	-12.04	-13.70

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T03:07:57.000
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       : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor) : 1.16
K magnitude          : 7.634
G magnitude          : 14.917
RP magnitude         : 13.309
BP magnitude         : 19.114
DUPflag             : 0
Distance (au)        : 4.283
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg) : 166.22
Sun-Moon sep (deg)  : 75.83
B (ring opening deg) : -2.58
PA of pole (deg)    : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 6.346
C/A sky separation (km) : 19715.3
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
    
```

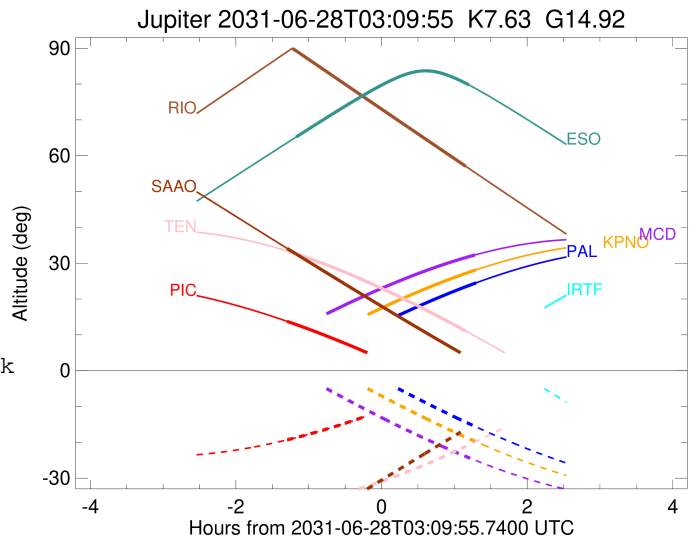
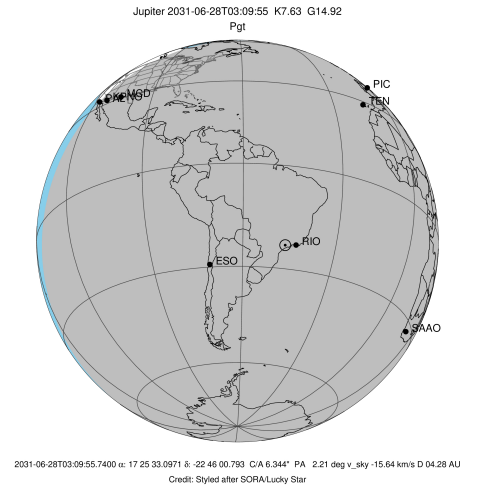


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T01:56:42.307	89.93	-76.33	71491.2	-16.61	-18.82
Jupiter	E	2031-06-28T04:19:23.774	57.03	-70.85	71491.3	-15.56	-17.65

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-28T03:10:51.970
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       : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor) : 1.16
K magnitude           : 7.634
G magnitude           : 14.917
RP magnitude          : 13.309
BP magnitude          : 19.114
DUPflag              : 0
Distance (au)         : 4.283
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg) : 166.22
Sun-Moon sep (deg)   : 75.75
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 6.576
C/A sky separation (km) : 20428.1
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
    
```

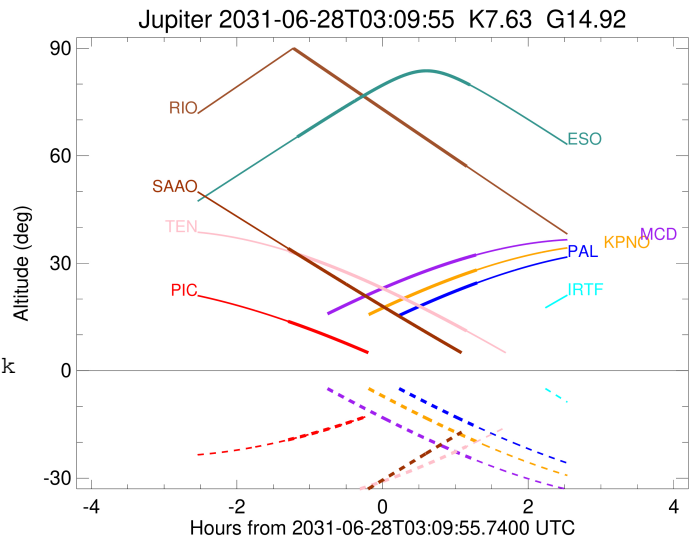
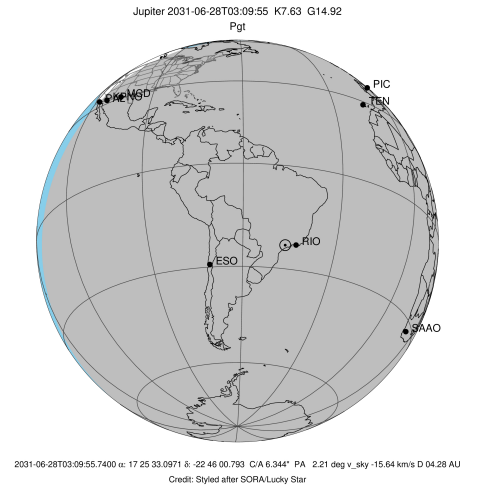


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-28T01:59:39.723	65.24	-52.40	71491.2	-17.46	-19.77
Jupiter	E	2031-06-28T04:22:00.150	79.75	-82.06	71491.3	-15.88	-18.01


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-28T03:03:55.710
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        : 4111725402536603904
2Mass ID (if available) : 17253310-2246005
ICRS Star Coord at Epoch: 17h 25m 33.09710s -22:46:00.79311s
RUWE (>1.4 is poor) : 1.16
K magnitude           : 7.634
G magnitude           : 14.917
RP magnitude          : 13.309
BP magnitude          : 19.114
DUPflag              : 0
Distance (au)         : 4.283
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.64
Sun-Target sep (deg)  : 166.22
Sun-Moon sep (deg)   : 75.36
B (ring opening deg) : -2.58
PA of pole (deg)     : 2.87
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 7.174
C/A sky separation (km) : 22286.9
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	2031-06-28T01:52:09.974	34.13	-46.91	71491.1	-18.29	-20.69
Jupiter	E	2031-06-28T04:16:16.836	4.76x	-16.91	71491.1	-18.05	-20.42