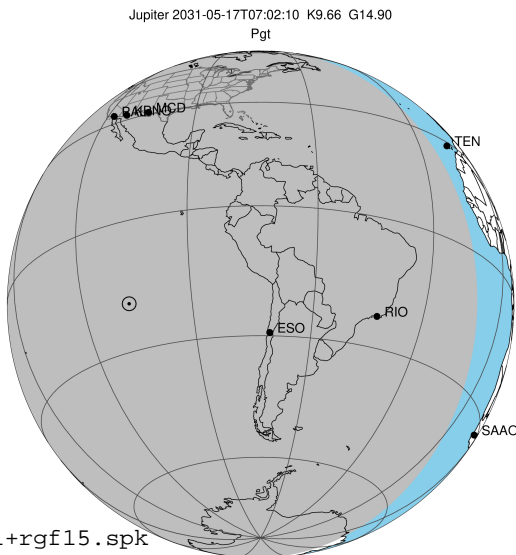


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-17T07:02:10.850
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068936331364699264
 2Mass ID (if available) : 17470244-2253224

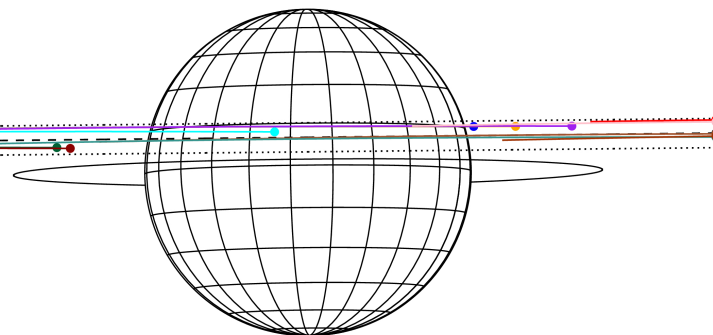
Jupiter 2031-05-17T07:02:10 K9.66 G14.90 Pgt

ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 9.657
 G magnitude : 14.896
 RP magnitude : 13.535
 BP magnitude : 17.126
 DUPflag : 0
 Distance (au) : 4.400
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -12.17
 Sun-Target sep (deg) : 148.75
 Sun-Moon sep (deg) : 102.30
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.56
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 4.831
 C/A sky separation (km) : 15416.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 naif0012.tls
 nep097.bsp
 nep101.bsp
 sat4401.bsp



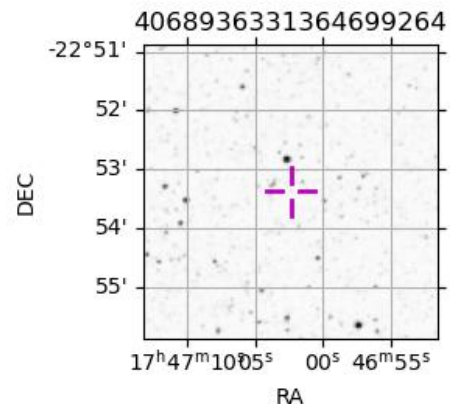
2031-05-17T07:02:10.8500 at: 17 47 02.4373 s: -22 53 22.585 C/A 4.819° PA 180.59 deg v_sky -12.17 km/s D 04.40 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO



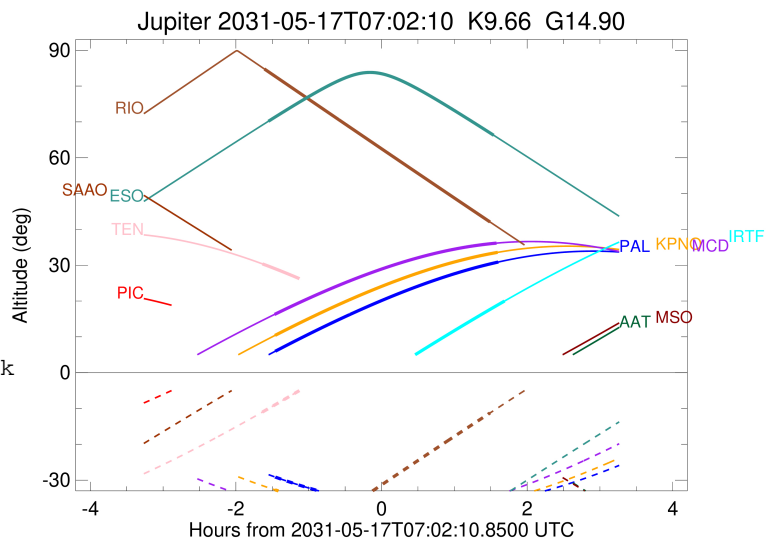
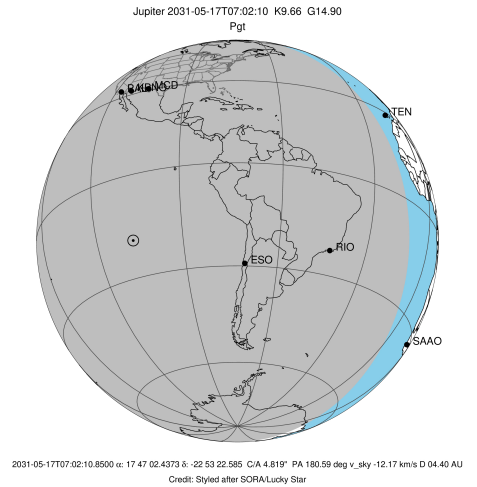
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+ +	MAY 17 05:34 - MAY 17 08:38	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 17 05:34 - MAY 17 08:37	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	MAY 17 05:34 - MAY 17 08:36	Pie
TEN	Teide Obs./Tenerife	28.3	343.5	+	MAY 17 05:24 - MAY 17 05:24	Pin
IRTF	Mauna Kea/IRTF	19.8	204.5	+	MAY 17 08:43 - MAY 17 08:43	Pne
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+ +	MAY 17 05:25 - MAY 17 08:31	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 17 05:28 - MAY 17 08:34	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             : 2031-05-17T07:06:56.270
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       : 4068936331364699264
2Mass ID (if available) : 17470244-2253224
ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 9.657
G magnitude          : 14.896
RP magnitude         : 13.535
BP magnitude         : 17.126
DUPflag             : 0
Distance (au)        : 4.400
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.17
Sun-Target sep (deg) : 148.75
Sun-Moon sep (deg)   : 102.51
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.56
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 6.310
C/A sky separation (km): 20133.7
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
    
```

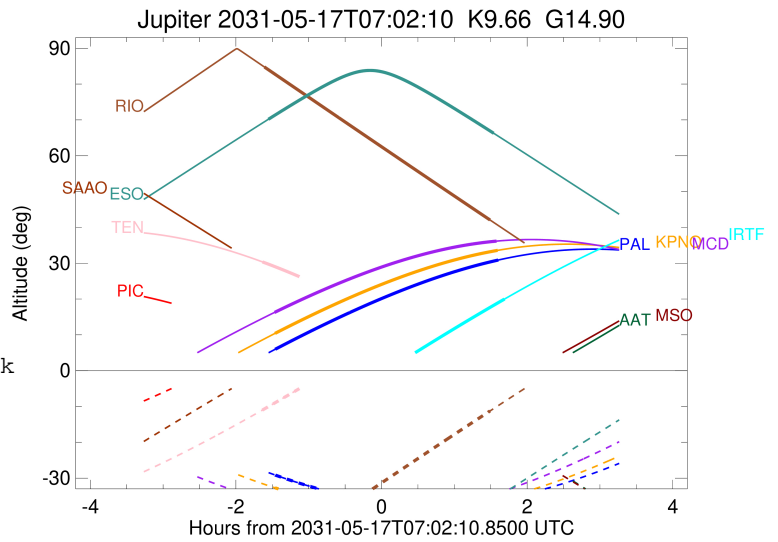


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T05:34:35.404	5.97	-29.14	71491.3	15.80	17.92
Jupiter	E	2031-05-17T08:38:24.169	30.88	-35.91	71491.2	16.67	18.89

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-17T07:06:31.410
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      : 4068936331364699264
2Mass ID (if available) : 17470244-2253224
ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 9.657
G magnitude         : 14.896
RP magnitude        : 13.535
BP magnitude        : 17.126
DUPflag            : 0
Distance (au)       : 4.400
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -12.17
Sun-Target sep (deg) : 148.75
Sun-Moon sep (deg)  : 102.58
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.56
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 6.318
C/A sky separation (km) : 20162.1
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
    
```

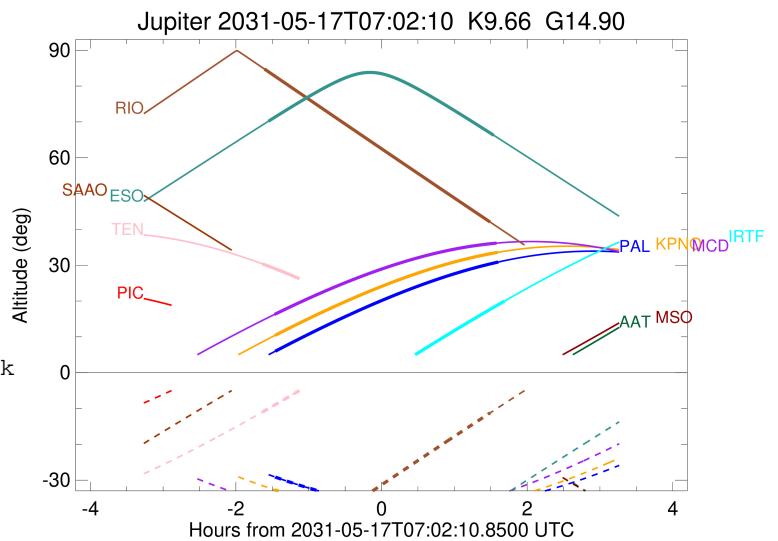
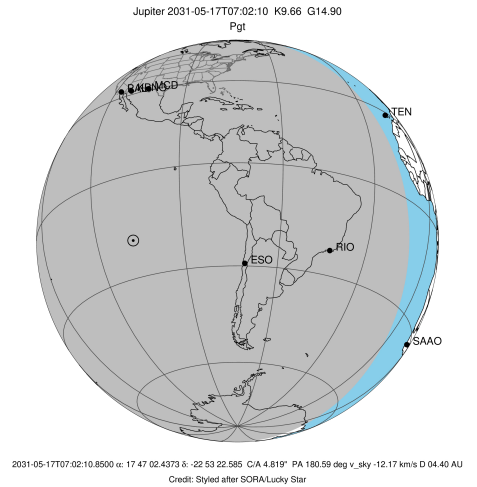


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T05:34:24.896	10.40	-32.70	71491.3	15.86	17.98
Jupiter	E	2031-05-17T08:37:49.259	33.57	-35.82	71491.2	16.64	18.86

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-17T07:05:48.710
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        : 4068936331364699264
2Mass ID (if available) : 17470244-2253224
ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.657
G magnitude           : 14.896
RP magnitude          : 13.535
BP magnitude          : 17.126
DUPflag              : 0
Distance (au)         : 4.400
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.17
Sun-Target sep (deg)  : 148.75
Sun-Moon sep (deg)   : 102.66
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.56
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 6.339
C/A sky separation (km) : 20229.0
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
    
```

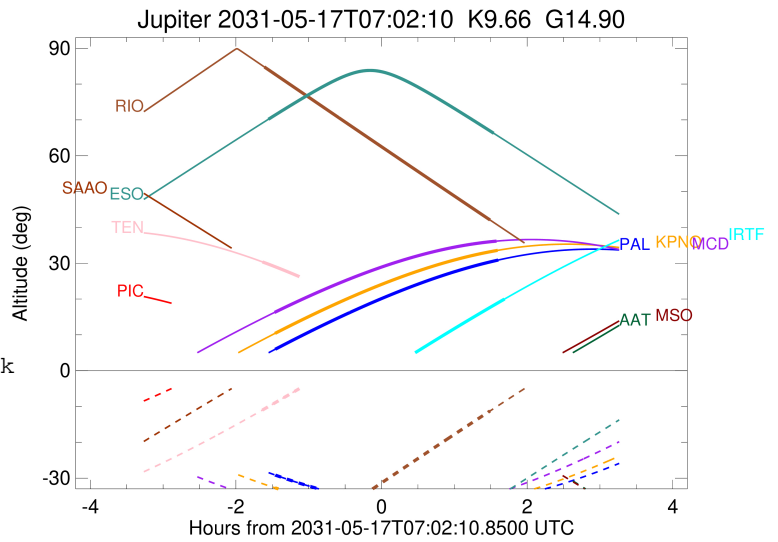
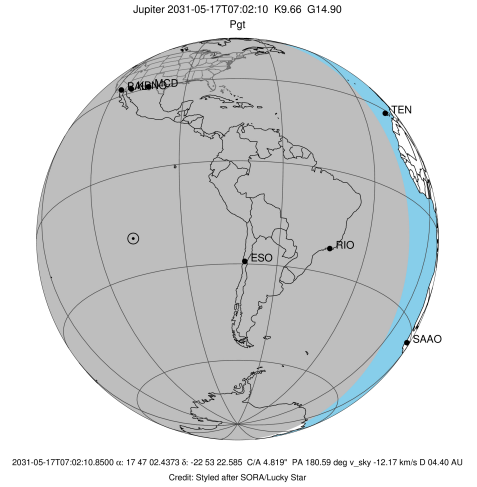


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T05:34:01.197	16.25	-36.76	71491.3	15.97	18.11
Jupiter	E	2031-05-17T08:36:54.717	36.16	-34.21	71491.2	16.62	18.83

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-17T06:56:10.830
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      : 4068936331364699264
2Mass ID (if available) : 17470244-2253224
ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 9.657
G magnitude          : 14.896
RP magnitude         : 13.535
BP magnitude         : 17.126
DUPflag             : 0
Distance (au)       : 4.400
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.17
Sun-Target sep (deg) : 148.75
Sun-Moon sep (deg)  : 102.71
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.56
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 6.102
C/A sky separation (km): 19470.8
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
    
```

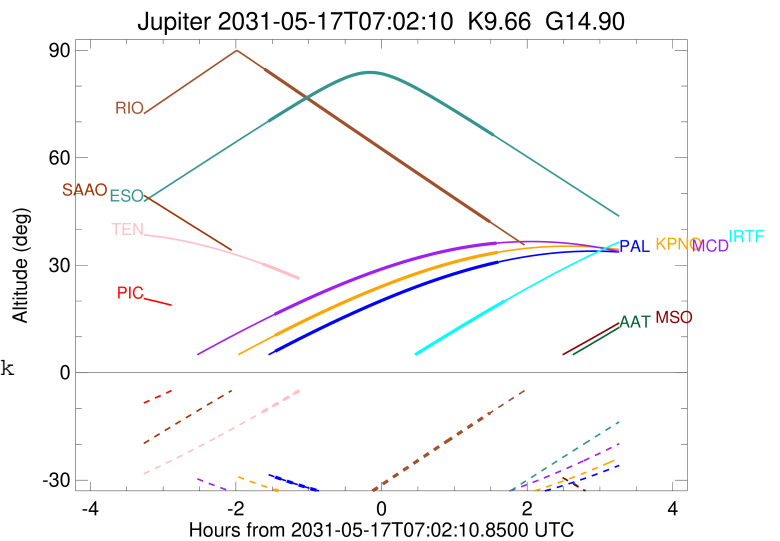
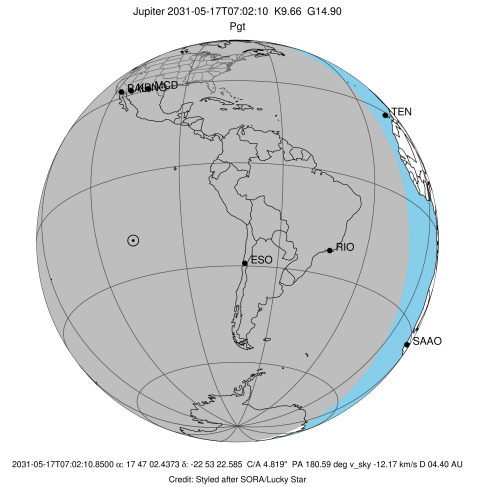


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T05:24:04.771	30.36	-10.98	71491.3	16.31	18.49
Jupiter	E	2031-05-17T08:29:08.540	-1.16x	27.61x	71491.4	15.08	17.12

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-17T07:09:58.840
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      : 4068936331364699264
2Mass ID (if available) : 17470244-2253224
ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 9.657
G magnitude          : 14.896
RP magnitude         : 13.535
BP magnitude         : 17.126
DUPflag             : 0
Distance (au)       : 4.400
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.17
Sun-Target sep (deg) : 148.75
Sun-Moon sep (deg)  : 102.11
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.56
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 5.562
C/A sky separation (km) : 17747.5
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
    
```

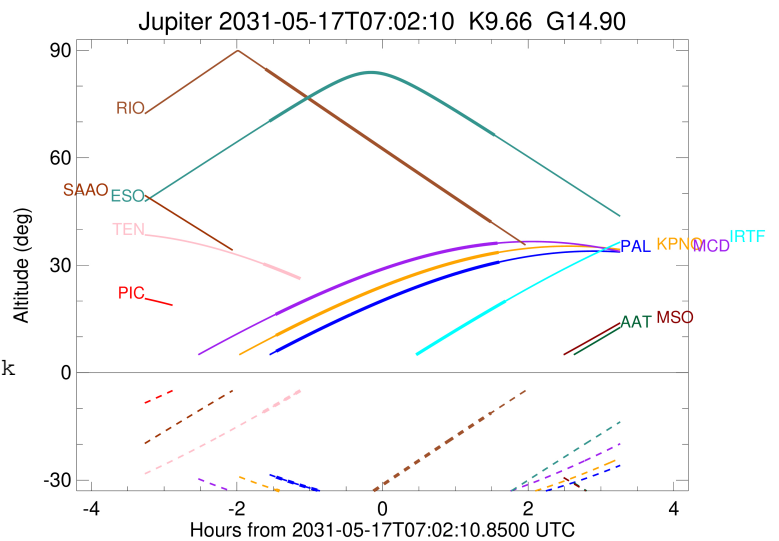
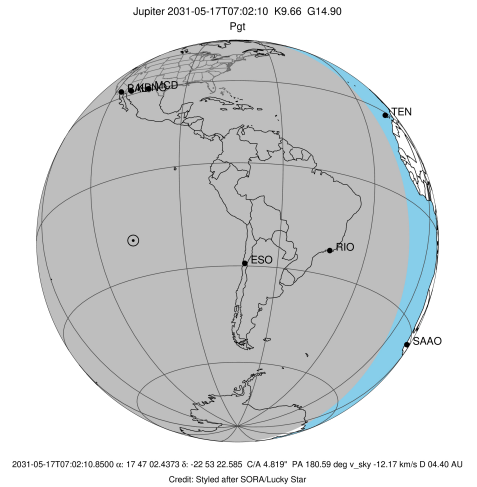


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T05:34:55.297	-20.16x	-10.39	71491.5	13.60	15.45
Jupiter	E	2031-05-17T08:43:34.378	19.99	-44.60	71491.4	15.06	17.09

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-17T06:58:24.710
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        : 4068936331364699264
2Mass ID (if available) : 17470244-2253224
ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.657
G magnitude           : 14.896
RP magnitude          : 13.535
BP magnitude          : 17.126
DUPflag              : 0
Distance (au)         : 4.400
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.17
Sun-Target sep (deg) : 148.75
Sun-Moon sep (deg)   : 103.22
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.56
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 4.753
C/A sky separation (km) : 15167.0
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
    
```

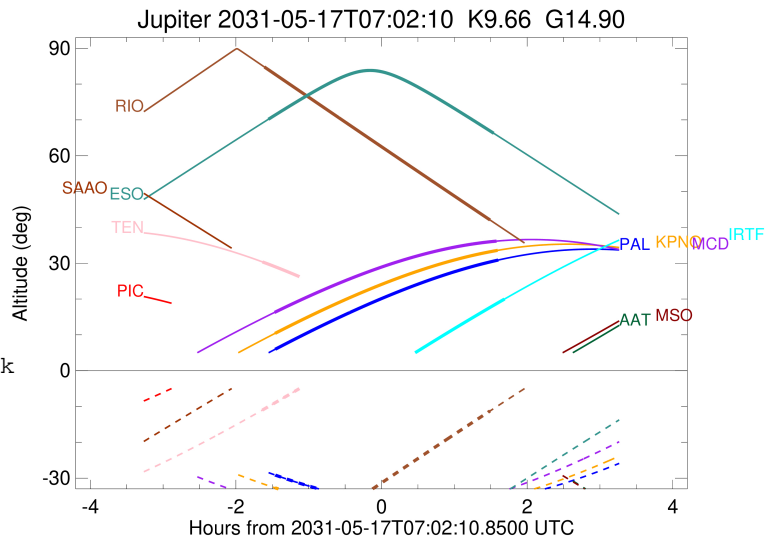


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-17T05:25:41.592	84.76	-53.44	71491.6	12.48	14.20
Jupiter	E	2031-05-17T08:31:36.753	42.06	-11.25	71491.6	11.72	13.34

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-17T07:01:52.470
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      : 4068936331364699264
2Mass ID (if available) : 17470244-2253224
ICRS Star Coord at Epoch: 17h 47m 02.43733s -22:53:22.58475s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 9.657
G magnitude          : 14.896
RP magnitude         : 13.535
BP magnitude         : 17.126
DUPflag             : 0
Distance (au)       : 4.400
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.17
Sun-Target sep (deg) : 148.75
Sun-Moon sep (deg)  : 103.22
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.56
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 4.616
C/A sky separation (km): 14728.0
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	2031-05-17T05:28:58.263	70.17	-75.04	71491.6	11.78	13.41
Jupiter	E	2031-05-17T08:34:41.931	66.25	-35.98	71491.6	11.68	13.30