

target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-19T03:13:21.390
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4117492998220141952
 2Mass ID (if available) : 17302495-2248356

Jupiter 2031-06-19T03:13:21 K9.55 G14.84 Pgt

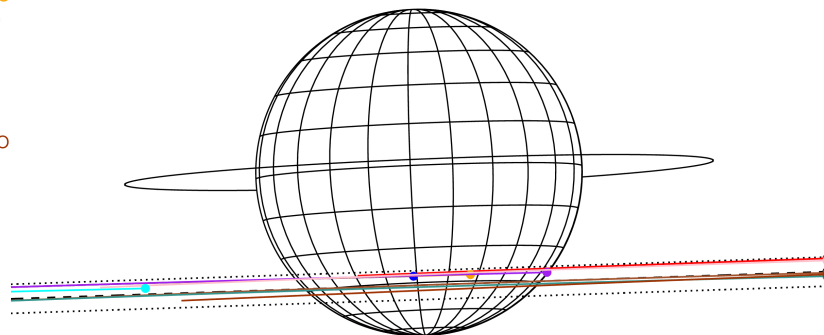
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s

RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.547
 G magnitude : 14.841
 RP magnitude : 13.539
 BP magnitude : 16.771
 DUPflag : 0
 Distance (au) : 4.265
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.41
 Sun-Target sep (deg) : 175.91
 Sun-Moon sep (deg) : 175.12
 B (ring opening deg) : -2.59
 PA of pole (deg) : 2.35
 Pole direction: RA (deg): 268.05692
 Dec (deg): 64.49651
 C/A sky separation (") : 15.955
 C/A sky separation (km) : 49354.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-19T03:13:21 K9.55 G14.84
 Pgt



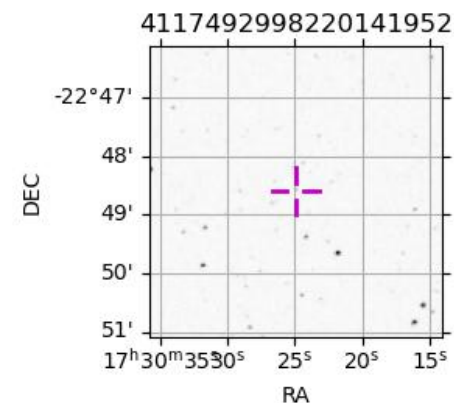
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 SAAO



2031-06-19T03:13:21.3900 α: 17 30 24.9513 δ: -22 48 35.966 C/A ***** PA 1.91 deg v_sky -16.41 km/s D 04.27 AU
 Credit: Styled after SORA/Lucky Star

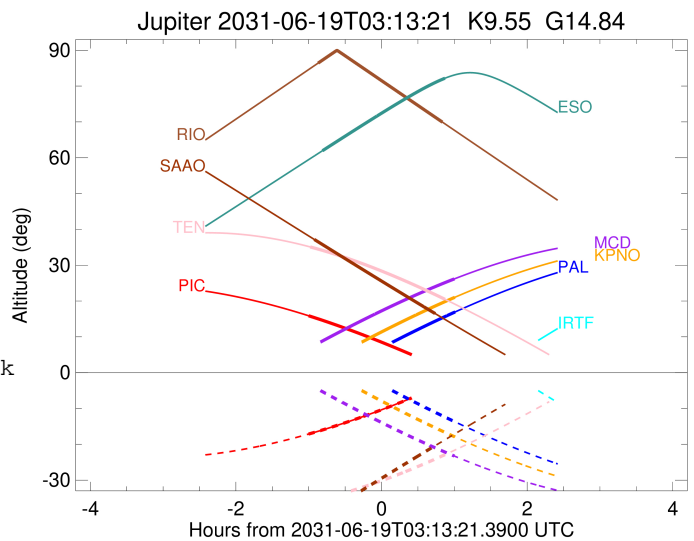
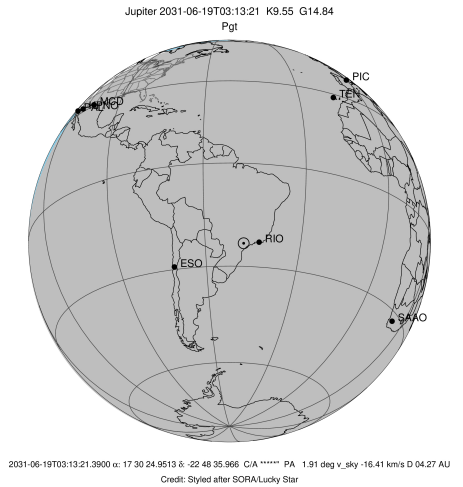
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 19 02:13 - JUN 19 02:13	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 19 04:14 - JUN 19 04:14	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 19 04:13 - JUN 19 04:13	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 19 04:13 - JUN 19 04:13	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 19 02:14 - JUN 19 04:05	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 19 02:21 - JUN 19 04:03	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 19 02:24 - JUN 19 04:05	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUN 19 02:18 - JUN 19 03:57	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T03:09:31.670
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       : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude           : 9.547
G magnitude           : 14.841
RP magnitude         : 13.539
BP magnitude         : 16.771
DUPflag              : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg) : 175.91
Sun-Moon sep (deg)   : 175.31
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 14.267
C/A sky separation (km) : 44135.0
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
    
```

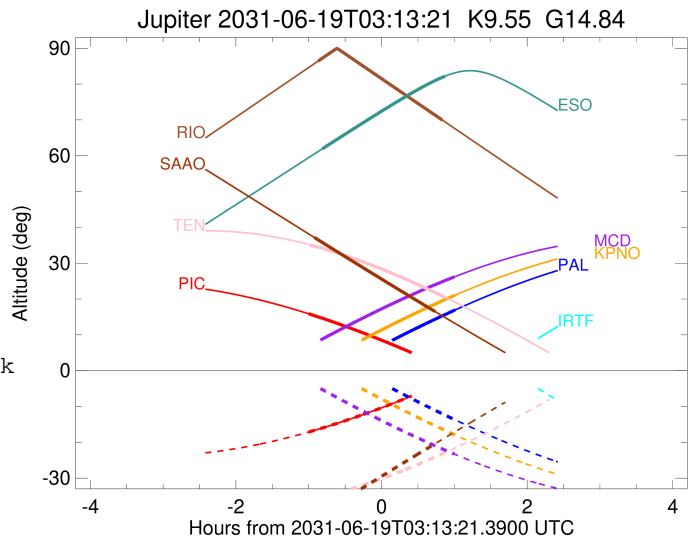
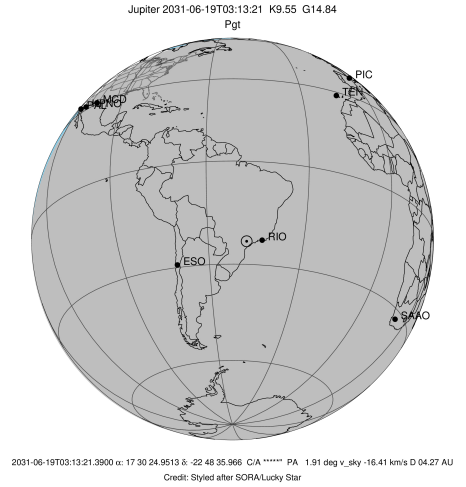


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T02:13:18.062	15.88	-17.13	71488.5	-38.23	-41.91
Jupiter	E	2031-06-19T04:05:59.017	0.83x	-3.08x	71488.5	-38.01	-41.69

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-19T03:18:41.950
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        : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude           : 9.547
G magnitude           : 14.841
RP magnitude          : 13.539
BP magnitude          : 16.771
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg)  : 175.91
Sun-Moon sep (deg)   : 174.29
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 14.660
C/A sky separation (km) : 45349.6
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
    
```

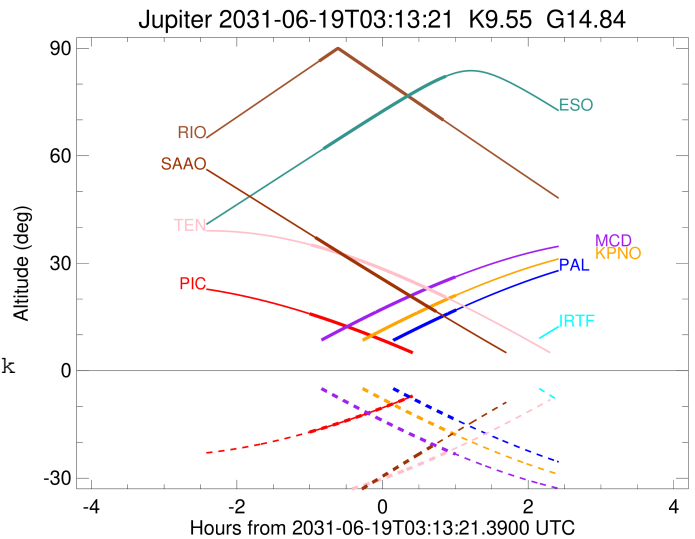
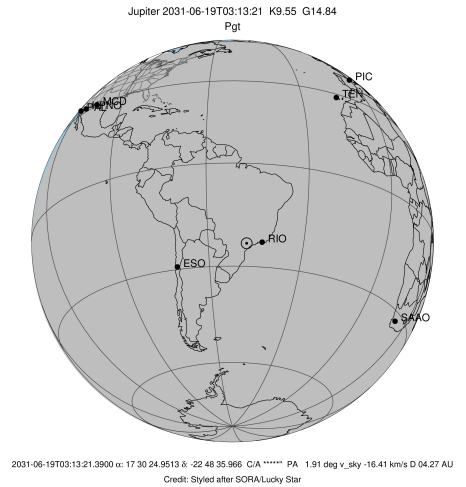


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T02:23:02.466	-2.27x	5.90x	71488.2	-40.27	-43.98
Jupiter	E	2031-06-19T04:14:04.368	16.95	-13.75	71488.4	-38.43	-42.12

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T03:18:31.120
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       : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude           : 9.547
G magnitude           : 14.841
RP magnitude          : 13.539
BP magnitude          : 16.771
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg) : 175.91
Sun-Moon sep (deg)   : 174.32
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 14.638
C/A sky separation (km) : 45282.9
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
    
```

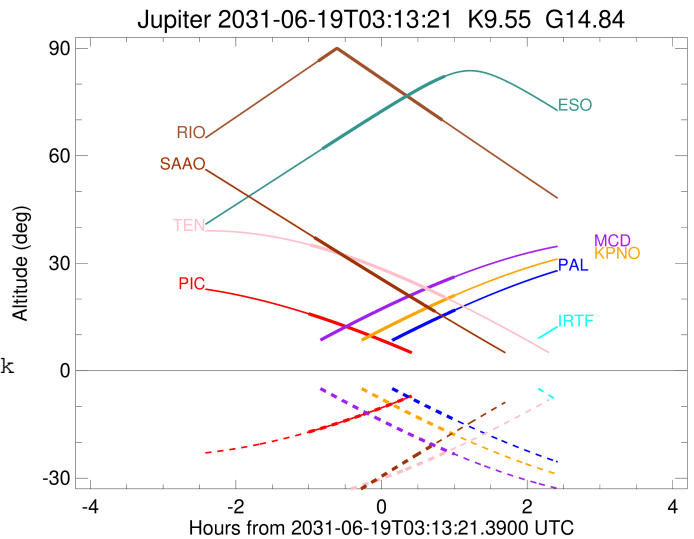
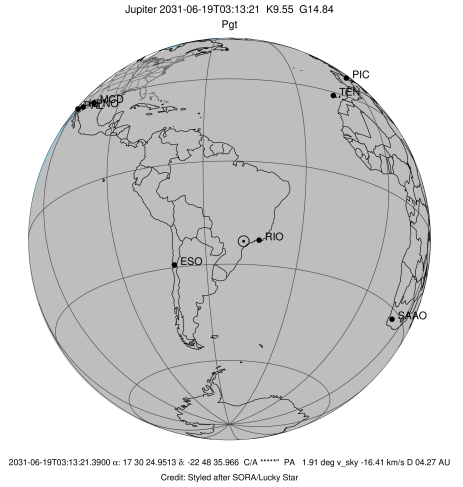


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T02:22:55.715	2.29x	1.32x	71488.2	-40.19	-43.90
Jupiter	E	2031-06-19T04:13:50.108	21.04	-17.93	71488.4	-38.38	-42.07

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-19T03:18:08.050
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       : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude          : 9.547
G magnitude          : 14.841
RP magnitude         : 13.539
BP magnitude         : 16.771
DUPflag             : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg) : 175.91
Sun-Moon sep (deg)   : 174.36
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 14.594
C/A sky separation (km) : 45144.2
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
    
```

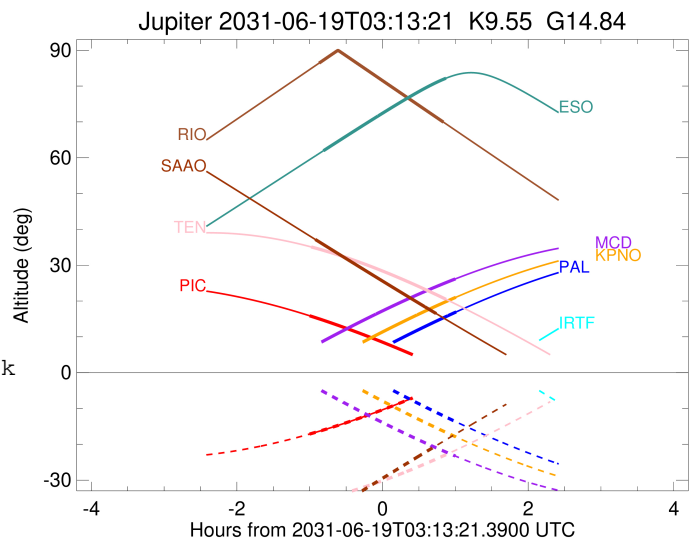
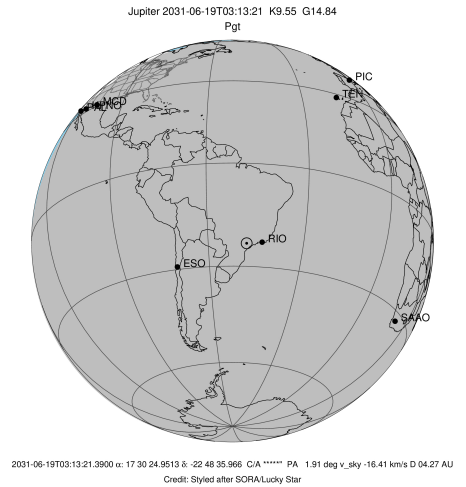


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T02:22:35.854	8.46	-4.92x	71488.2	-40.02	-43.73
Jupiter	E	2031-06-19T04:13:25.169	26.18	-23.28	71488.5	-38.28	-41.96

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-19T03:09:59.690
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        : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude           : 9.547
G magnitude           : 14.841
RP magnitude          : 13.539
BP magnitude          : 16.771
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg) : 175.91
Sun-Moon sep (deg)   : 175.32
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 14.451
C/A sky separation (km) : 44704.7
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
    
```

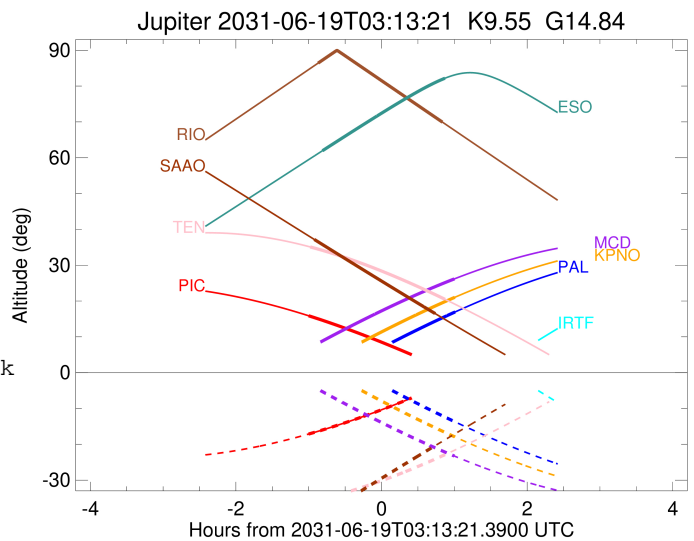
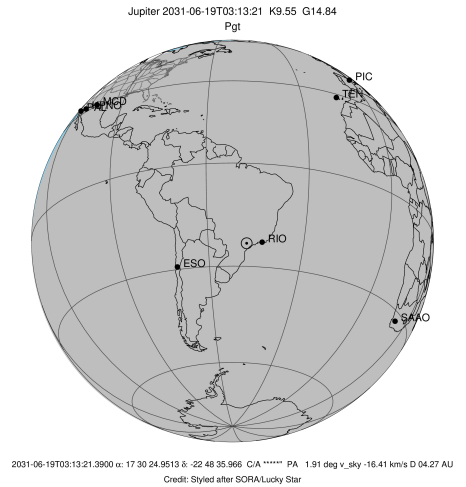


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T02:14:37.479	35.09	-35.96	71488.4	-38.88	-42.58
Jupiter	E	2031-06-19T04:05:33.469	20.50	-22.90	71488.4	-38.55	-42.24

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-19T03:12:23.270
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        : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude           : 9.547
G magnitude           : 14.841
RP magnitude          : 13.539
BP magnitude          : 16.771
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg) : 175.91
Sun-Moon sep (deg)   : 175.32
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 15.952
C/A sky separation (km) : 49347.0
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
    
```

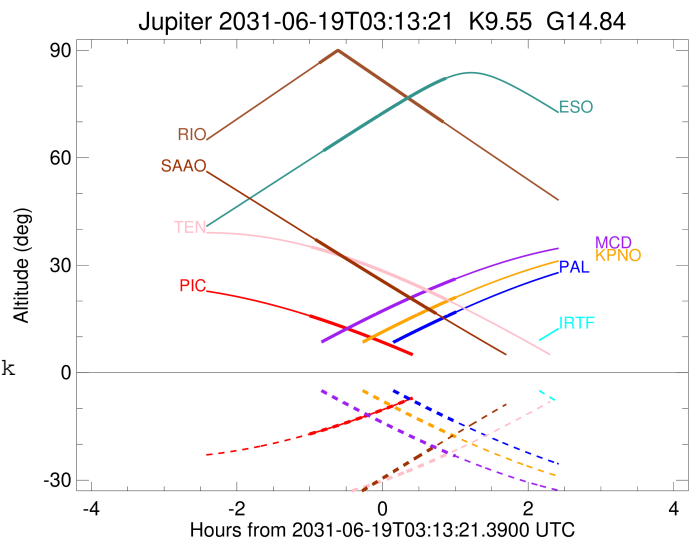
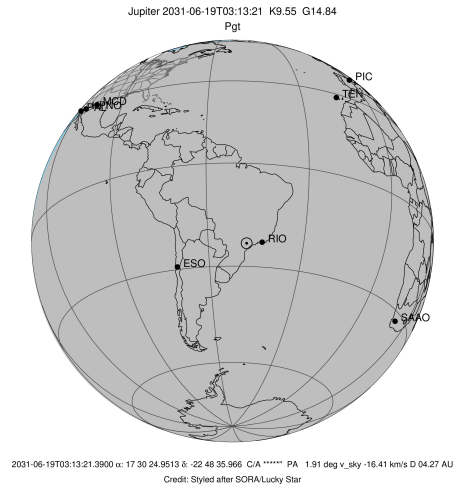


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T02:21:15.457	86.44	-82.41	71487.5	-44.06	-47.77
Jupiter	E	2031-06-19T04:03:33.852	69.93	-74.04	71487.7	-43.27	-46.98


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-19T03:15:14.740
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       : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude           : 9.547
G magnitude           : 14.841
RP magnitude          : 13.539
BP magnitude          : 16.771
DUPflag              : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg) : 175.91
Sun-Moon sep (deg)   : 175.00
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 16.230
C/A sky separation (km) : 50205.6
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
    
```

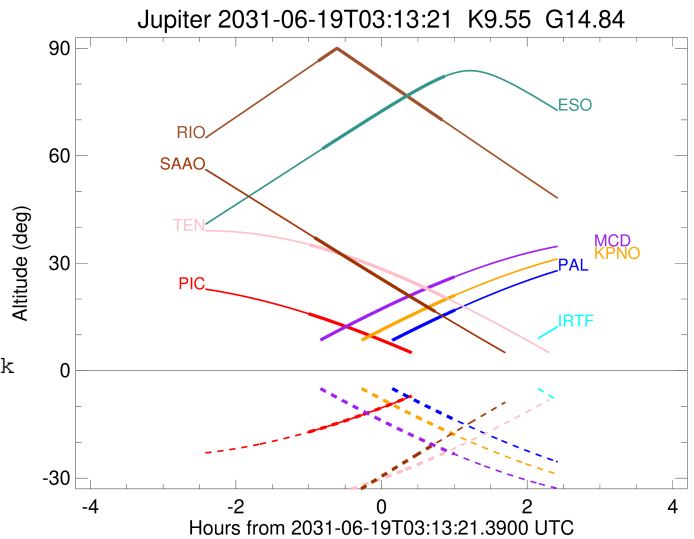
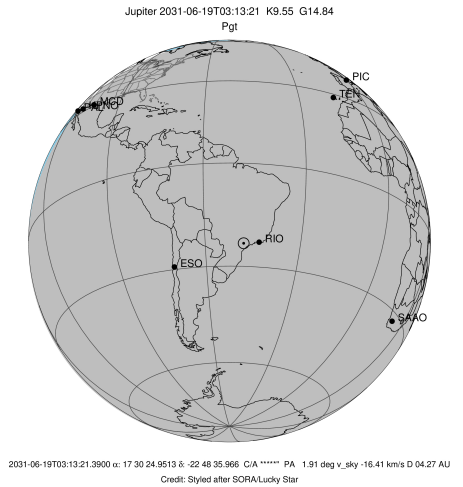


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-19T02:24:45.238	61.96	-58.34	71487.3	-45.25	-48.95
Jupiter	E	2031-06-19T04:05:39.230	82.18	-79.66	71487.6	-43.97	-47.68


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-19T03:07:38.010
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       : 4117492998220141952
2Mass ID (if available) : 17302495-2248356
ICRS Star Coord at Epoch: 17h 30m 24.95129s -22:48:35.96591s
RUWE (>1.4 is poor) : 1.01
K magnitude           : 9.547
G magnitude           : 14.841
RP magnitude          : 13.539
BP magnitude          : 16.771
DUPflag              : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.41
Sun-Target sep (deg) : 175.91
Sun-Moon sep (deg)  : 175.96
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.35
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 16.706
C/A sky separation (km) : 51679.4
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	2031-06-19T02:18:00.755	37.18	-41.09	71487.2	-46.21	-49.90
Jupiter	E	2031-06-19T03:57:30.413	16.51	-20.39	71487.2	-46.30	-49.98