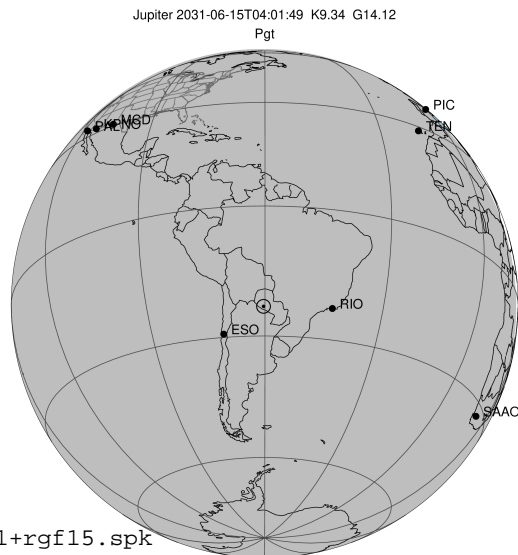


target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-06-15T04:01:49.360  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4117456989223390720  
 2Mass ID (if available) : 17323674-2249369

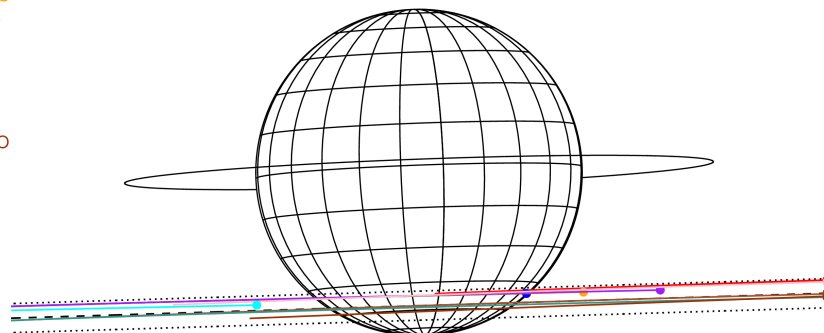
Jupiter 2031-06-15T04:01:49 K9.34 G14.12 Pgt

ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s

RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.344  
 G magnitude : 14.118  
 RP magnitude : 12.898  
 BP magnitude : 15.758  
 DUPflag : 0  
 Distance (au) : 4.265  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -16.47  
 Sun-Target sep (deg) : 179.48  
 Sun-Moon sep (deg) : 126.59  
 B (ring opening deg) : -2.59  
 PA of pole (deg) : 2.11  
 Pole direction: RA (deg): 268.05692  
 Dec (deg): 64.49651  
 C/A sky separation (") : 18.851  
 C/A sky separation (km) : 58309.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk



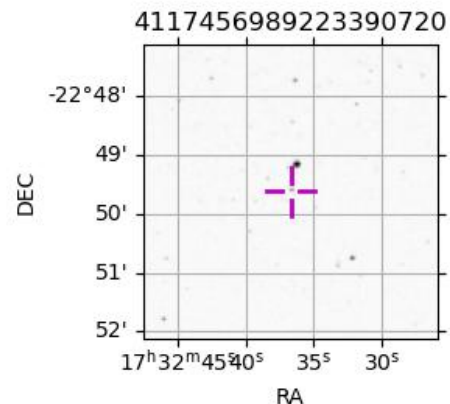
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 SAAO



2031-06-15T04:01:49.3600 α: 17 32 36.7598 δ: -22 49 37.088 C/A \*\*\*\*\* PA 1.75 deg v\_sky -16.47 km/s D 04.26 AU  
 Credit: Styled after SORA/Lucky Star

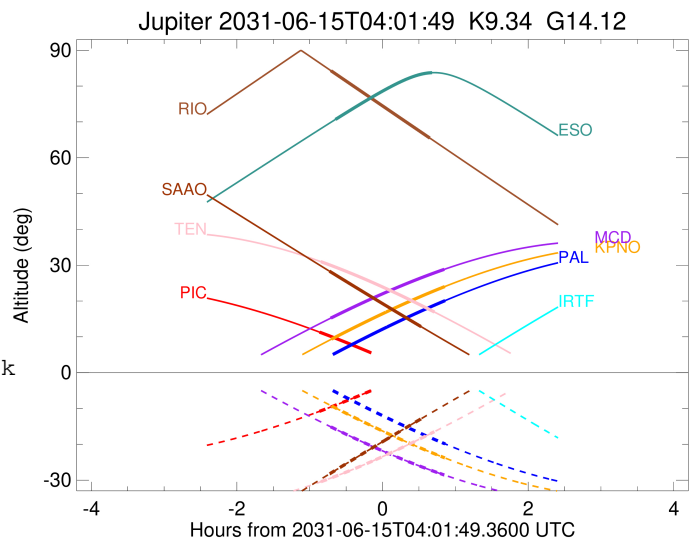
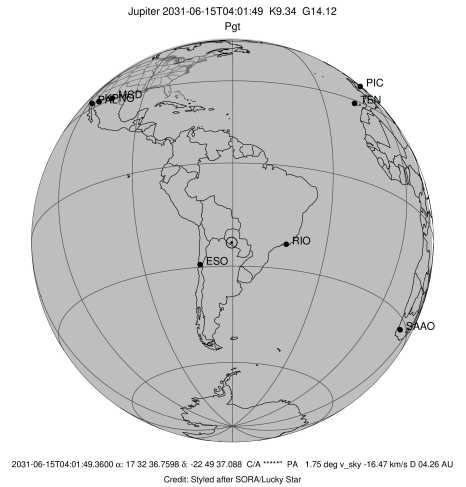
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUN 15 03:09 - JUN 15 03:09	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	JUN 15 04:53 - JUN 15 04:53	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	JUN 15 03:19 - JUN 15 04:53	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+	JUN 15 03:19 - JUN 15 04:52	Pie
TEN	Teide Obs./Tenerife	28.3	343.5	+	JUN 15 03:11 - JUN 15 04:44	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 03:19 - JUN 15 04:40	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUN 15 03:23 - JUN 15 04:42	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	JUN 15 03:18 - JUN 15 04:33	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-15T03:57:32.560
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        : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor)  : 0.96
K magnitude           : 9.344
G magnitude           : 14.118
RP magnitude          : 12.898
BP magnitude          : 15.758
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.48
Sun-Moon sep (deg)   : 127.01
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 17.227
C/A sky separation (km): 53286.2
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
    
```

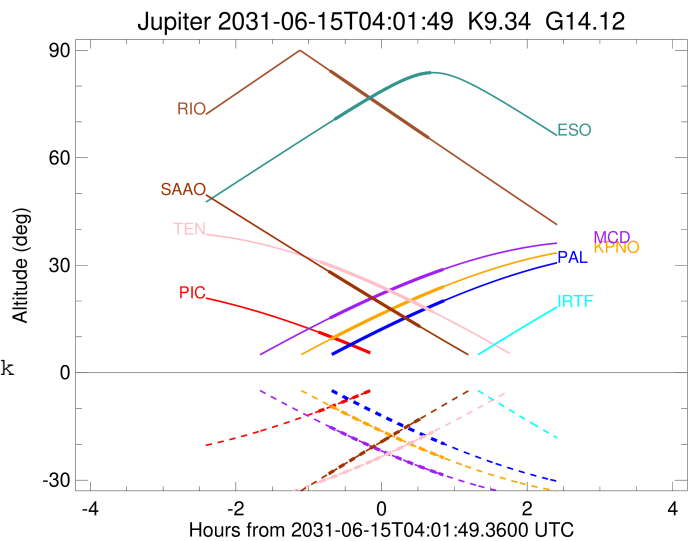
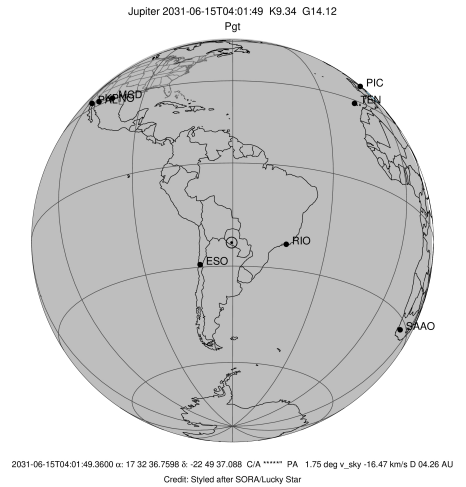


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T03:09:57.224	11.32	-10.78	71486.9	-48.14	-51.78
Jupiter	E	2031-06-15T04:45:18.513	-2.55x	3.03x	71486.9	-48.17	-51.81

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T04:06:49.140
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       : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor) : 0.96
K magnitude           : 9.344
G magnitude           : 14.118
RP magnitude          : 12.898
BP magnitude          : 15.758
DUPflag              : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.48
Sun-Moon sep (deg)   : 126.37
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 17.473
C/A sky separation (km): 54045.9
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
    
```

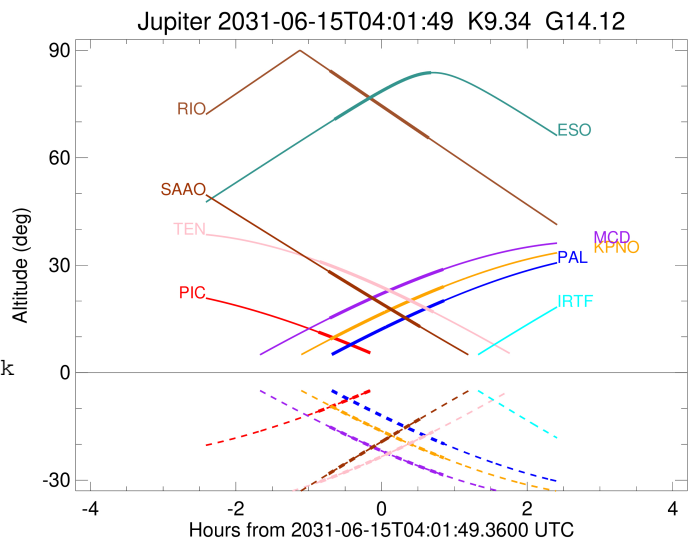
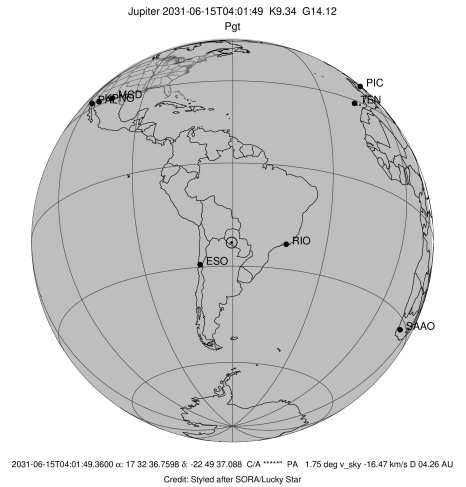


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T03:20:01.187	4.91x	-4.85x	71486.6	-49.88	-53.47
Jupiter	E	2031-06-15T04:53:25.707	20.11	-19.89	71486.9	-48.27	-51.91

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T04:06:34.260
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      : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor) : 0.96
K magnitude         : 9.344
G magnitude         : 14.118
RP magnitude        : 12.898
BP magnitude        : 15.758
DUPflag            : 0
Distance (au)       : 4.265
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.48
Sun-Moon sep (deg)  : 126.44
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (" ) : 17.454
C/A sky separation (km) : 53988.5
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
    
```

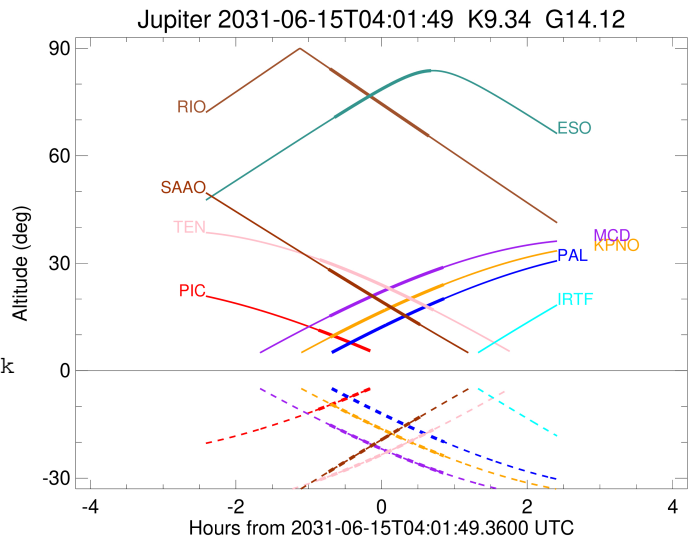
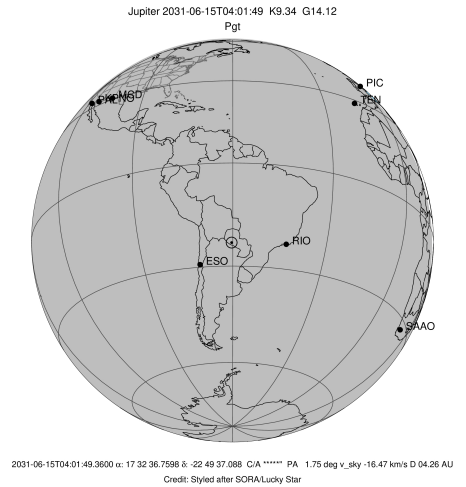


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T03:19:48.254	9.36	-9.28	71486.6	-49.79	-53.39
Jupiter	E	2031-06-15T04:53:09.488	24.04	-23.79	71486.9	-48.23	-51.87

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T04:06:05.830
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      : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor) : 0.96
K magnitude          : 9.344
G magnitude          : 14.118
RP magnitude         : 12.898
BP magnitude         : 15.758
DUPflag             : 0
Distance (au)       : 4.265
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.48
Sun-Moon sep (deg)  : 126.55
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 17.416
C/A sky separation (km) : 53869.3
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
    
```

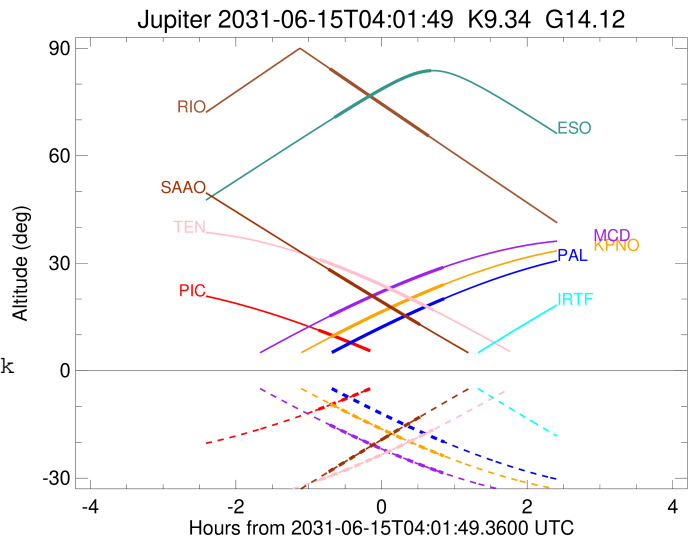
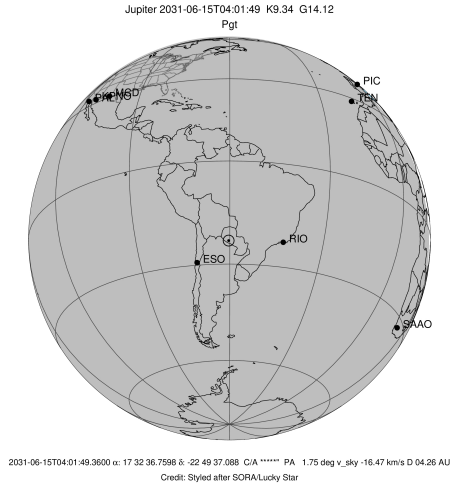


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T03:19:19.415	15.25	-15.14	71486.6	-49.61	-53.21
Jupiter	E	2031-06-15T04:52:42.578	28.84	-28.55	71486.9	-48.13	-51.77

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T03:57:46.410
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      : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor) : 0.96
K magnitude          : 9.344
G magnitude          : 14.118
RP magnitude         : 12.898
BP magnitude         : 15.758
DUPflag             : 0
Distance (au)       : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.48
Sun-Moon sep (deg)  : 127.24
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 17.403
C/A sky separation (km): 53830.3
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
    
```

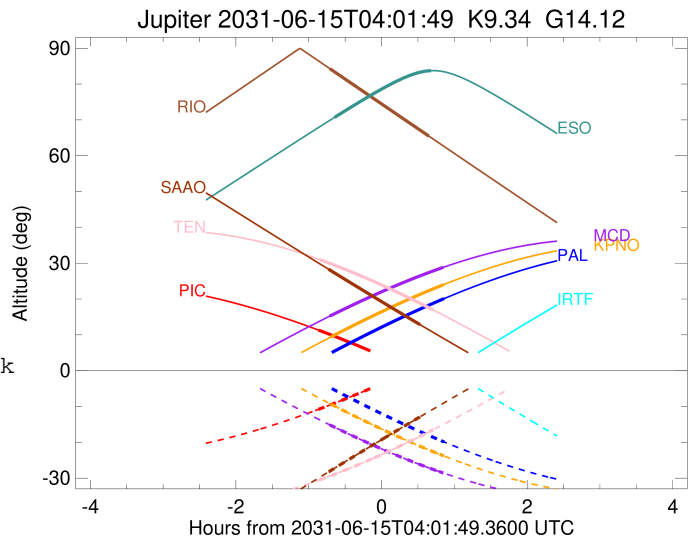
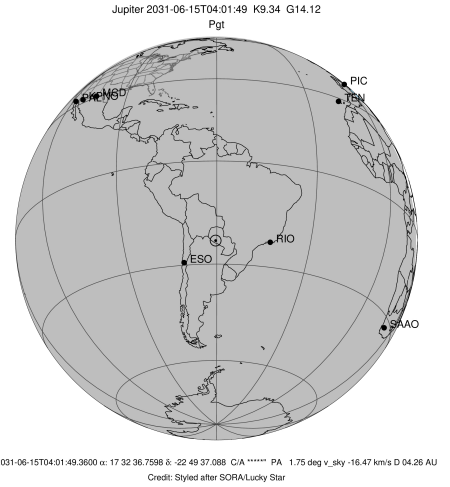


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T03:11:09.601	30.96	-30.43	71486.8	-48.85	-52.47
Jupiter	E	2031-06-15T04:44:32.723	16.93	-16.47	71486.8	-48.81	-52.43

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-15T04:00:00.970
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        : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor)  : 0.96
K magnitude           : 9.344
G magnitude           : 14.118
RP magnitude          : 12.898
BP magnitude          : 15.758
DUPflag              : 0
Distance (au)         : 4.265
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg)  : 179.48
Sun-Moon sep (deg)    : 127.46
B (ring opening deg)  : -2.59
PA of pole (deg)      : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 18.863
C/A sky separation (km) : 58347.2
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
    
```

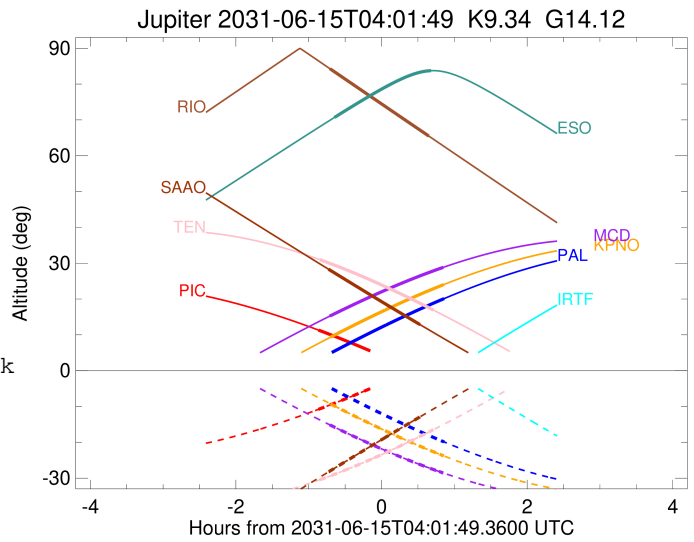
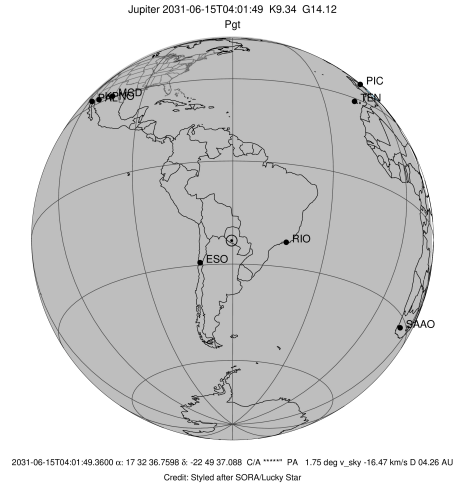


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T03:19:19.093	84.28	-83.99	71485.8	-54.91	-58.29
Jupiter	E	2031-06-15T04:40:45.875	65.49	-65.31	71485.9	-54.44	-57.83

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-15T04:02:57.340
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       : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor) : 0.96
K magnitude           : 9.344
G magnitude           : 14.118
RP magnitude          : 12.898
BP magnitude          : 15.758
DUPflag              : 0
Distance (au)        : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.48
Sun-Moon sep (deg)   : 127.23
B (ring opening deg) : -2.59
PA of pole (deg)     : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation ("): 19.096
C/A sky separation (km): 59066.0
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
    
```



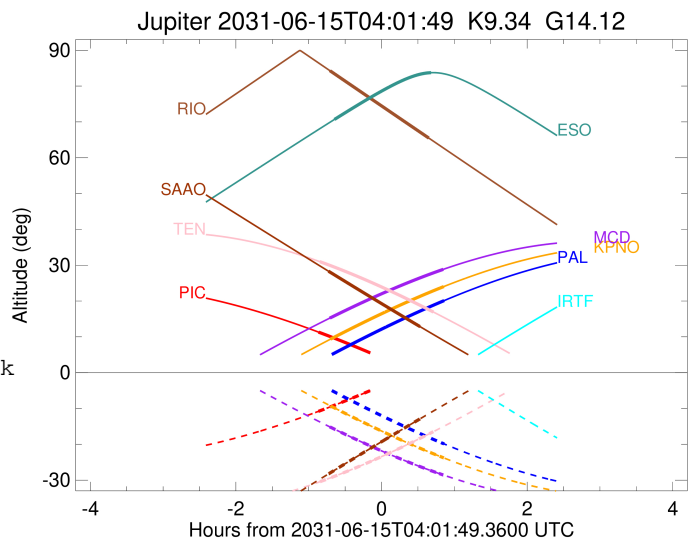
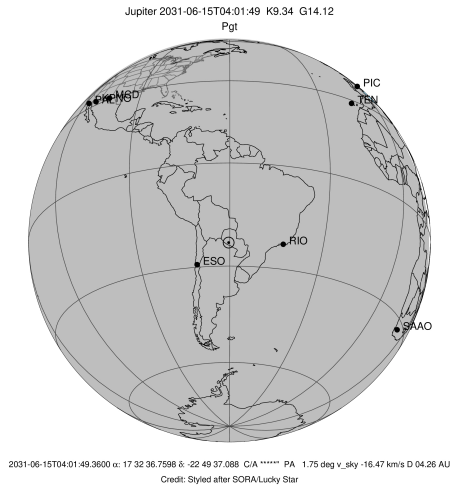
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-15T03:23:12.144	70.71	-71.14	71485.6	-56.17	-59.47
Jupiter	E	2031-06-15T04:42:40.554	83.73	-84.20	71485.8	-55.19	-58.55



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-15T03:55:50.050
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      : 4117456989223390720
2Mass ID (if available) : 17323674-2249369
ICRS Star Coord at Epoch: 17h 32m 36.75980s -22:49:37.08835s
RUWE (>1.4 is poor) : 0.96
K magnitude          : 9.344
G magnitude          : 14.118
RP magnitude         : 12.898
BP magnitude         : 15.758
DUPflag             : 0
Distance (au)       : 4.265
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.47
Sun-Target sep (deg) : 179.48
Sun-Moon sep (deg)  : 127.30
B (ring opening deg) : -2.59
PA of pole (deg)    : 2.11
Pole direction: RA (deg): 268.05692
Dec (deg): 64.49651
C/A sky separation (") : 19.692
C/A sky separation (km) : 60911.3
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	2031-06-15T03:18:14.394	28.30	-28.24	71485.3	-58.21	-61.39
Jupiter	E	2031-06-15T04:33:34.615	12.85	-12.89	71485.3	-58.51	-61.67