

target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-09T04:09:55.770  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4116787691509752064  
 2Mass ID (if available) : 17355507-2250412

Jupiter 2031-06-09T04:09:55 K9.16 G13.49 Pgt

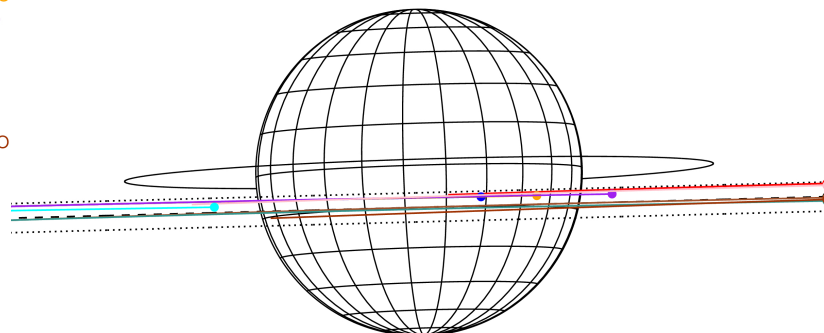
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s

RUWE (>1.4 is poor) : 0.86  
 K magnitude : 9.163  
 G magnitude : 13.492  
 RP magnitude : 12.350  
 BP magnitude : 14.885  
 DUPflag : 0  
 Distance (au) : 4.273  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.24  
 Sun-Target sep (deg) : 173.26  
 Sun-Moon sep (deg) : 45.00  
 B (ring opening deg) : -2.60  
 PA of pole (deg) : 1.76  
 Pole direction: RA (deg): 268.05692  
 Dec (deg): 64.49651  
 C/A sky separation (") : 4.927  
 C/A sky separation (km) : 15270.6  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-06-09T04:09:55 K9.16 G13.49  
 Pgt



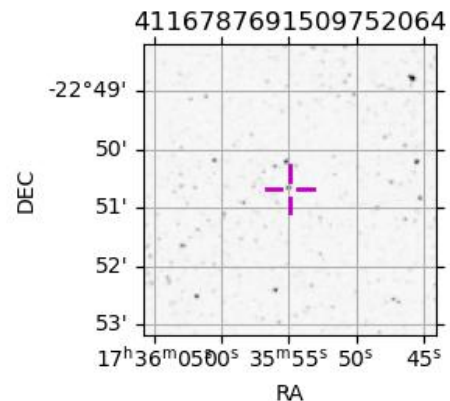
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 SAAO



2031-06-09T04:09:55.7700 a: 17 35 55.07488 s: -22 50 41.272 C/A 4.939" PA 1.51 deg v\_sky -16.24 km/s D 04.27 AU  
 Credit: Styled after SORA/Lucky Star

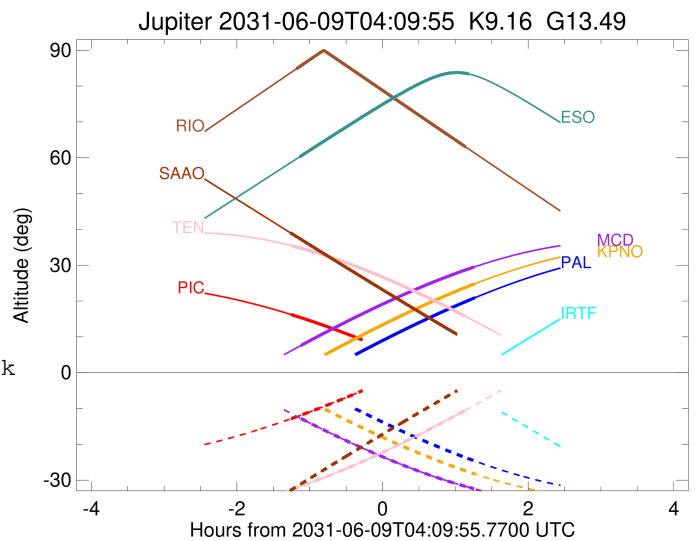
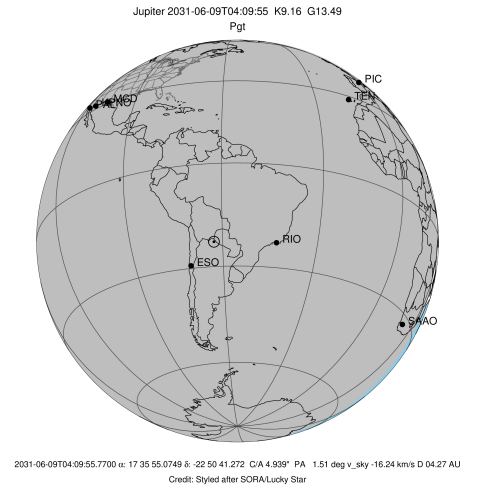
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 09 02:54 - JUN 09 02:54	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 09 05:26 - JUN 09 05:26	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 09 05:25 - JUN 09 05:25	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 09 03:02 - JUN 09 05:25	Pie
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 09 02:55 - JUN 09 05:17	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 09 02:58 - JUN 09 05:18	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 09 03:01 - JUN 09 05:21	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUN 09 02:54 - JUN 09 02:54	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T04:06:04.420
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        : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude           : 9.163
G magnitude           : 13.492
RP magnitude          : 12.350
BP magnitude          : 14.885
DUPflag              : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg)  : 173.26
Sun-Moon sep (deg)   : 44.62
B (ring opening deg) : -2.60
PA of pole (deg)     : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 3.274
C/A sky separation (km) : 10145.5
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
    
```

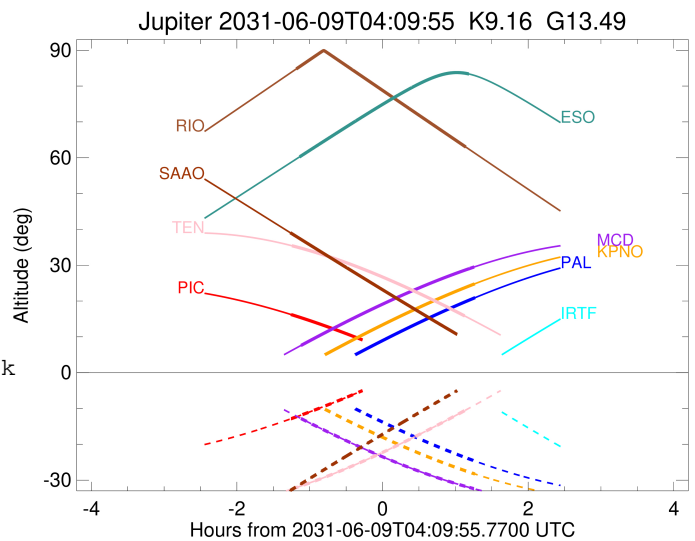
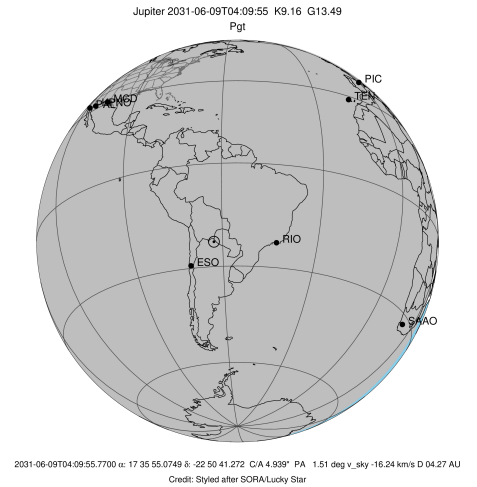


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T02:54:31.715	16.23	-12.87	71491.8	-8.09	-9.23
Jupiter	E	2031-06-09T05:17:58.939	-3.50x	8.33x	71491.8	-8.30	-9.47

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T04:14:52.450
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       : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude          : 9.163
G magnitude          : 13.492
RP magnitude         : 12.350
BP magnitude         : 14.885
DUPflag             : 0
Distance (au)        : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg) : 173.26
Sun-Moon sep (deg)  : 45.60
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 3.593
C/A sky separation (km) : 11136.4
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
    
```

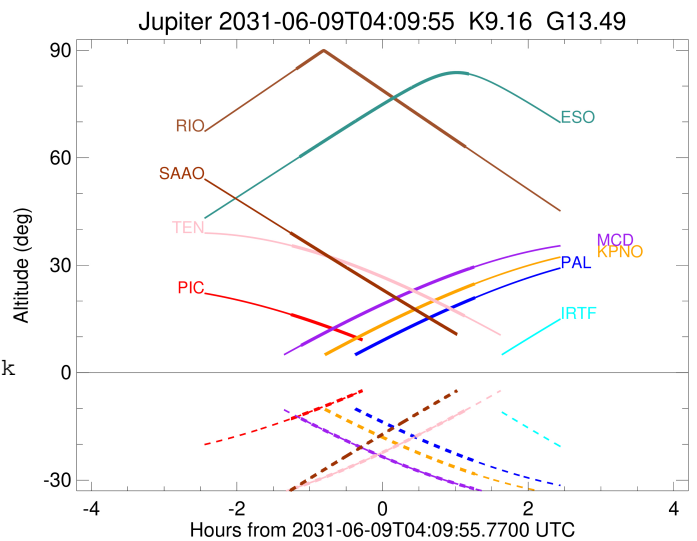
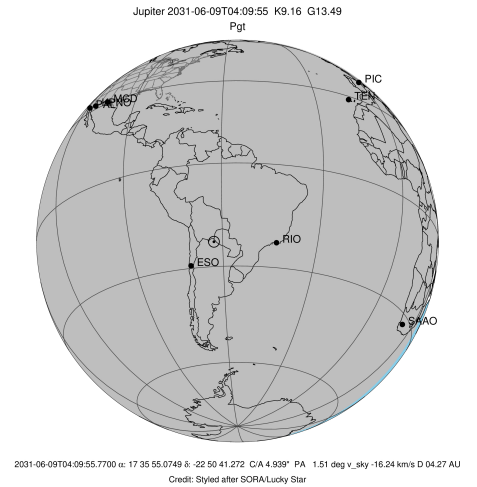


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T03:03:01.069	-3.20x	-2.25x	71491.7	-9.70	-11.06
Jupiter	E	2031-06-09T05:26:15.357	20.94	-24.69	71491.8	-8.28	-9.45

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T04:14:40.540
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      : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude         : 9.163
G magnitude         : 13.492
RP magnitude        : 12.350
BP magnitude        : 14.885
DUPflag            : 0
Distance (au)       : 4.273
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg) : 173.26
Sun-Moon sep (deg)  : 45.63
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 3.573
C/A sky separation (km) : 11073.7
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
    
```

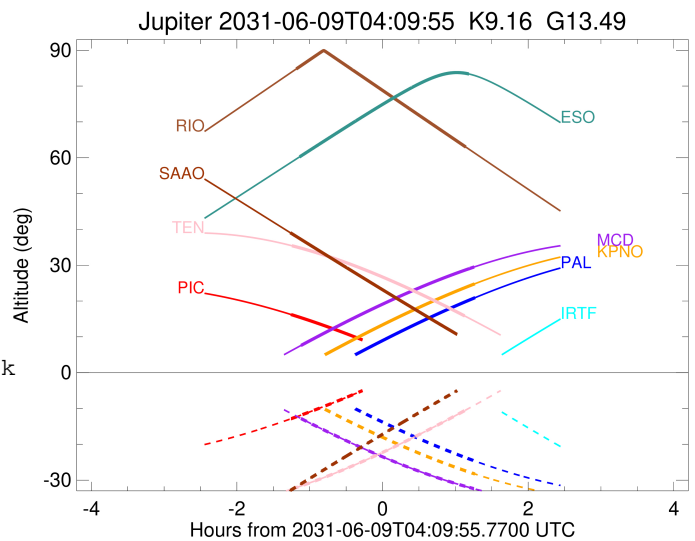
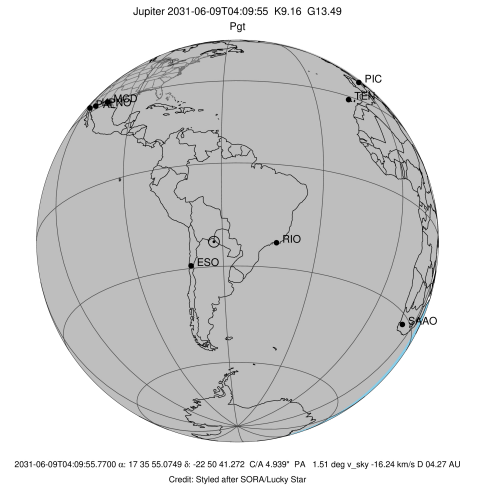


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T03:02:57.878	1.38x	-6.76	71491.7	-9.64	-10.99
Jupiter	E	2031-06-09T05:25:56.001	24.80	-28.26	71491.8	-8.25	-9.42

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T04:14:16.420
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      : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude          : 9.163
G magnitude          : 13.492
RP magnitude         : 12.350
BP magnitude         : 14.885
DUPflag             : 0
Distance (au)       : 4.273
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg) : 173.26
Sun-Moon sep (deg)  : 45.66
B (ring opening deg) : -2.60
PA of pole (deg)    : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 3.531
C/A sky separation (km) : 10943.9
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
    
```

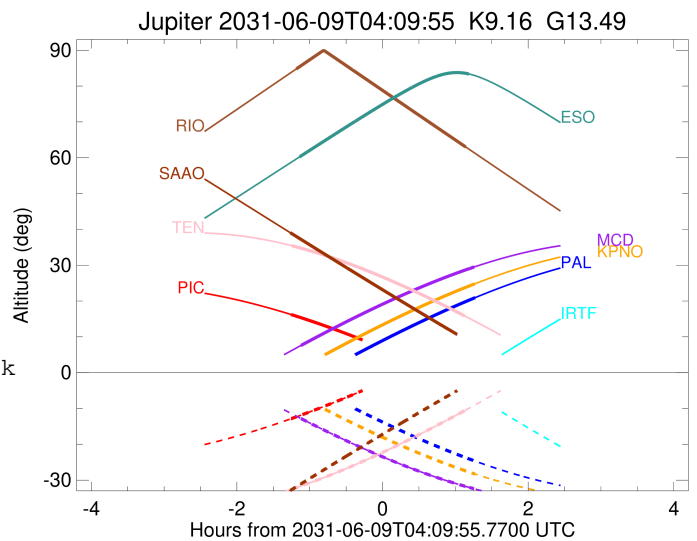
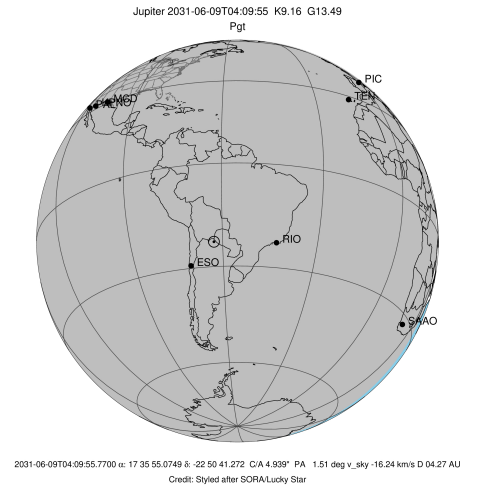


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T03:02:45.128	7.59	-12.80	71491.7	-9.51	-10.84
Jupiter	E	2031-06-09T05:25:22.962	29.49	-32.40	71491.8	-8.19	-9.35

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T04:06:25.510
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        : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude           : 9.163
G magnitude           : 13.492
RP magnitude          : 12.350
BP magnitude          : 14.885
DUPflag              : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg) : 173.26
Sun-Moon sep (deg)   : 44.90
B (ring opening deg) : -2.60
PA of pole (deg)     : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 3.453
C/A sky separation (km) : 10700.9
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
    
```

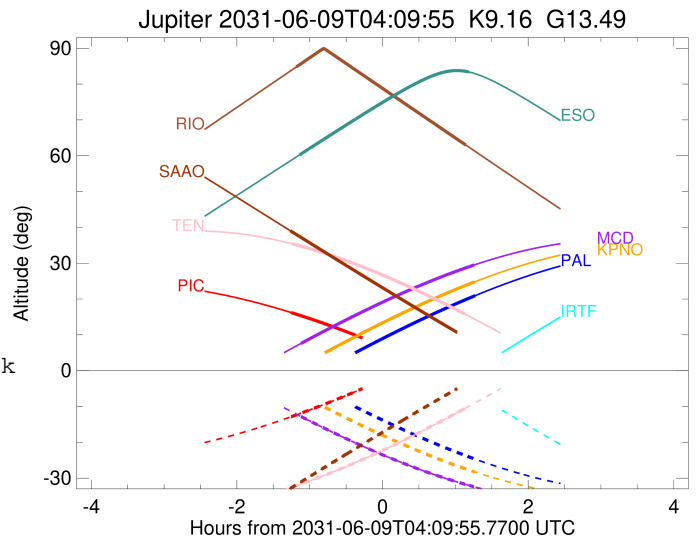
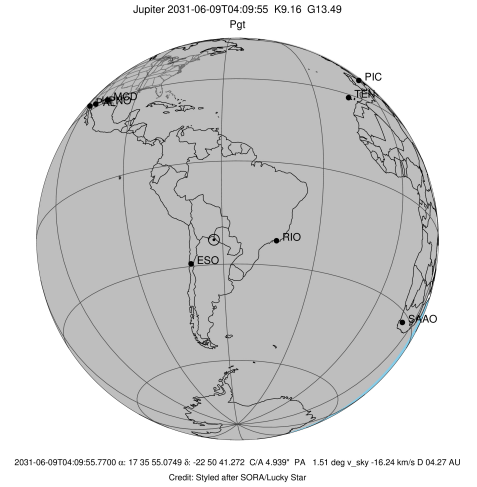


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T02:55:28.672	35.41	-32.45	71491.8	-8.61	-9.82
Jupiter	E	2031-06-09T05:17:41.495	15.83	-10.58	71491.8	-8.73	-9.96

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T04:08:40.150
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        : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude           : 9.163
G magnitude           : 13.492
RP magnitude          : 12.350
BP magnitude          : 14.885
DUPflag              : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg)  : 173.26
Sun-Moon sep (deg)    : 45.57
B (ring opening deg)  : -2.60
PA of pole (deg)      : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 4.930
C/A sky separation (km) : 15279.9
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
    
```



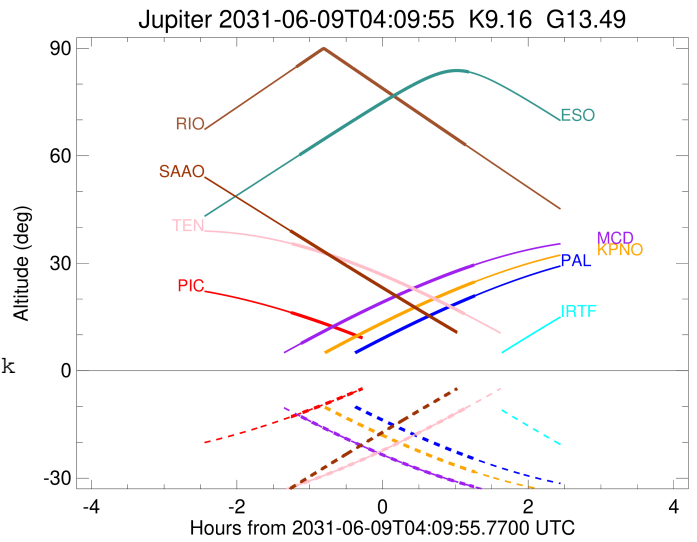
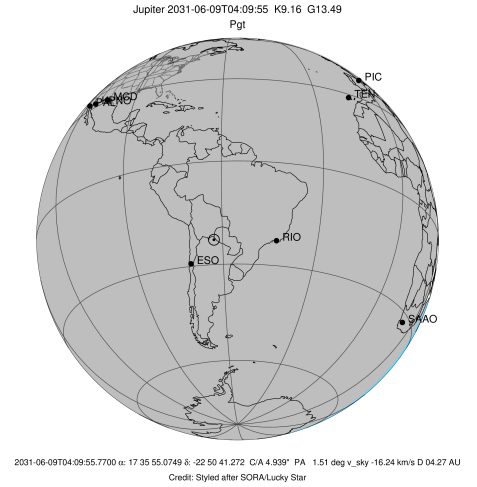
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T02:58:52.025	84.77	-88.43	71491.6	-12.58	-14.31
Jupiter	E	2031-06-09T05:18:34.009	62.98	-56.34	71491.6	-12.25	-13.94



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-09T04:11:26.280
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        : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude           : 9.163
G magnitude           : 13.492
RP magnitude          : 12.350
BP magnitude          : 14.885
DUPflag              : 0
Distance (au)         : 4.273
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg)  : 173.26
Sun-Moon sep (deg)    : 45.87
B (ring opening deg) : -2.60
PA of pole (deg)      : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 5.185
C/A sky separation (km) : 16069.7
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
    
```



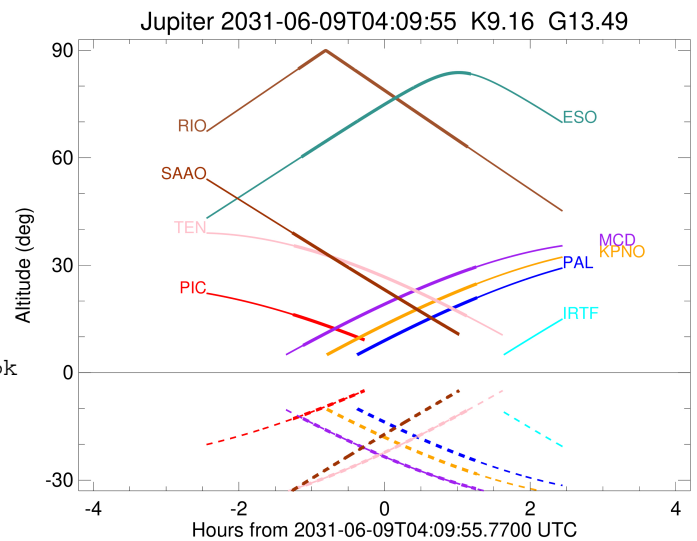
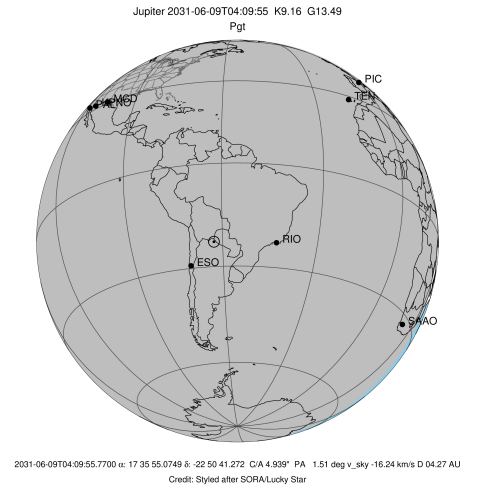
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-09T03:01:34.261	60.22	-66.63	71491.5	-13.47	-15.31
Jupiter	E	2031-06-09T05:21:09.254	83.37	-79.28	71491.6	-12.64	-14.38



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-09T04:04:22.160
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     : 4116787691509752064
2Mass ID (if available) : 17355507-2250412
ICRS Star Coord at Epoch: 17h 35m 55.07488s -22:50:41.27191s
RUWE (>1.4 is poor) : 0.86
K magnitude         : 9.163
G magnitude         : 13.492
RP magnitude        : 12.350
BP magnitude        : 14.885
DUPflag            : 0
Distance (au)      : 4.273
f0 (km)            : 0.00
g0 (km)            : 0.00
skyplane vel. (km/s) : -16.24
Sun-Target sep (deg) : 173.26
Sun-Moon sep (deg) : 44.72
B (ring opening deg) : -2.60
PA of pole (deg)   : 1.76
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 5.721
C/A sky separation (km) : 17731.3
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	2031-06-09T02:54:01.508	39.05	-32.87	71491.4	-14.12	-16.04
Jupiter	E	2031-06-09T05:15:12.378	9.92	-4.28x	71491.4	-14.63	-16.61