

target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-06-21T04:45:20.290
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4111500384971133312
 2Mass ID (if available) : 17291687-2247285

Jupiter 2031-06-21T04:45:20 K9.22 G14.22 Pgt

ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s

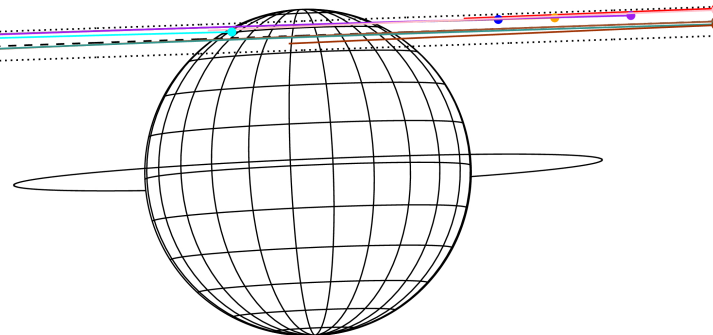
RUWE (>1.4 is poor) : 1.54
 K magnitude : 9.222
 G magnitude : 14.222
 RP magnitude : 12.919
 BP magnitude : 15.965
 DUPflag : 0
 Distance (au) : 4.267
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -16.31
 Sun-Target sep (deg) : 173.68
 Sun-Moon sep (deg) : 159.69
 B (ring opening deg) : -2.60
 PA of pole (deg) : 2.47
 Pole direction: RA (deg): 268.05691
 Dec (deg): 64.49651
 C/A sky separation (") : 19.387
 C/A sky separation (km) : 60002.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-06-21T04:45:20 K9.22 G14.22
 Pgt



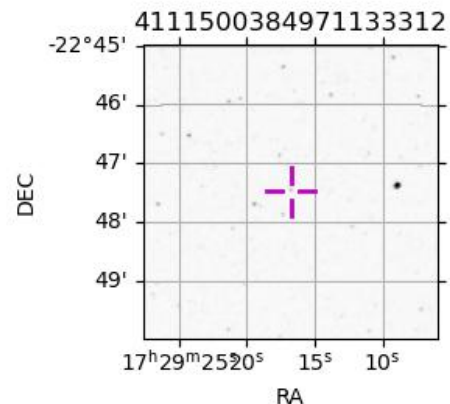
2031-06-21T04:45:20.2900 a: 17 29 16.8648 s: -22 47 28.632 C/A ***** PA 181.98 deg v_sky -16.31 km/s D 04.27 AU
 Credit: Styled after SORA/Lucky Star

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



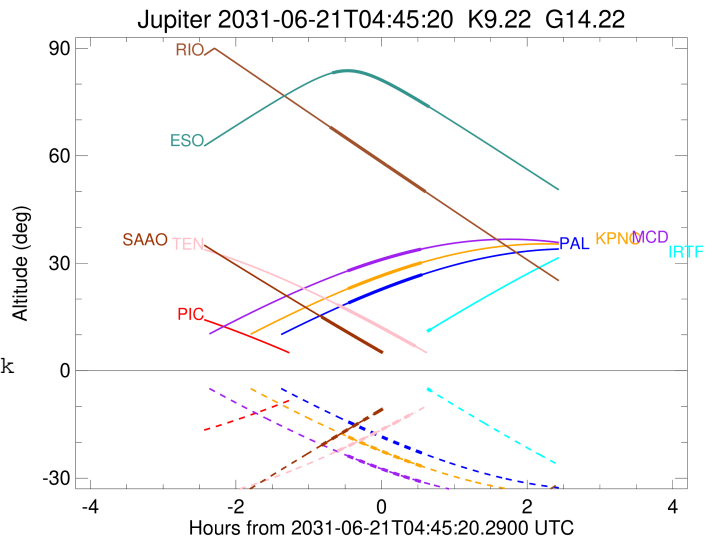
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+ +	JUN 21 04:17 - JUN 21 05:18	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	JUN 21 04:17 - JUN 21 05:18	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	JUN 21 04:17 - JUN 21 05:17	Pie
TEN	Teide Obs./Tenerife	28.3	343.5	+ +	JUN 21 04:08 - JUN 21 05:13	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5		JUN 21 05:26 - JUN 21 05:26	Pne
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+ +	JUN 21 04:03 - JUN 21 05:21	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	JUN 21 04:04 - JUN 21 05:24	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8		JUN 21 03:55 - JUN 21 03:55	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T04:48:27.730
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       : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude           : 9.222
G magnitude           : 14.222
RP magnitude          : 12.919
BP magnitude          : 15.965
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg) : 173.68
Sun-Moon sep (deg)   : 160.17
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation ("): 20.917
C/A sky separation (km): 64735.1
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
    
```

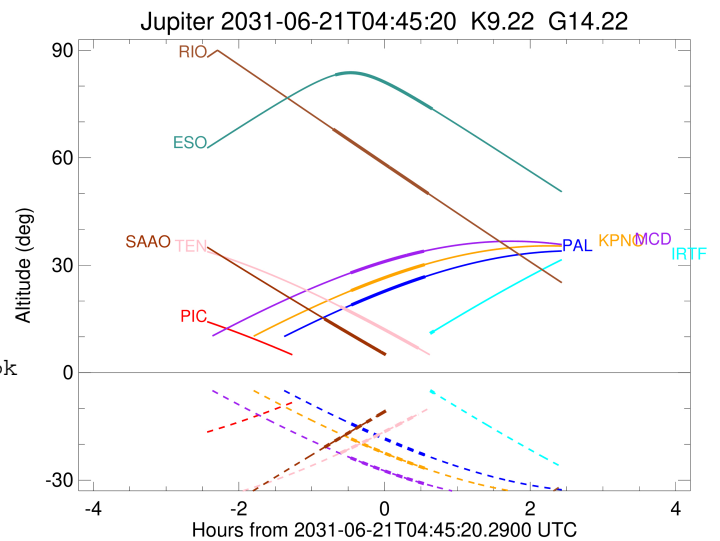
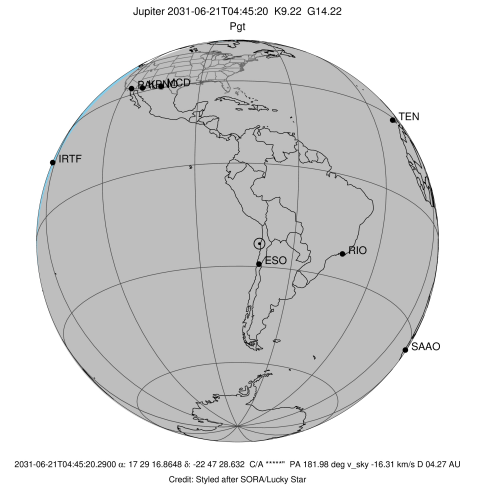


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T04:17:59.128	18.89	-14.28	71484.6	63.91	66.68
Jupiter	E	2031-06-21T05:18:52.991	26.81	-23.02	71484.4	65.59	68.21

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T04:48:08.740
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        : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude           : 9.222
G magnitude           : 14.222
RP magnitude          : 12.919
BP magnitude          : 15.965
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg) : 173.68
Sun-Moon sep (deg)   : 160.14
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 20.925
C/A sky separation (km) : 64762.5
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
    
```

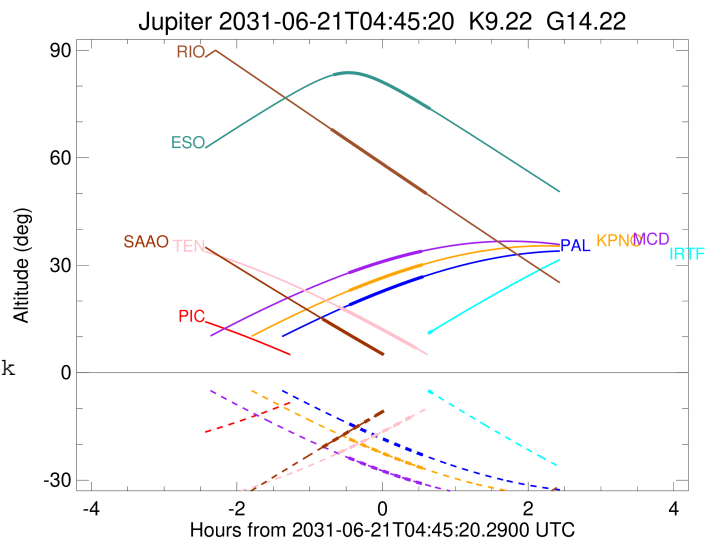
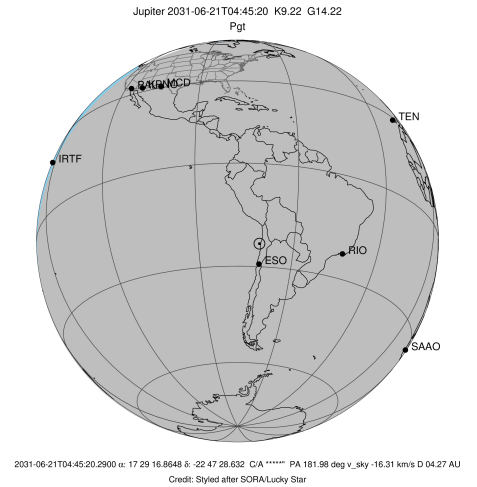


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T04:17:46.533	22.89	-18.45	71484.6	63.99	66.75
Jupiter	E	2031-06-21T05:18:27.989	30.17	-26.67	71484.4	65.61	68.23

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T04:47:36.970
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       : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude           : 9.222
G magnitude           : 14.222
RP magnitude          : 12.919
BP magnitude          : 15.965
DUPflag              : 0
Distance (au)        : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg) : 173.68
Sun-Moon sep (deg)   : 160.08
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 20.947
C/A sky separation (km) : 64827.6
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
    
```

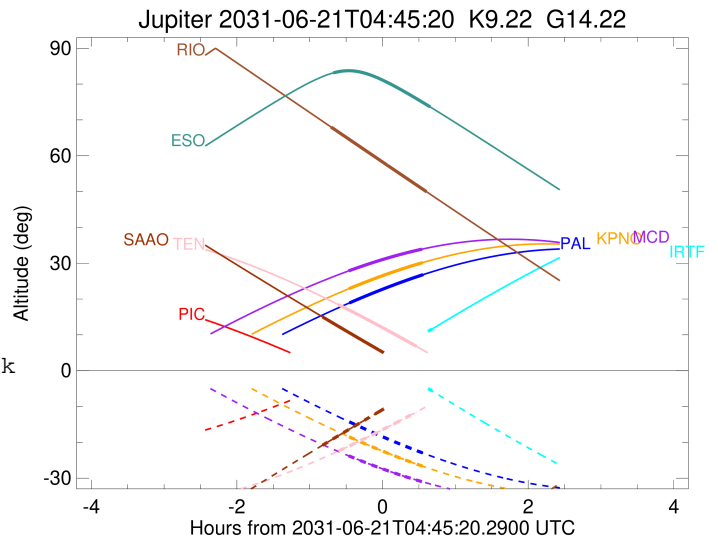
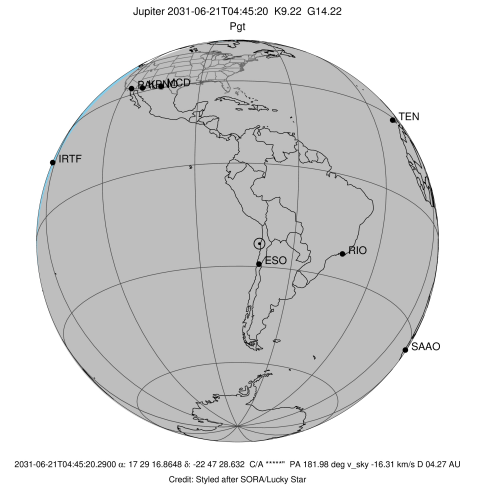


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T04:17:26.598	27.84	-23.76	71484.5	64.17	66.91
Jupiter	E	2031-06-21T05:17:45.006	33.90	-30.97	71484.4	65.67	68.29

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T04:41:00.090
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        : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude           : 9.222
G magnitude           : 14.222
RP magnitude          : 12.919
BP magnitude          : 15.965
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg) : 173.68
Sun-Moon sep (deg)   : 159.05
B (ring opening deg) : -2.60
PA of pole (deg)     : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 20.683
C/A sky separation (km) : 64011.1
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
    
```

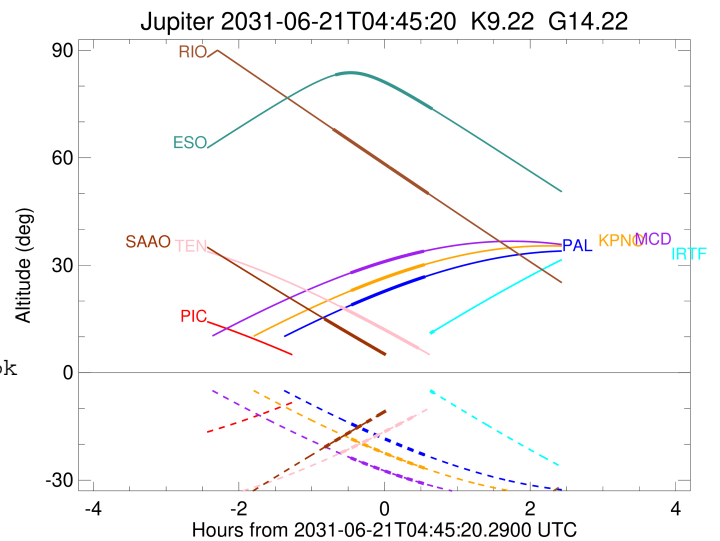
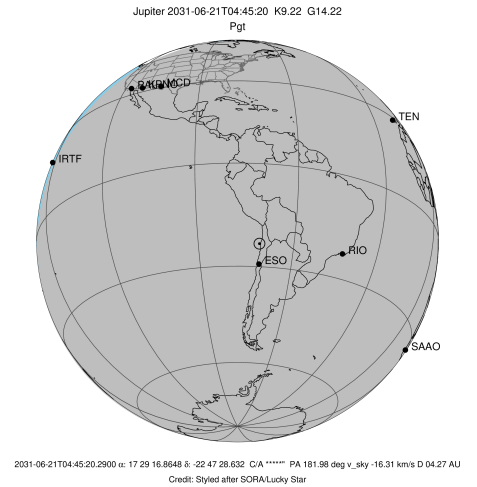


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T04:08:55.127	18.44	-22.44	71484.6	63.39	66.20
Jupiter	E	2031-06-21T05:13:10.770	6.82	-11.55	71484.6	63.46	66.26

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T04:50:43.660
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       : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude           : 9.222
G magnitude           : 14.222
RP magnitude          : 12.919
BP magnitude          : 15.965
DUPflag              : 0
Distance (au)        : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg) : 173.68
Sun-Moon sep (deg)  : 160.44
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 20.147
C/A sky separation (km) : 62353.0
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
    
```

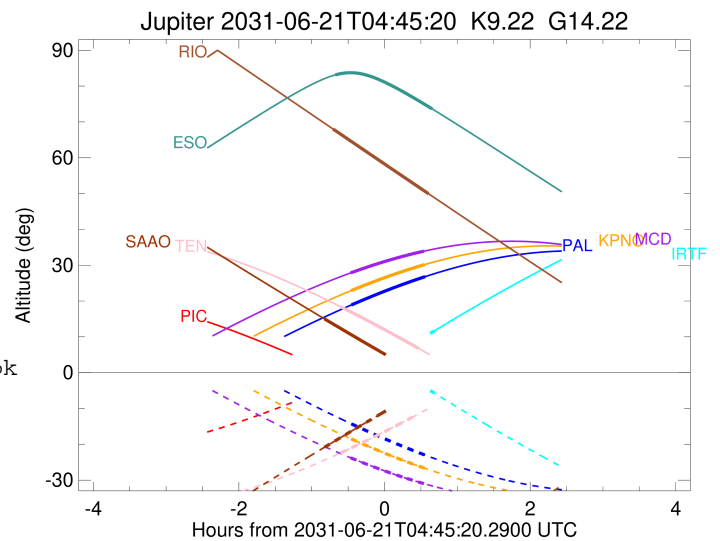
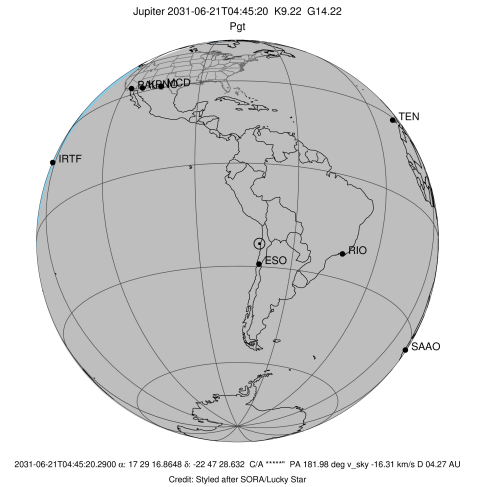


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T04:15:08.569	-3.43x	9.55x	71485.2	59.54	62.64
Jupiter	E	2031-06-21T05:26:10.613	11.62	-5.67	71484.9	61.68	64.62

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-06-21T04:42:17.290
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        : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude           : 9.222
G magnitude           : 14.222
RP magnitude          : 12.919
BP magnitude          : 15.965
DUPflag              : 0
Distance (au)         : 4.267
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg)  : 173.68
Sun-Moon sep (deg)    : 159.53
B (ring opening deg) : -2.60
PA of pole (deg)      : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 19.299
C/A sky separation (km) : 59727.6
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
    
```

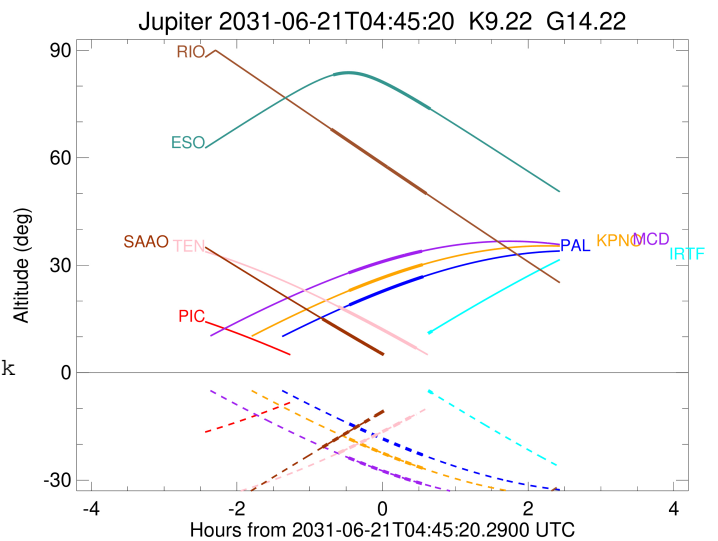
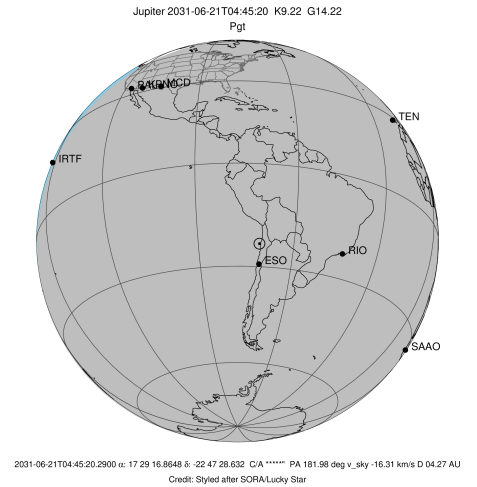


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T04:03:01.087	67.99	-74.27	71485.6	56.33	59.63
Jupiter	E	2031-06-21T05:21:39.199	49.94	-56.28	71485.6	56.75	60.02


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-06-21T04:44:39.640
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      : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude          : 9.222
G magnitude          : 14.222
RP magnitude         : 12.919
BP magnitude         : 15.965
DUPflag             : 0
Distance (au)       : 4.267
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg) : 173.68
Sun-Moon sep (deg)  : 159.92
B (ring opening deg) : -2.60
PA of pole (deg)    : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 19.164
C/A sky separation (km) : 59310.4
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
    
```

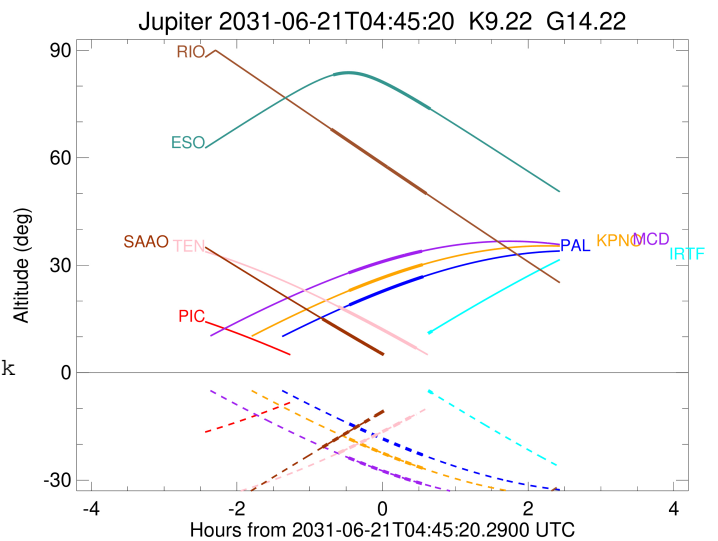
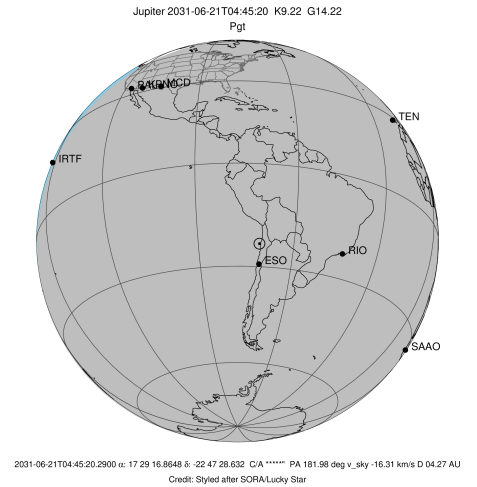


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-06-21T04:04:49.697	83.11	-79.43	71485.8	55.47	58.81
Jupiter	E	2031-06-21T05:24:30.872	73.64	-79.43	71485.6	56.40	59.69


```

target          : Jupiter
target radius (km) : 71492.00
C/A epoch       : 2031-06-21T04:40:18.670
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  : 4111500384971133312
2Mass ID (if available) : 17291687-2247285
ICRS Star Coord at Epoch: 17h 29m 16.86479s -22:47:28.63246s
RUWE (>1.4 is poor) : 1.54
K magnitude     : 9.222
G magnitude     : 14.222
RP magnitude    : 12.919
BP magnitude    : 15.965
DUPflag        : 0
Distance (au)   : 4.267
f0 (km)        : 0.00
g0 (km)        : 0.00
skyplane vel. (km/s) : -16.31
Sun-Target sep (deg) : 173.68
Sun-Moon sep (deg) : 159.07
B (ring opening deg) : -2.60
PA of pole (deg) : 2.47
Pole direction: RA (deg): 268.05691
Dec (deg): 64.49651
C/A sky separation (") : 18.345
C/A sky separation (km) : 56777.4
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	2031-06-21T03:55:54.856	15.01	-20.81	71486.2	52.56	56.04
Jupiter	E	2031-06-21T05:24:54.803	-2.32x	-3.20x	71486.2	52.46	55.95