

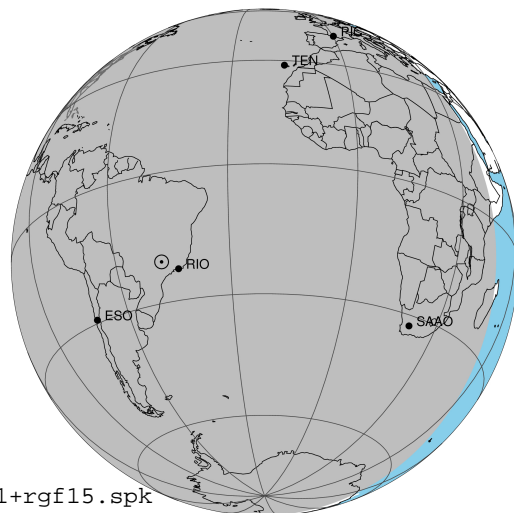
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-24T03:06:14.600
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116892866668942848
 2Mass ID (if available) : 17440619-2252580

Jupiter 2031-05-24T03:06:14 K9.30 G13.31 Pgt

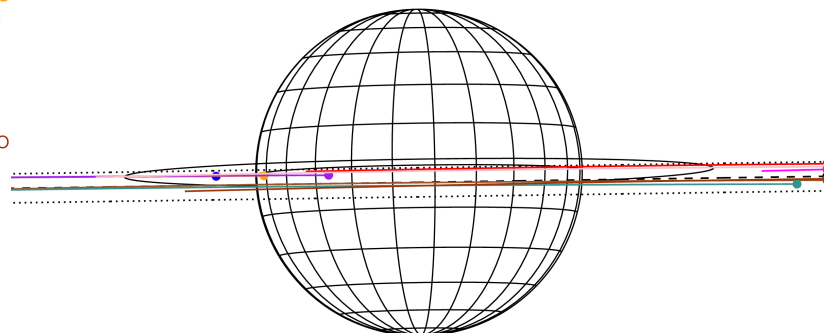
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s

RUWE (>1.4 is poor) : 0.94
 K magnitude : 9.303
 G magnitude : 13.313
 RP magnitude : 12.228
 BP magnitude : 14.544
 DUPflag : 0
 Distance (au) : 4.347
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -13.91
 Sun-Target sep (deg) : 156.01
 Sun-Moon sep (deg) : 172.41
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.88
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 1.363
 C/A sky separation (km) : 4298.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-24T03:06:14 K9.30 G13.31
 Pgt



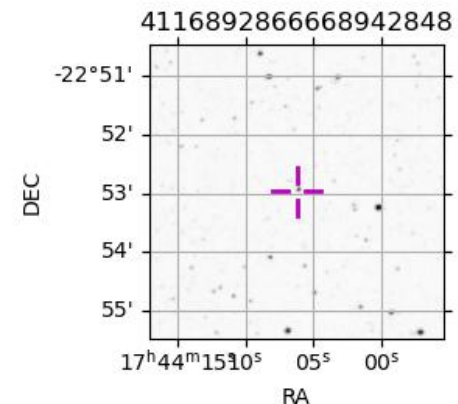
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 KAV
 RIO
 ESO
 SAAO



2031-05-24T03:06:14.6000 a: 17 44 06.1985 δ: -22 52 58.209 C/A 1.375" PA 0.85 deg v_sky -13.91 km/s D 04.35 AU
 Credit: Styled after SORA/Lucky Star

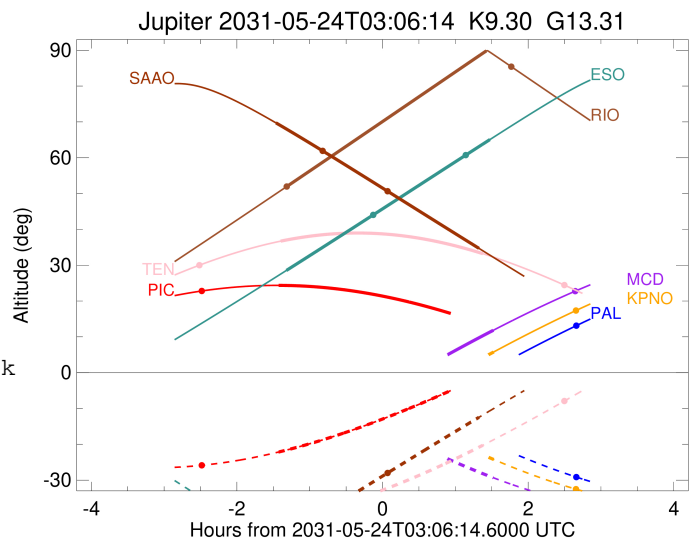
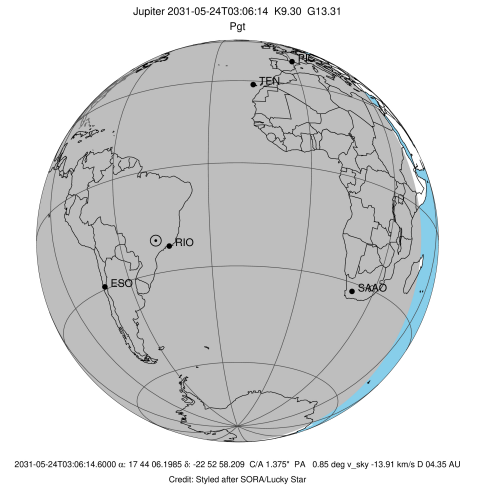
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	MAY 24 01:40 - MAY 24 01:40	Pin
PAL	Palomar Mt (200")	33.4	243.1			Pnn
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 24 04:37 - MAY 24 04:37	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 24 04:37 - MAY 24 04:37	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+ +	MAY 24 01:42 - MAY 24 04:29	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	+ +	MAY 24 01:45 - MAY 24 04:31	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 24 01:47 - MAY 24 04:34	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	MAY 24 01:38 - MAY 24 04:25	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-24T03:04:17.690
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      : 4116892866668942848
2Mass ID (if available) : 17440619-2252580
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 9.303
G magnitude          : 13.313
RP magnitude         : 12.228
BP magnitude         : 14.544
DUPflag             : 0
Distance (au)        : 4.347
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.91
Sun-Target sep (deg) : 156.01
Sun-Moon sep (deg)  : 171.94
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.88
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 0.444
C/A sky separation (km) : 1401.2
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
    
```

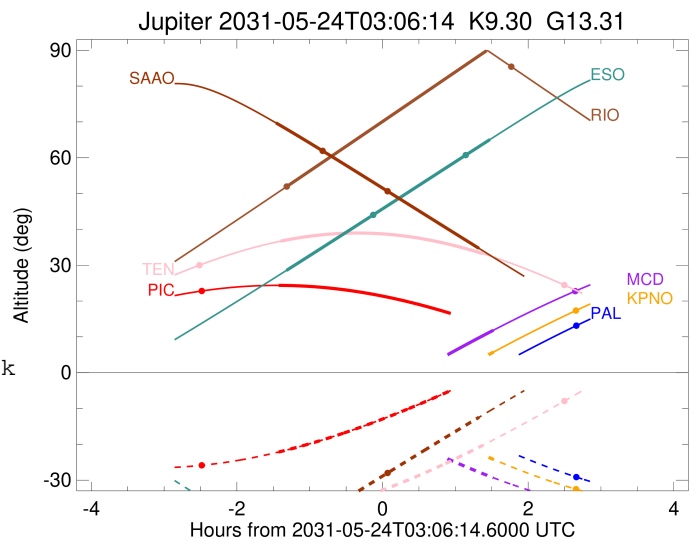
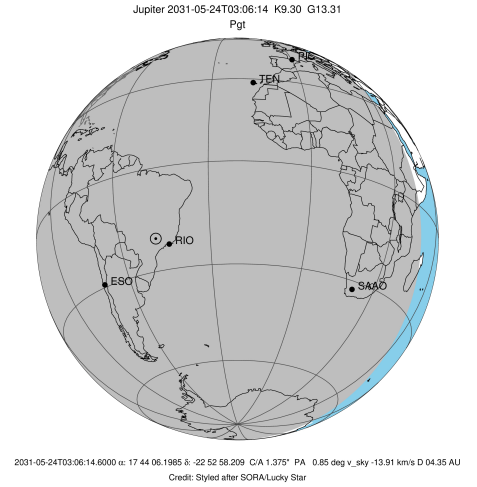


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T01:40:36.654	24.36	-22.15	71492.0	1.17	1.34
Jupiter	E	2031-05-24T04:28:10.240	13.68	-1.00x	71492.0	0.88	1.01

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-24T03:12:47.480
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       : 4116892866668942848
2Mass ID (if available) : 17440619-2252580
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.303
G magnitude           : 13.313
RP magnitude          : 12.228
BP magnitude          : 14.544
DUPflag              : 0
Distance (au)         : 4.347
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.91
Sun-Target sep (deg)  : 156.01
Sun-Moon sep (deg)   : 172.93
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.88
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 0.383
C/A sky separation (km) : 1206.6
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
    
```

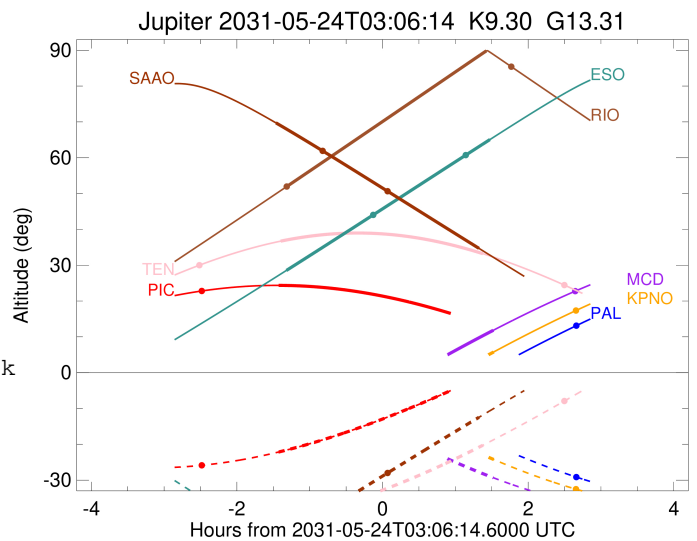
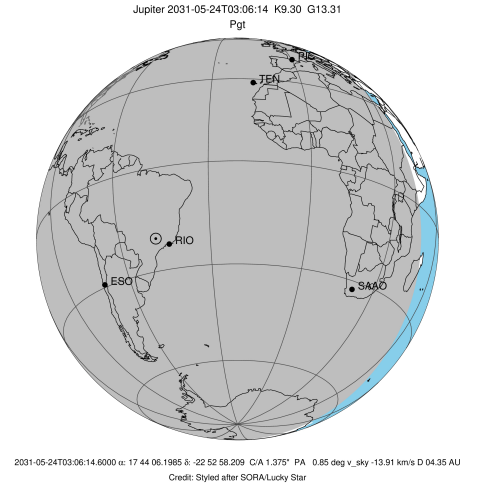


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T01:46:42.686	-28.17x	6.02x	71492.0	-1.62	-1.85
Jupiter	E	2031-05-24T04:37:53.950	5.78	-24.24	71492.0	-0.32	-0.37

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T03:12:47.910
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        : 4116892866668942848
2Mass ID (if available) : 17440619-2252580
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.303
G magnitude           : 13.313
RP magnitude          : 12.228
BP magnitude          : 14.544
DUPflag              : 0
Distance (au)         : 4.347
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.91
Sun-Target sep (deg)  : 156.01
Sun-Moon sep (deg)    : 172.94
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.88
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 0.329
C/A sky separation (km) : 1037.6
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
    
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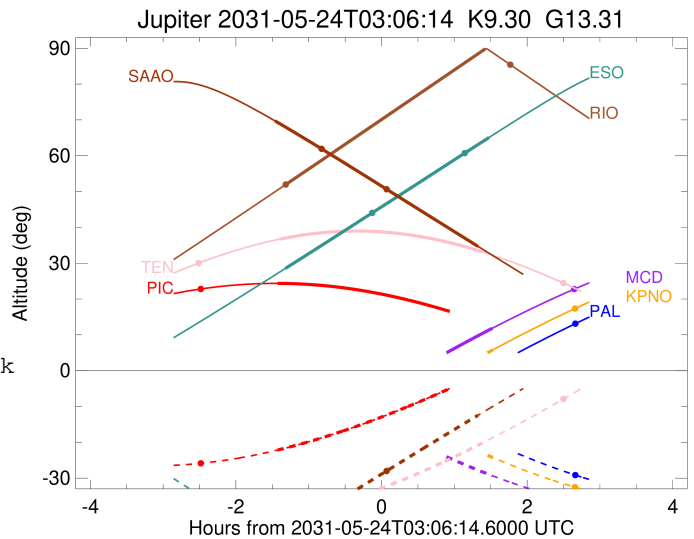
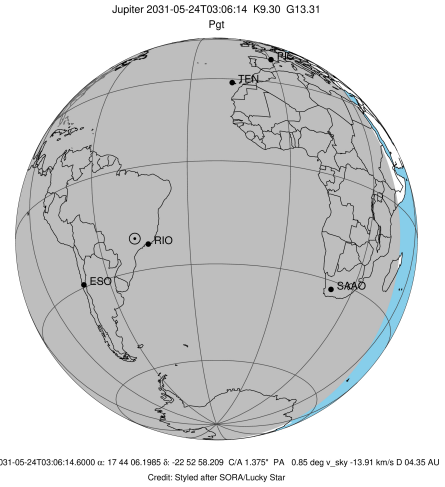


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T01:47:02.216	-21.50x	-0.53x	71492.0	-1.50	-1.71
Jupiter	E	2031-05-24T04:37:35.840	11.84	-29.33	71492.0	-0.20	-0.23

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T03:05:43.710
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        : 4116892866668942848
2Mass ID (if available) : 17440619-2252580
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.303
G magnitude           : 13.313
RP magnitude          : 12.228
BP magnitude          : 14.544
DUPflag              : 0
Distance (au)         : 4.347
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.91
Sun-Target sep (deg)  : 156.01
Sun-Moon sep (deg)    : 172.17
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.88
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 0.208
C/A sky separation (km) : 655.8
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
    
```

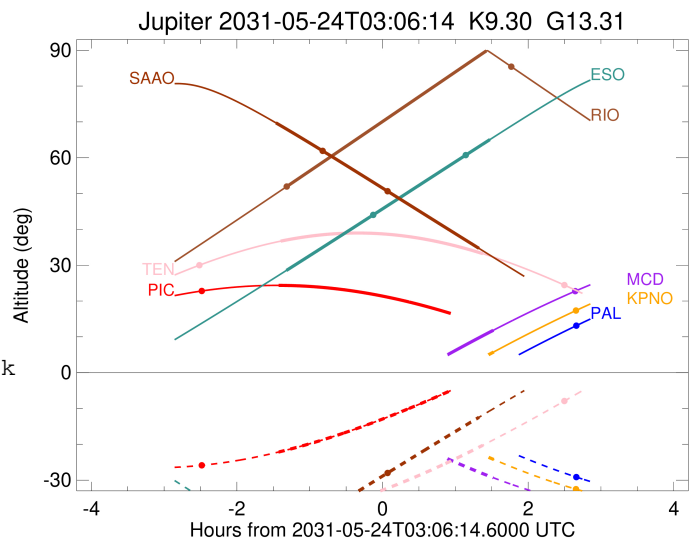
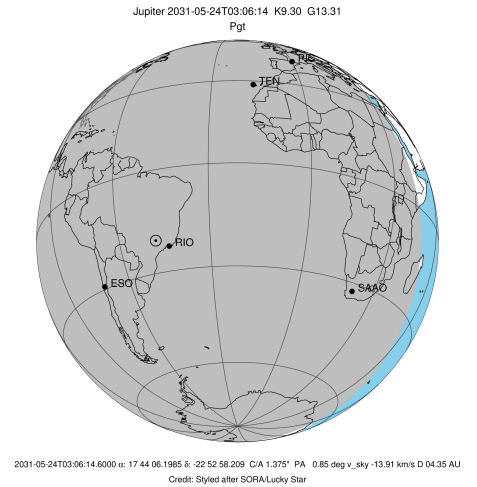


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T01:42:27.375	36.72	-40.24	71492.0	0.41	0.47
Jupiter	E	2031-05-24T04:29:00.249	33.21	-20.25	71492.0	0.40	0.46

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T03:08:47.350
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        : 4116892866668942848
2Mass ID (if available) : 17440619-2252580
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.303
G magnitude           : 13.313
RP magnitude          : 12.228
BP magnitude          : 14.544
DUPflag              : 0
Distance (au)         : 4.347
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.91
Sun-Target sep (deg)  : 156.01
Sun-Moon sep (deg)    : 172.81
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.88
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 1.414
C/A sky separation (km) : 4458.8
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
    
```

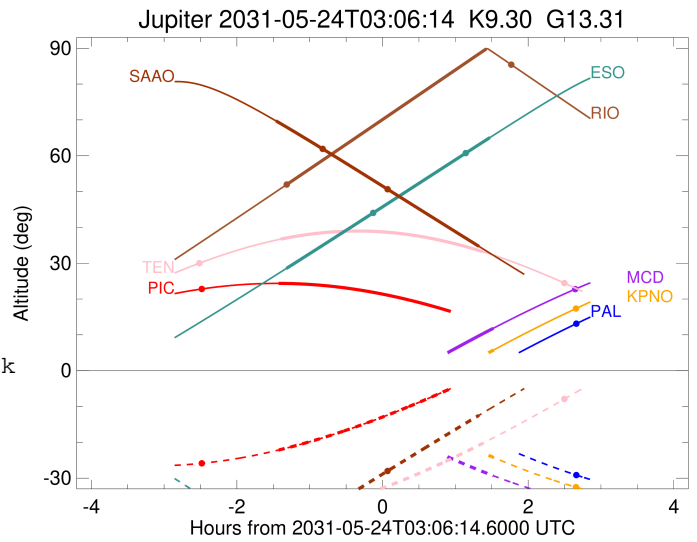
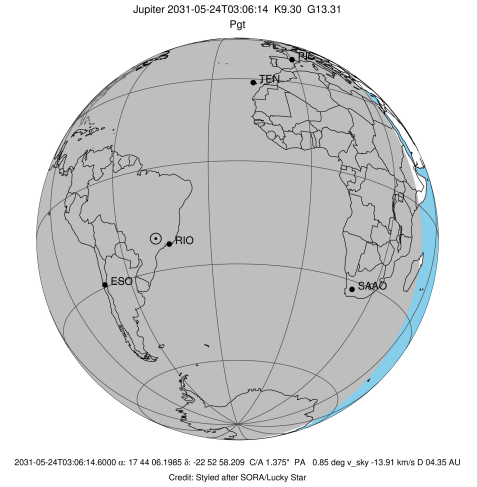


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T01:45:26.436	51.52	-74.94	71492.0	-3.97	-4.53
Jupiter	E	2031-05-24T04:31:44.760	89.78	-66.25	71492.0	-3.40	-3.89

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T03:11:14.070
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        : 4116892866668942848
2Mass ID (if available) : 17440619-2252580
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.303
G magnitude           : 13.313
RP magnitude          : 12.228
BP magnitude          : 14.544
DUPflag              : 0
Distance (au)         : 4.347
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.91
Sun-Target sep (deg)  : 156.01
Sun-Moon sep (deg)    : 173.11
B (ring opening deg)  : -2.61
PA of pole (deg)      : 0.88
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 1.823
C/A sky separation (km) : 5748.2
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
    
```

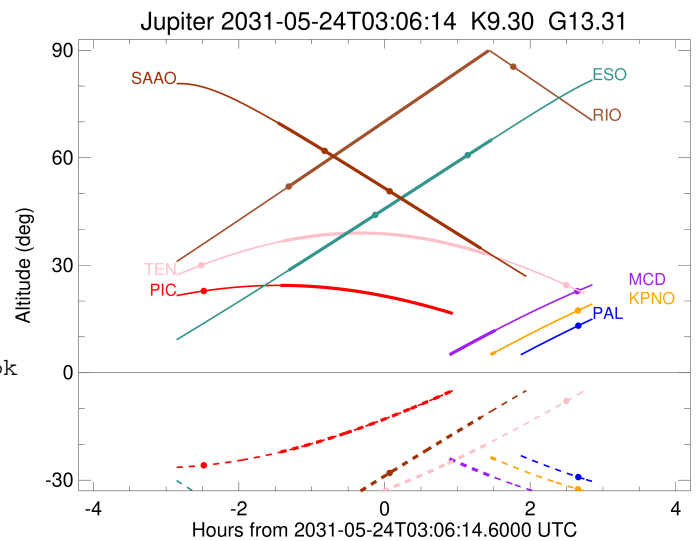
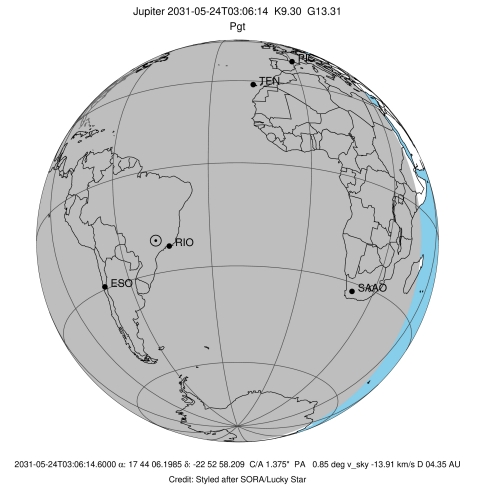


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T01:47:05.677	28.54	-50.19	71491.9	-5.19	-5.93
Jupiter	E	2031-05-24T04:34:39.404	65.04	-81.55	71491.9	-4.18	-4.78


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T03:01:54.480
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        : 4116892866668942848
2Mass ID (if available) : 17440619-2252580
ICRS Star Coord at Epoch: 17h 44m 06.19845s -22:52:58.20937s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.303
G magnitude           : 13.313
RP magnitude          : 12.228
BP magnitude          : 14.544
DUPflag              : 0
Distance (au)         : 4.347
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.91
Sun-Target sep (deg)  : 156.01
Sun-Moon sep (deg)    : 172.08
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.88
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 1.843
C/A sky separation (km) : 5811.1
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	2031-05-24T01:38:30.962	69.70	-47.38	71491.9	-4.39	-5.02
Jupiter	E	2031-05-24T04:25:46.984	34.69	-12.45	71491.9	-5.10	-5.83