

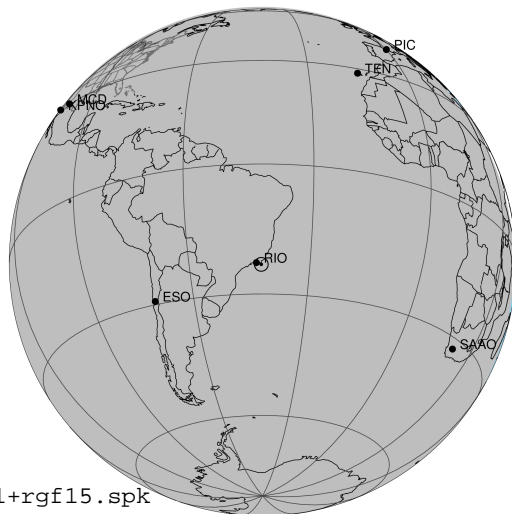
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-15T02:48:27.420
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4117457023583127552
 2Mass ID (if available) : 17323848-2249252

Jupiter 2031-06-15T02:48:27 K9.72 G14.94 Pgt

ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s

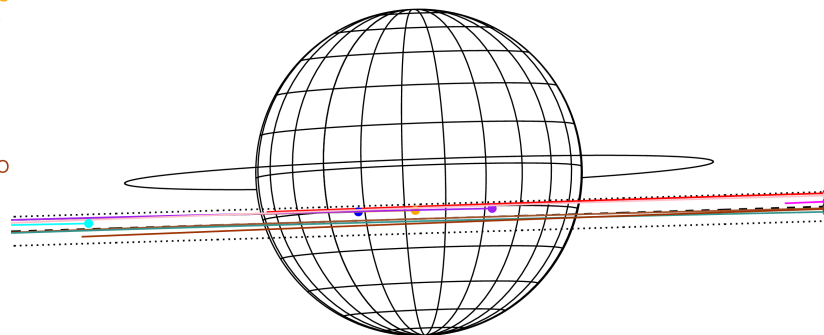
RUWE (>1.4 is poor) : 0.93
 K magnitude : 9.722
 G magnitude : 14.938
 RP magnitude : 13.664
 BP magnitude : 16.772
 DUPflag : 0
 Distance (au) : 4.265
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.47
 Sun-Target sep (deg) : 179.46
 Sun-Moon sep (deg) : 125.95
 B (ring opening deg) : -2.60
 PA of pole (deg) : 2.11
 Pole direction: RA (deg): 268.05692
 Dec (deg): 64.49651
 C/A sky separation (") : 6.565
 C/A sky separation (km) : 20306.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-15T02:48:27 K9.72 G14.94
 Pgt



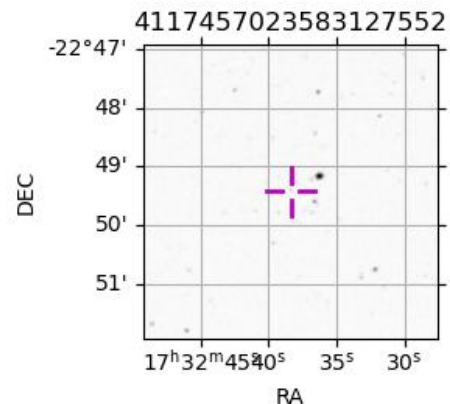
2031-06-15T02:48:27.4200 a: 17 32 38.4817 s: -22 49 25.524 C/A 6.577" PA 1.75 deg v_sky -16.47 km/s D 04.26 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 KAV
 RIO
 ESO
 SAAO



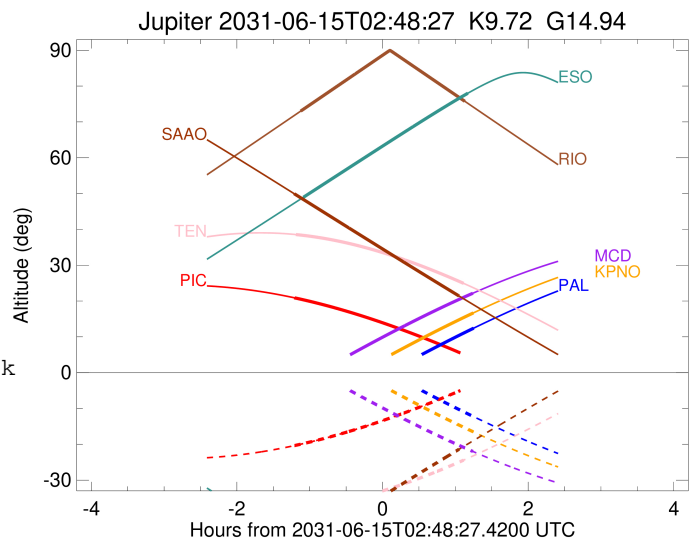
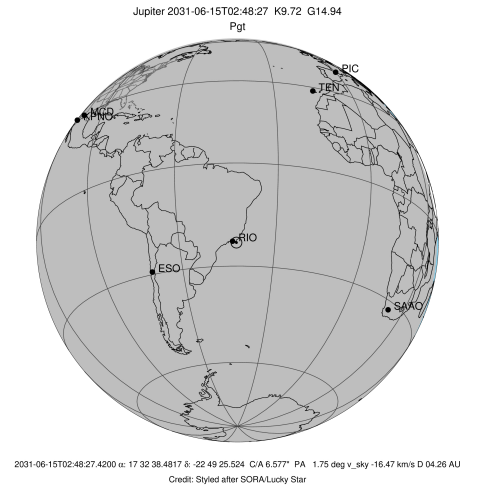
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 15 01:35 - JUN 15 01:35	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 15 04:03 - JUN 15 04:03	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 15 04:03 - JUN 15 04:03	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 15 04:02 - JUN 15 04:02	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+ +	JUN 15 01:37 - JUN 15 03:55	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 15 01:41 - JUN 15 03:56	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUN 15 01:43 - JUN 15 03:58	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	JUN 15 01:35 - JUN 15 03:51	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T02:45:25.430
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      : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude          : 9.722
G magnitude          : 14.938
RP magnitude         : 13.664
BP magnitude         : 16.772
DUPflag             : 0
Distance (au)       : 4.265
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.46
Sun-Moon sep (deg)  : 126.40
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 4.807
C/A sky separation (km) : 14870.1
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
    
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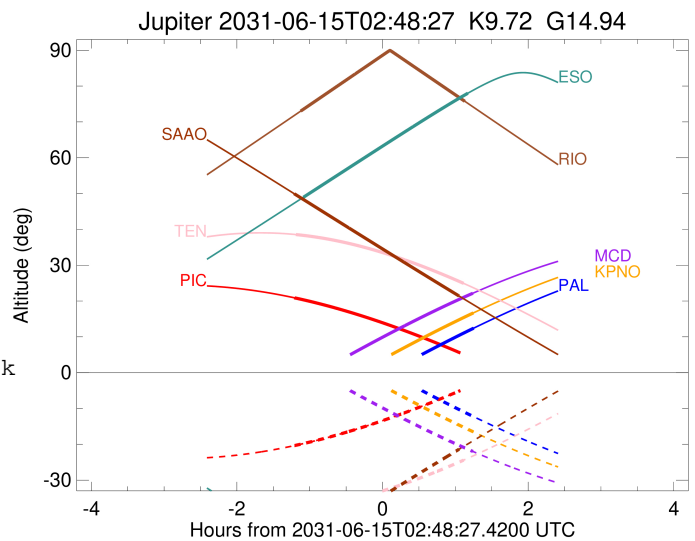
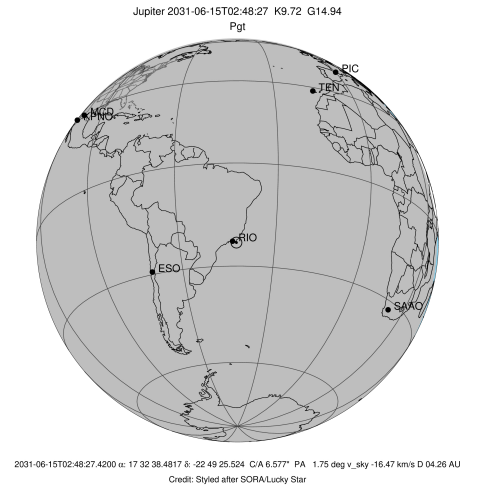


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T01:35:54.251	20.89	-20.35	71491.6	-12.14	-13.81
Jupiter	E	2031-06-15T03:55:13.327	5.13	-4.62x	71491.6	-11.96	-13.61

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-15T02:53:53.610
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        : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 9.722
G magnitude           : 14.938
RP magnitude          : 13.664
BP magnitude          : 16.772
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.46
Sun-Moon sep (deg)   : 125.50
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 5.385
C/A sky separation (km): 16656.2
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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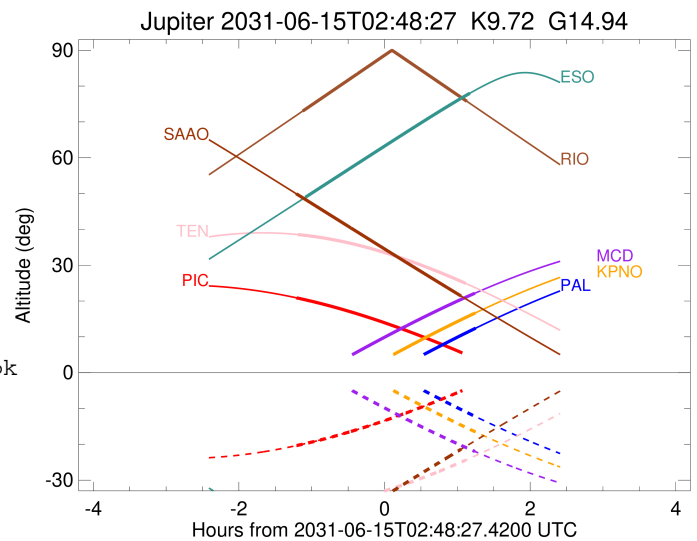
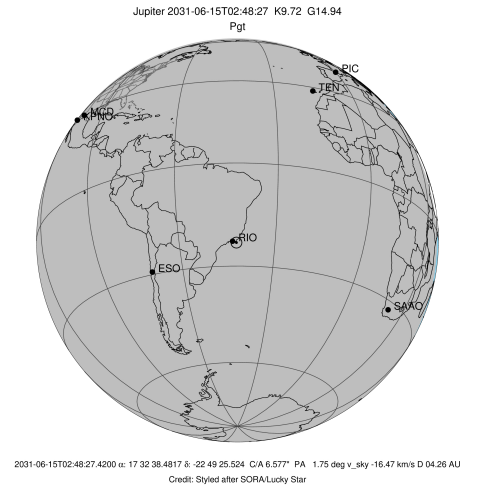


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T01:43:44.879	-13.38x	13.30x	71491.4	-14.34	-16.28
Jupiter	E	2031-06-15T04:03:33.220	12.41	-12.28	71491.6	-12.62	-14.35

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T02:53:48.770
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      : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude          : 9.722
G magnitude          : 14.938
RP magnitude         : 13.664
BP magnitude         : 16.772
DUPflag             : 0
Distance (au)       : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.46
Sun-Moon sep (deg)  : 125.57
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 5.361
C/A sky separation (km) : 16582.5
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
    
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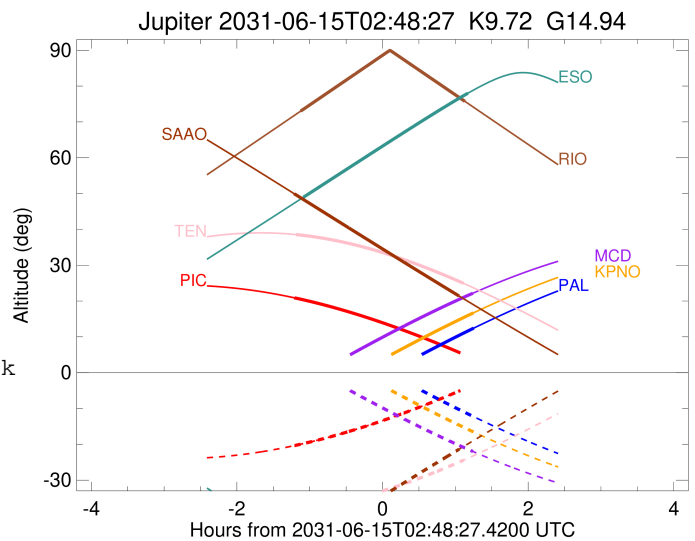
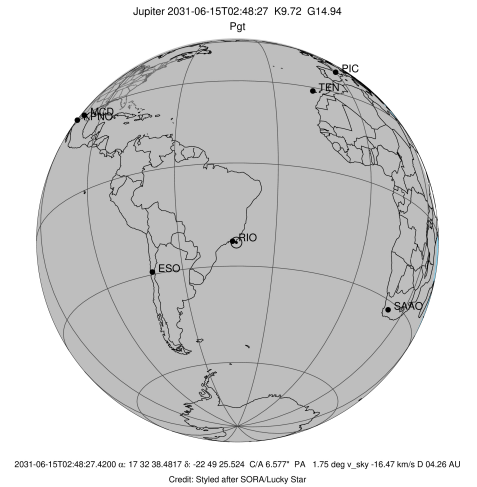


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T01:43:48.353	-8.72x	8.65x	71491.4	-14.28	-16.22
Jupiter	E	2031-06-15T04:03:20.679	16.68	-16.52	71491.6	-12.57	-14.30

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-15T02:53:34.200
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        : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 9.722
G magnitude           : 14.938
RP magnitude          : 13.664
BP magnitude          : 16.772
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg)  : 179.46
Sun-Moon sep (deg)    : 125.67
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 5.310
C/A sky separation (km) : 16425.3
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
    
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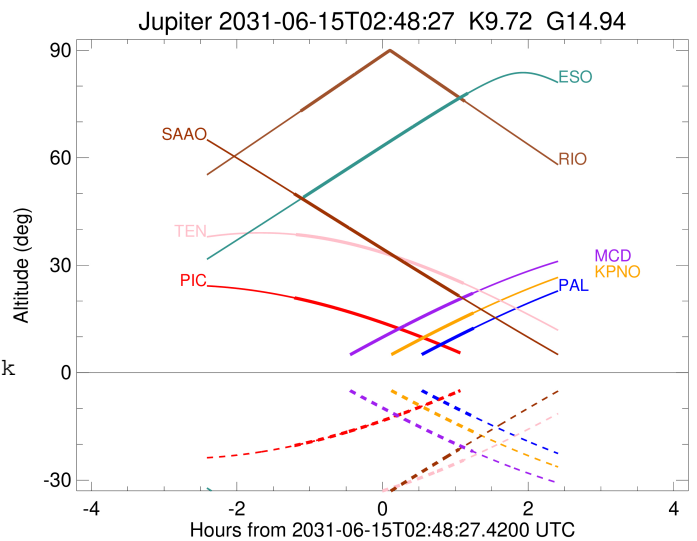
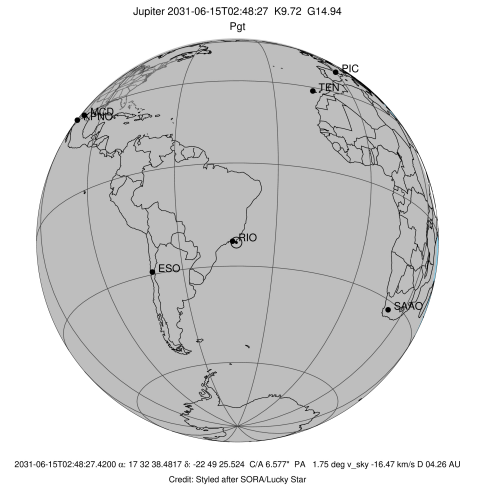


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T01:43:44.755	-2.27x	2.21x	71491.4	-14.14	-16.06
Jupiter	E	2031-06-15T04:02:56.647	22.17	-21.99	71491.6	-12.47	-14.18

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-15T02:46:10.050
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        : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 9.722
G magnitude           : 14.938
RP magnitude          : 13.664
BP magnitude          : 16.772
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg)  : 179.46
Sun-Moon sep (deg)    : 126.57
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 5.008
C/A sky separation (km) : 15489.5
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
    
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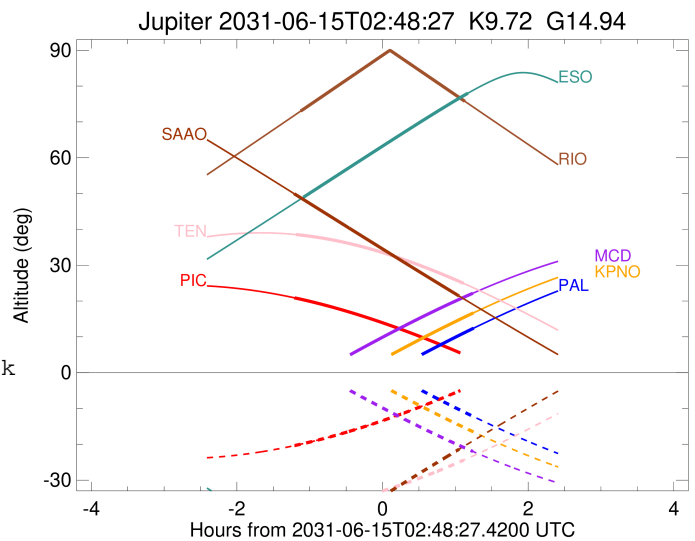
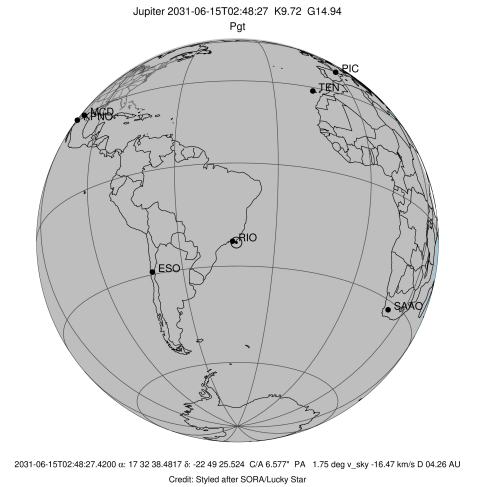


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T01:37:13.102	38.54	-38.05	71491.6	-12.75	-14.50
Jupiter	E	2031-06-15T03:55:19.250	24.92	-24.42	71491.6	-12.41	-14.12

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T02:48:37.940
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      : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude          : 9.722
G magnitude          : 14.938
RP magnitude         : 13.664
BP magnitude         : 16.772
DUPflag             : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.46
Sun-Moon sep (deg)  : 126.68
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 6.563
C/A sky separation (km): 20301.7
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
    
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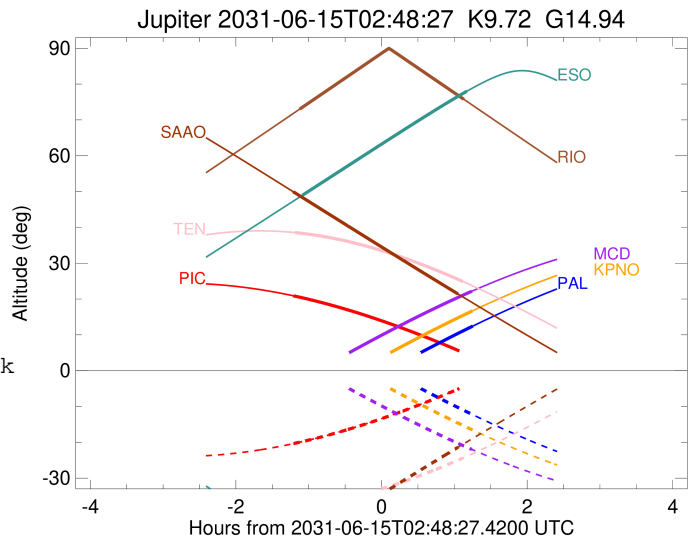
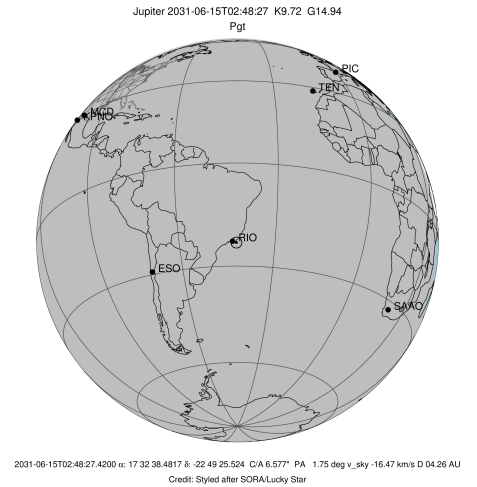


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T01:41:01.549	73.00	-73.38	71491.2	-16.97	-19.23
Jupiter	E	2031-06-15T03:56:13.104	75.76	-75.52	71491.3	-16.15	-18.31

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-15T02:51:12.950
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        : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude           : 9.722
G magnitude           : 14.938
RP magnitude          : 13.664
BP magnitude          : 16.772
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg)  : 179.46
Sun-Moon sep (deg)    : 126.38
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 6.896
C/A sky separation (km) : 21332.2
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
    
```

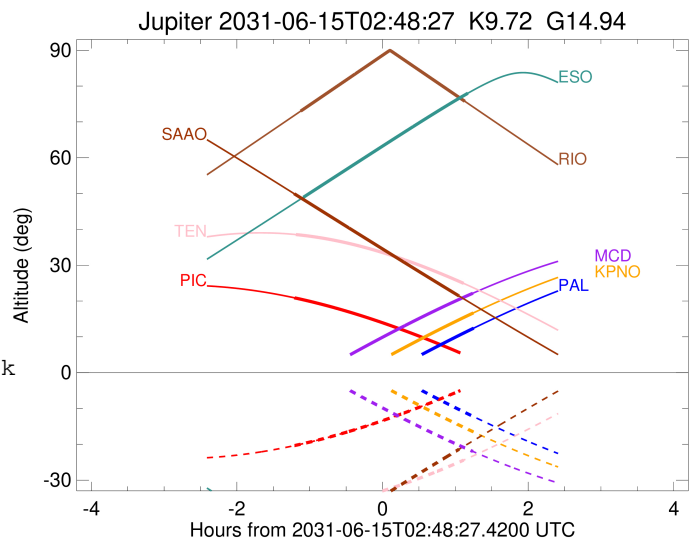
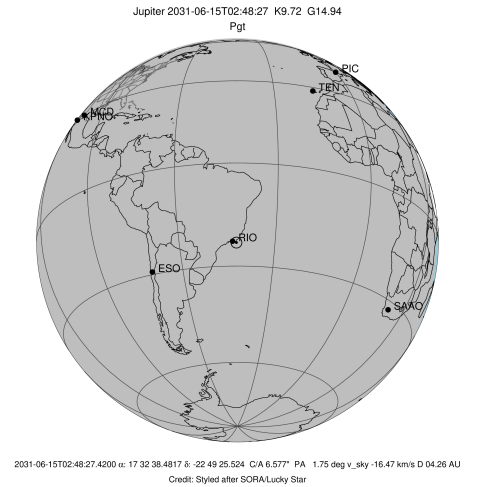


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T01:43:31.198	49.01	-49.49	71491.1	-18.05	-20.42
Jupiter	E	2031-06-15T03:58:40.568	77.97	-78.43	71491.2	-16.77	-19.00


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T02:43:26.570
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      : 4117457023583127552
2Mass ID (if available) : 17323848-2249252
ICRS Star Coord at Epoch: 17h 32m 38.48171s -22:49:25.52436s
RUWE (>1.4 is poor) : 0.93
K magnitude          : 9.722
G magnitude          : 14.938
RP magnitude         : 13.664
BP magnitude         : 16.772
DUPflag             : 0
Distance (au)       : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.46
Sun-Moon sep (deg)  : 126.79
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 7.210
C/A sky separation (km) : 22300.6
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	2031-06-15T01:35:43.489	49.94	-49.79	71491.1	-18.12	-20.50
Jupiter	E	2031-06-15T03:51:34.516	21.39	-21.37	71491.1	-18.28	-20.67