

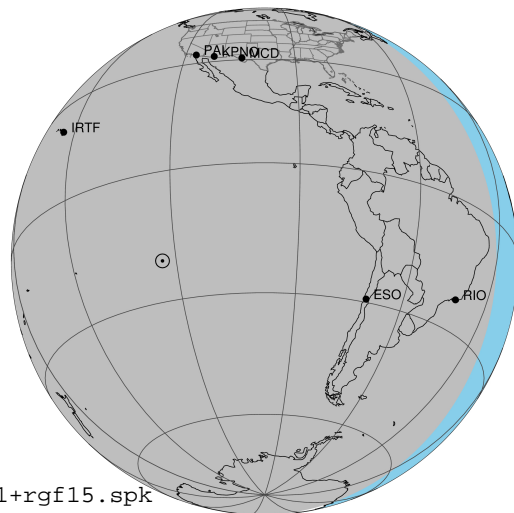
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-05-24T08:11:04.980  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4116869467685698048  
 2Mass ID (if available) : 17440032-2253162

Jupiter 2031-05-24T08:11:04 K8.73 G12.01 Pgt

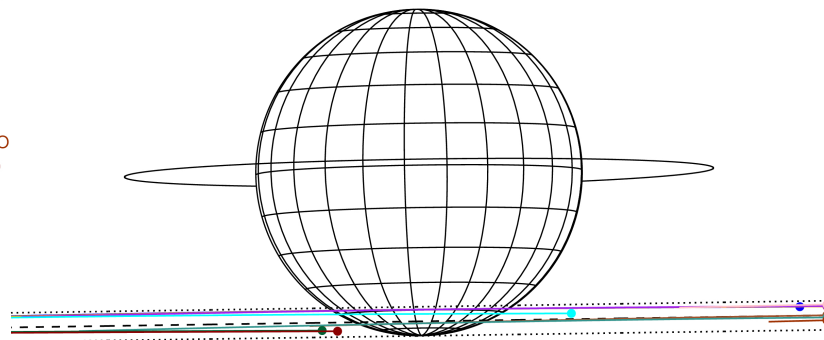
ICRS Star Coord at Epoch: 17h 44m 00.32862s -22:53:16.33391s

RUWE (>1.4 is poor) : 0.77  
 K magnitude : 8.733  
 G magnitude : 12.007  
 RP magnitude : 11.044  
 BP magnitude : 12.952  
 DUPflag : 0  
 Distance (au) : 4.345  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -13.96  
 Sun-Target sep (deg) : 156.24  
 Sun-Moon sep (deg) : 169.94  
 B (ring opening deg) : -2.60  
 PA of pole (deg) : 0.89  
 Pole direction: RA (deg): 268.05694  
 Dec (deg): 64.49651  
 C/A sky separation (") : 20.689  
 C/A sky separation (km) : 65204.0  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-05-24T08:11:04 K8.73 G12.01  
 Pgt



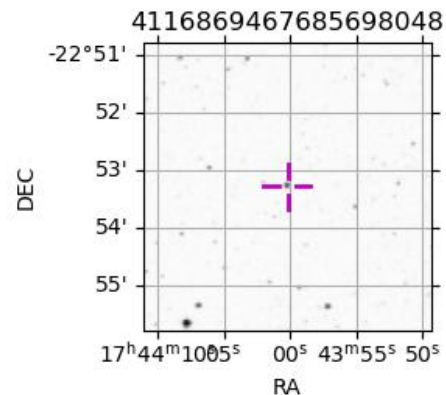
Earth  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 AAT  
 SAAO  
 MSO



2031-05-24T08:11:04.9800 α: 17 44 00.3286 δ: -22 53 16.334 C/A \*\*\*\*\* PA 0.85 deg v\_sky -13.96 km/s D 04.35 AU  
 Credit: Styled after SORA/Lucky Star

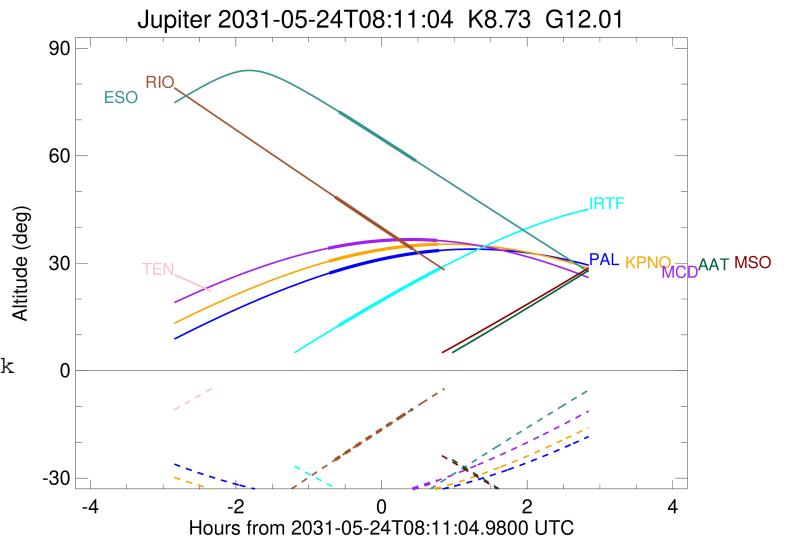
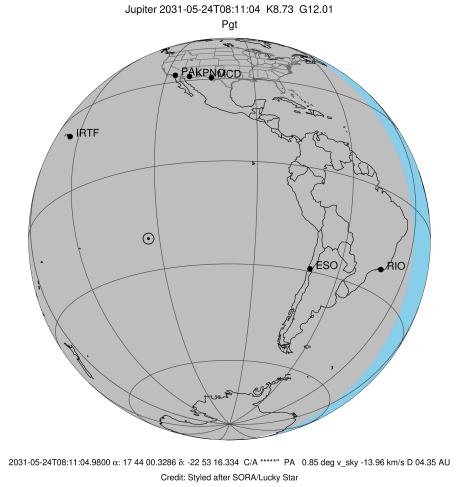
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+ +	MAY 24 07:28 - MAY 24 08:58	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 24 07:27 - MAY 24 08:57	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	MAY 24 07:27 - MAY 24 08:56	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 24 07:35 - MAY 24 08:59	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+ +	MAY 24 07:32 - MAY 24 08:36	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 24 07:36 - MAY 24 08:39	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T08:13:24.440
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       : 4116869467685698048
2Mass ID (if available) : 17440032-2253162
ICRS Star Coord at Epoch: 17h 44m 00.32862s -22:53:16.33391s
RUWE (>1.4 is poor) : 0.77
K magnitude           : 8.733
G magnitude           : 12.007
RP magnitude          : 11.044
BP magnitude          : 12.952
DUPflag              : 0
Distance (au)        : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.96
Sun-Target sep (deg) : 156.24
Sun-Moon sep (deg)   : 170.04
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.051
C/A sky separation (km) : 60039.6
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
    
```

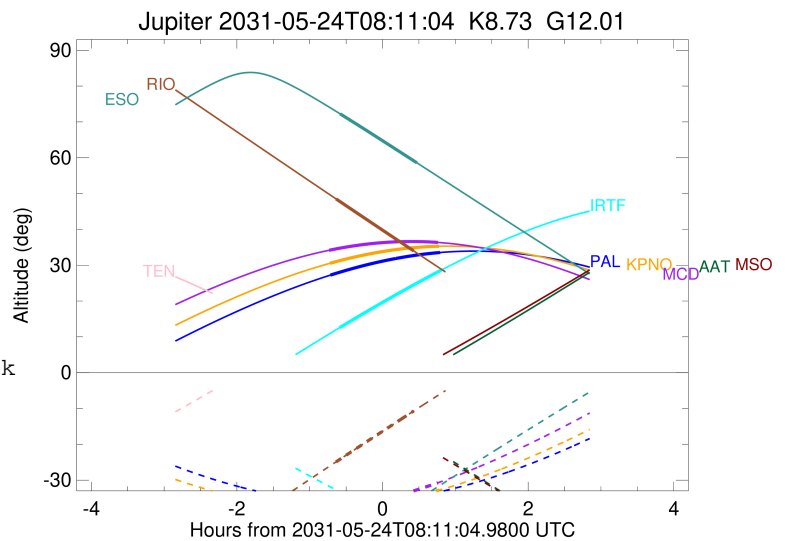
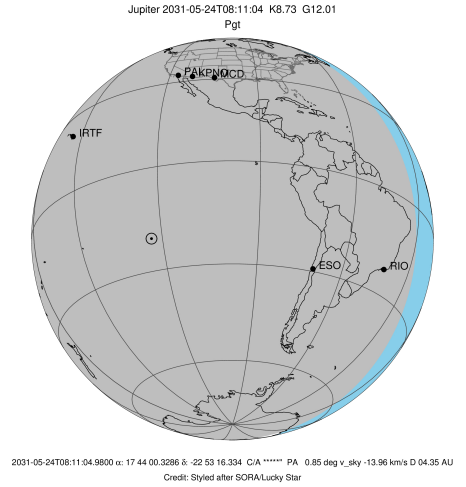


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T07:28:16.551	27.24	-35.94	71485.4	-57.33	-60.57
Jupiter	E	2031-05-24T08:58:26.425	33.54	-33.24	71485.5	-56.85	-60.12

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-24T08:12:49.220
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      : 4116869467685698048
2Mass ID (if available) : 17440032-2253162
ICRS Star Coord at Epoch: 17h 44m 00.32862s -22:53:16.33391s
RUWE (>1.4 is poor) : 0.77
K magnitude          : 8.733
G magnitude          : 12.007
RP magnitude         : 11.044
BP magnitude         : 12.952
DUPflag             : 0
Distance (au)       : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.96
Sun-Target sep (deg) : 156.24
Sun-Moon sep (deg)  : 169.99
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.061
C/A sky separation (km) : 60072.2
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
    
```

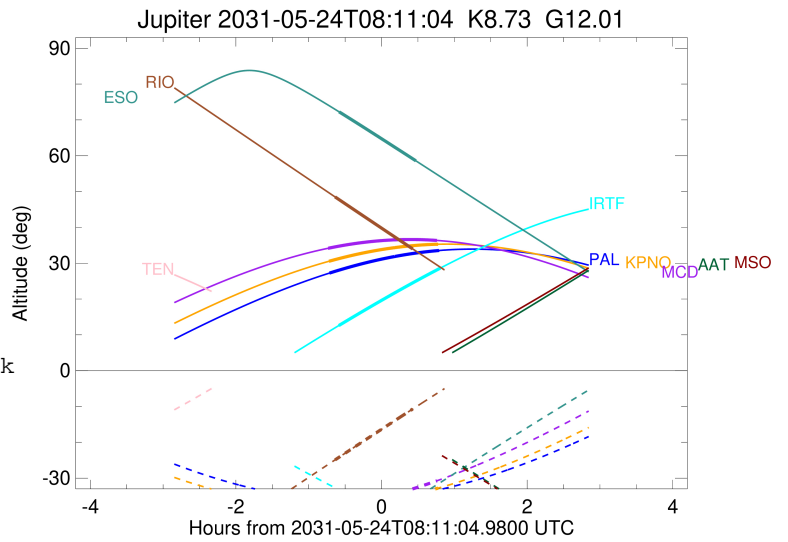
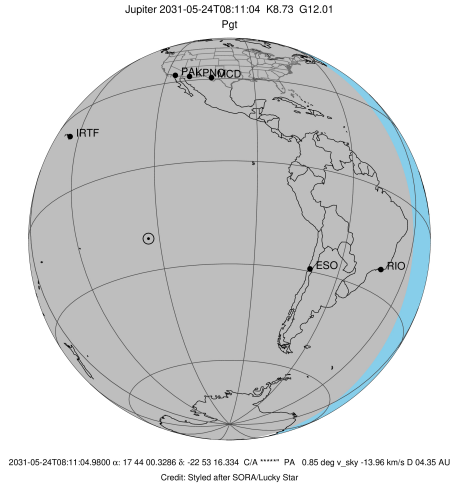


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T07:27:48.527	30.53	-37.45	71485.4	-57.34	-60.57
Jupiter	E	2031-05-24T08:57:45.267	35.29	-32.78	71485.5	-56.95	-60.21

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T08:11:54.890
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       : 4116869467685698048
2Mass ID (if available) : 17440032-2253162
ICRS Star Coord at Epoch: 17h 44m 00.32862s -22:53:16.33391s
RUWE (>1.4 is poor) : 0.77
K magnitude           : 8.733
G magnitude           : 12.007
RP magnitude         : 11.044
BP magnitude         : 12.952
DUPflag              : 0
Distance (au)        : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.96
Sun-Target sep (deg) : 156.24
Sun-Moon sep (deg)   : 169.91
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.071
C/A sky separation (km) : 60103.8
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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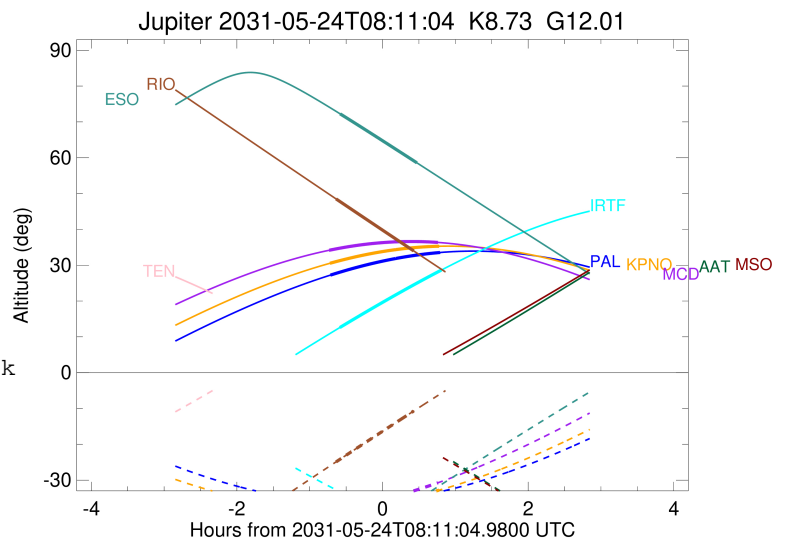
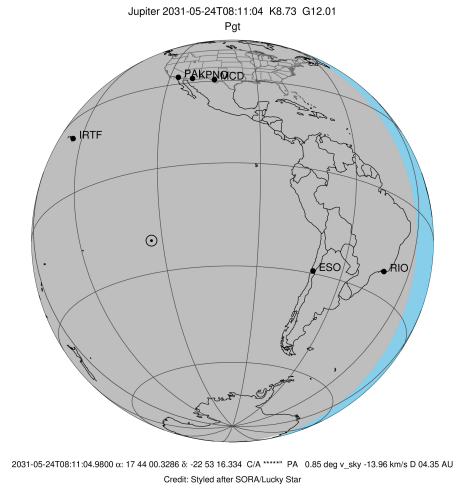


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T07:27:01.297	34.16	-38.10	71485.4	-57.31	-60.55
Jupiter	E	2031-05-24T08:56:45.743	36.35	-30.73	71485.4	-57.08	-60.33

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T08:17:48.360
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : IRTF
Location              : Mauna Kea/IRTF
Latitude (deg)        : 19.82622
E. Longitude (deg)    : 204.52800
Altitude (km)         : 4.168
Gaia source ID        : 4116869467685698048
2Mass ID (if available) : 17440032-2253162
ICRS Star Coord at Epoch: 17h 44m 00.32862s -22:53:16.33391s
RUWE (>1.4 is poor) : 0.77
K magnitude           : 8.733
G magnitude           : 12.007
RP magnitude          : 11.044
BP magnitude          : 12.952
DUPflag              : 0
Distance (au)         : 4.345
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.96
Sun-Target sep (deg)  : 156.24
Sun-Moon sep (deg)    : 170.54
B (ring opening deg) : -2.60
PA of pole (deg)      : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.662
C/A sky separation (km) : 61967.7
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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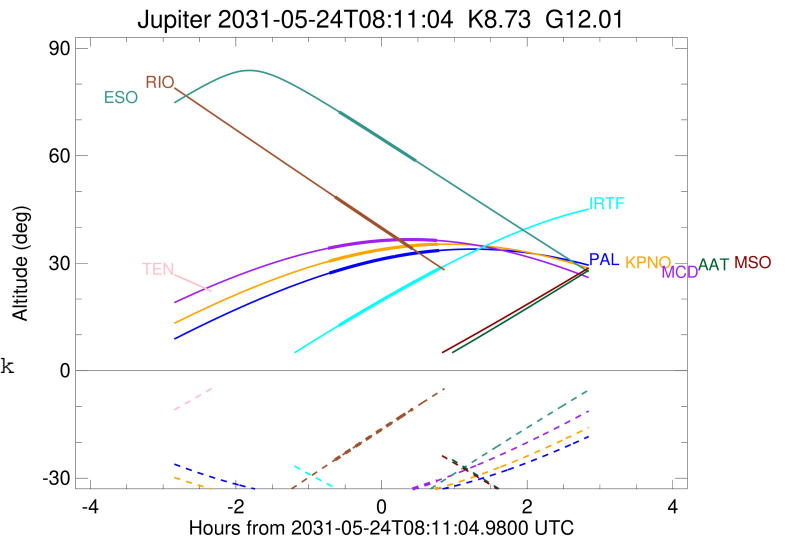
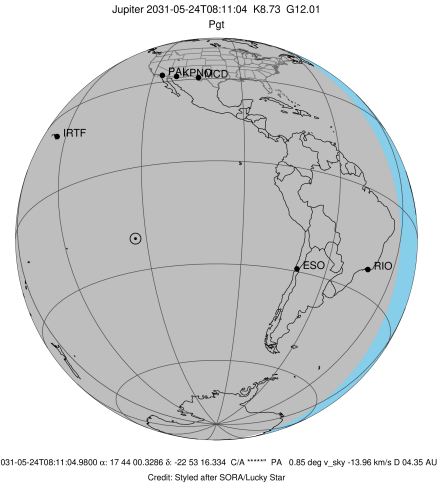


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T07:35:54.788	12.59	-33.23	71484.9	-60.64	-63.66
Jupiter	E	2031-05-24T08:59:28.840	28.61	-45.13	71485.1	-59.42	-62.52

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T08:04:43.370
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       : 4116869467685698048
2Mass ID (if available) : 17440032-2253162
ICRS Star Coord at Epoch: 17h 44m 00.32862s -22:53:16.33391s
RUWE (>1.4 is poor) : 0.77
K magnitude           : 8.733
G magnitude           : 12.007
RP magnitude          : 11.044
BP magnitude          : 12.952
DUPflag              : 0
Distance (au)        : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.96
Sun-Target sep (deg) : 156.24
Sun-Moon sep (deg)   : 169.43
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 20.959
C/A sky separation (km): 66054.7
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
    
```

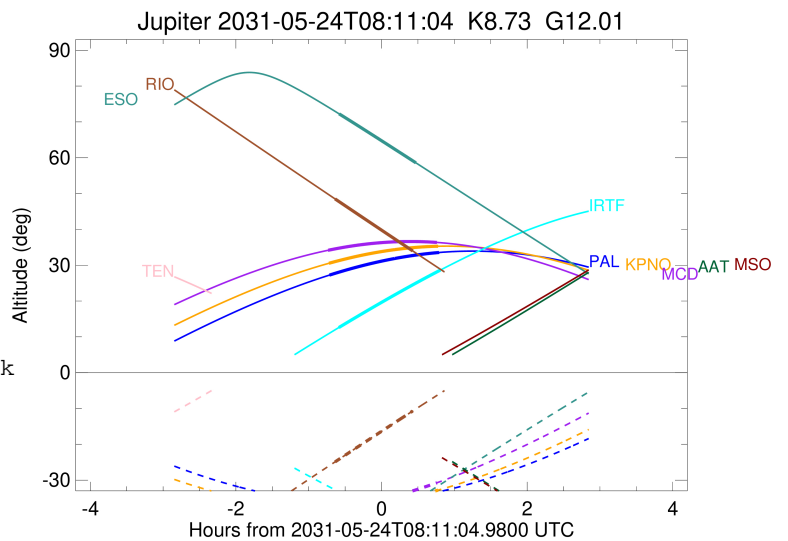
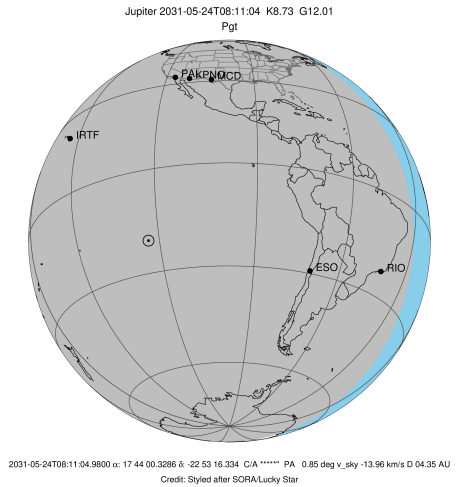


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T07:32:46.121	48.51	-24.91	71484.1	-66.93	-69.44
Jupiter	E	2031-05-24T08:36:46.701	33.99	-10.71	71484.0	-67.90	-70.32

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T08:07:44.430
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       : 4116869467685698048
2Mass ID (if available) : 17440032-2253162
ICRS Star Coord at Epoch: 17h 44m 00.32862s -22:53:16.33391s
RUWE (>1.4 is poor) : 0.77
K magnitude           : 8.733
G magnitude           : 12.007
RP magnitude          : 11.044
BP magnitude          : 12.952
DUPflag              : 0
Distance (au)        : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.96
Sun-Target sep (deg) : 156.24
Sun-Moon sep (deg)   : 169.77
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 20.971
C/A sky separation (km) : 66091.7
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	2031-05-24T07:36:06.812	72.25	-49.40	71484.1	-67.27	-69.75
Jupiter	E	2031-05-24T08:39:24.867	58.57	-35.59	71484.0	-67.73	-70.16