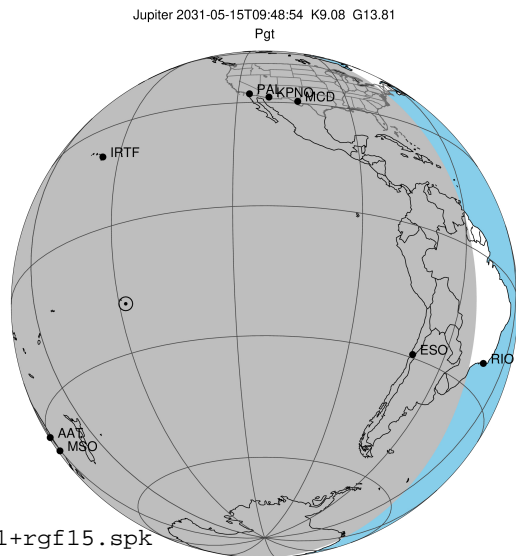


target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-05-15T09:48:54.580  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4068887192568516352  
 2Mass ID (if available) : 17474625-2253475

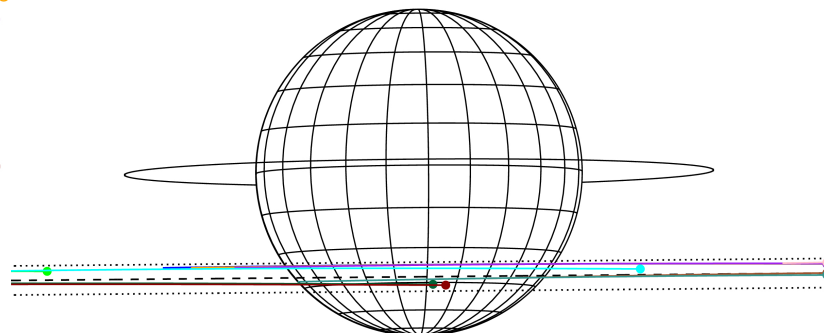
Jupiter 2031-05-15T09:48:54 K9.08 G13.81 Pgt

ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s

RUWE (>1.4 is poor) : 0.99  
 K magnitude : 9.080  
 G magnitude : 13.813  
 RP magnitude : 12.605  
 BP magnitude : 15.396  
 DUPflag : 0  
 Distance (au) : 4.416  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -11.62  
 Sun-Target sep (deg) : 146.77  
 Sun-Moon sep (deg) : 77.31  
 B (ring opening deg) : -2.60  
 PA of pole (deg) : 0.48  
 Pole direction: RA (deg): 268.05695  
 Dec (deg): 64.49651  
 C/A sky separation (") : 14.258  
 C/A sky separation (km) : 45668.2  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk



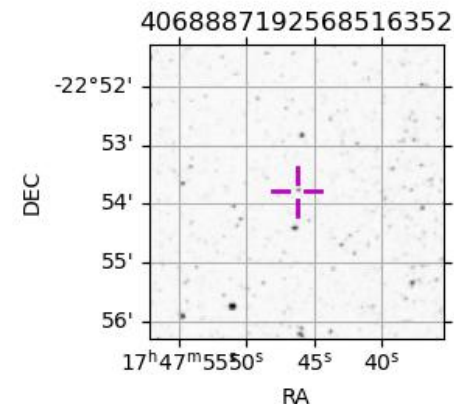
Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 AAT  
 MSO



2031-05-15T09:48:54.5800 α: 17 47 46.2587 δ: -22 53 47.587 C/A \*\*\*\*\* PA 0.52 deg v\_sky -11.62 km/s D 04.42 AU  
 Credit: Styled after SORA/Lucky Star

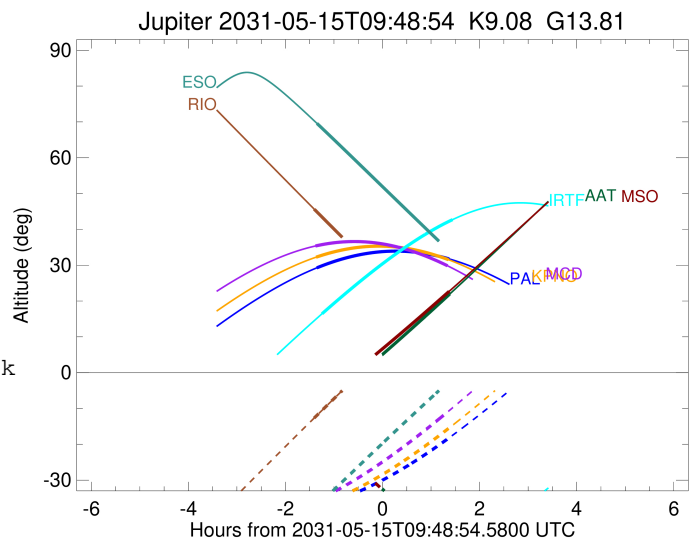
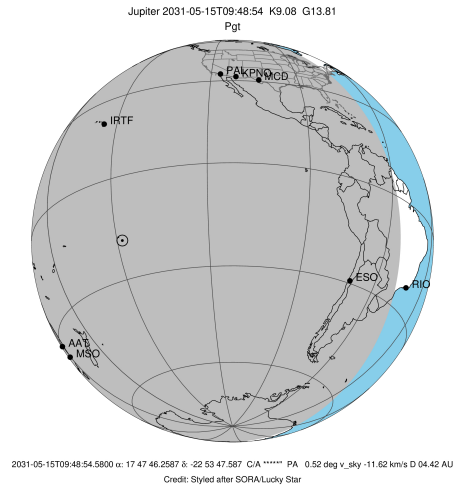
Observable events with sun below -5 deg and altitude above 5 deg

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 15 08:27 - MAY 15 11:11	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 15 08:27 - MAY 15 11:10	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	MAY 15 08:26 - MAY 15 11:09	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 15 08:34 - MAY 15 11:15	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	MAY 15 08:24 - MAY 15 08:24	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 15 08:28 - MAY 15 10:58	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	MAY 15 11:12 - MAY 15 11:12	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAY 15 11:11 - MAY 15 11:11	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T09:49:32.580
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        : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.080
G magnitude           : 13.813
RP magnitude          : 12.605
BP magnitude          : 15.396
DUPflag              : 0
Distance (au)         : 4.416
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.62
Sun-Target sep (deg)  : 146.77
Sun-Moon sep (deg)    : 77.83
B (ring opening deg) : -2.60
PA of pole (deg)      : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation ("): 12.609
C/A sky separation (km): 40386.3
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
    
```

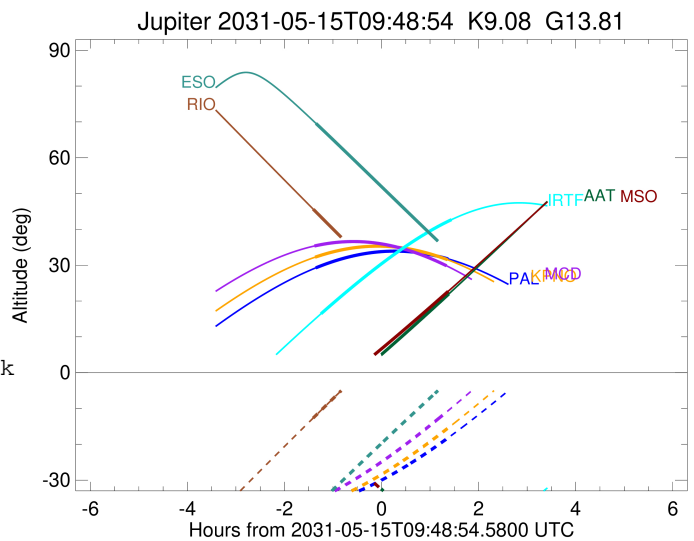
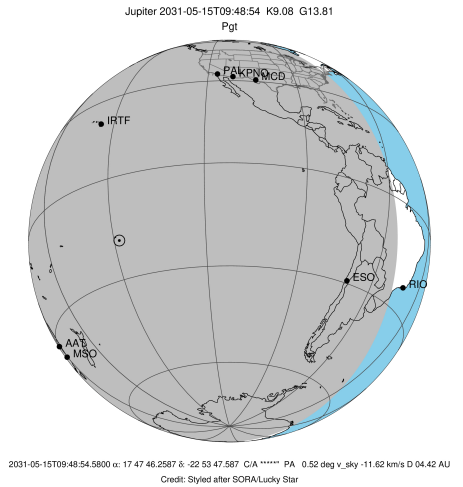


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T08:27:38.715	29.25	-36.93	71489.0	-34.50	-38.08
Jupiter	E	2031-05-15T11:11:16.007	31.75	-18.18	71489.0	-34.47	-38.05

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T09:48:47.870
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        : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.080
G magnitude           : 13.813
RP magnitude          : 12.605
BP magnitude          : 15.396
DUPflag              : 0
Distance (au)         : 4.416
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.62
Sun-Target sep (deg)  : 146.77
Sun-Moon sep (deg)    : 77.84
B (ring opening deg) : -2.60
PA of pole (deg)      : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 12.634
C/A sky separation (km) : 40466.1
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
    
```

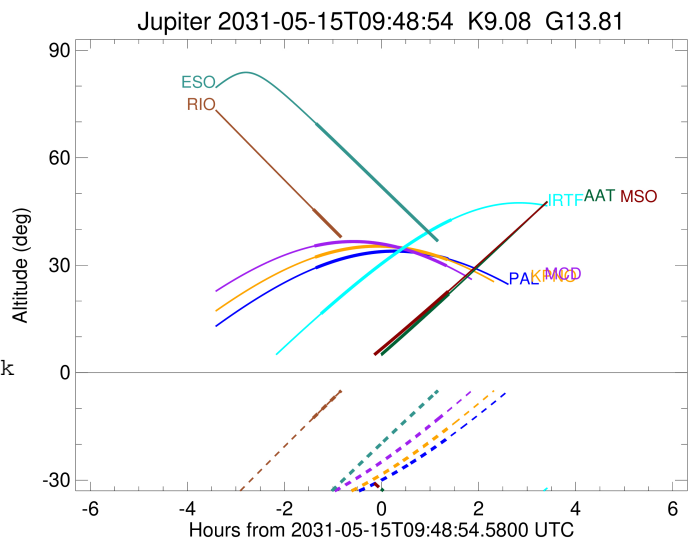
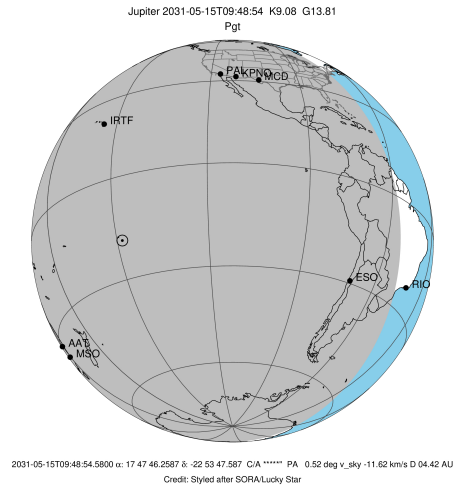


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T08:27:04.035	32.25	-37.06	71489.0	-34.52	-38.10
Jupiter	E	2031-05-15T11:10:26.391	31.54	-15.58	71489.0	-34.61	-38.19

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-15T09:47:41.920
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       : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 9.080
G magnitude          : 13.813
RP magnitude         : 12.605
BP magnitude         : 15.396
DUPflag             : 0
Distance (au)        : 4.416
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.62
Sun-Target sep (deg) : 146.77
Sun-Moon sep (deg)   : 77.82
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation ("): 12.666
C/A sky separation (km): 40568.5
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
    
```

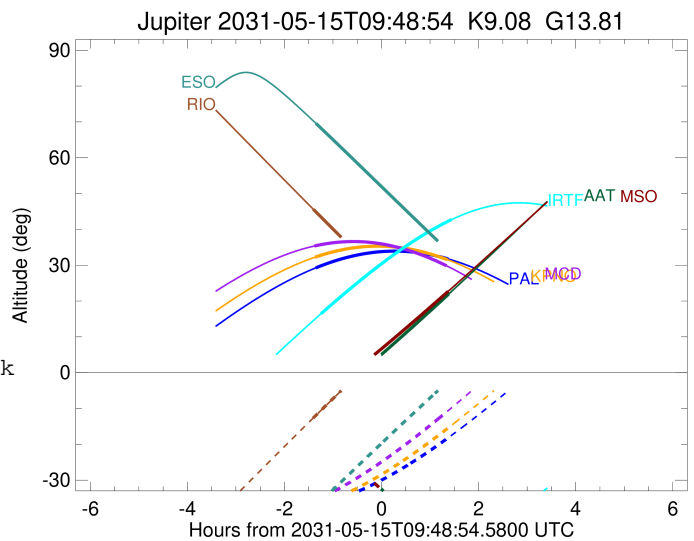
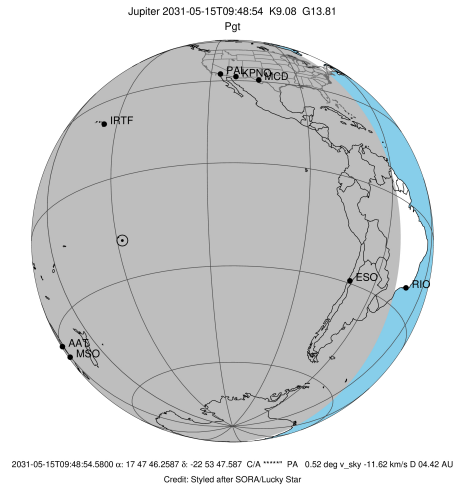


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T08:26:08.230	35.36	-35.75	71489.0	-34.53	-38.11
Jupiter	E	2031-05-15T11:09:17.838	29.83	-10.98	71489.0	-34.80	-38.39

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T09:55:11.080
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        : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor)  : 0.99
K magnitude           : 9.080
G magnitude           : 13.813
RP magnitude          : 12.605
BP magnitude          : 15.396
DUPflag               : 0
Distance (au)         : 4.416
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.62
Sun-Target sep (deg)  : 146.77
Sun-Moon sep (deg)    : 77.90
B (ring opening deg)  : -2.60
PA of pole (deg)      : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 13.097
C/A sky separation (km) : 41951.4
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
    
```

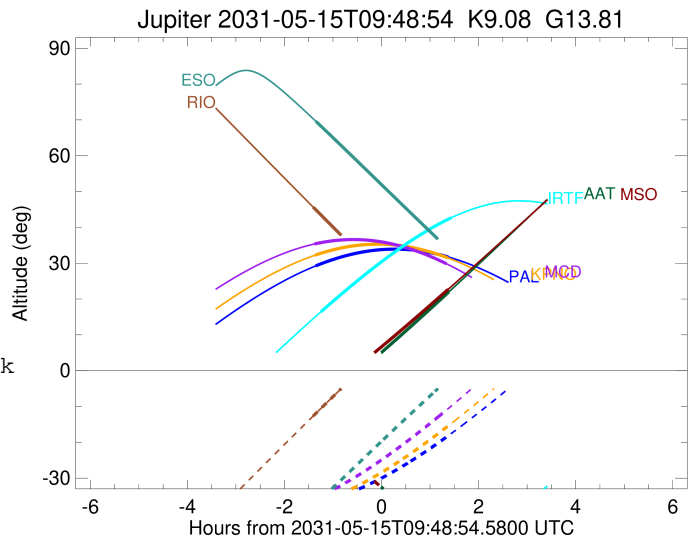
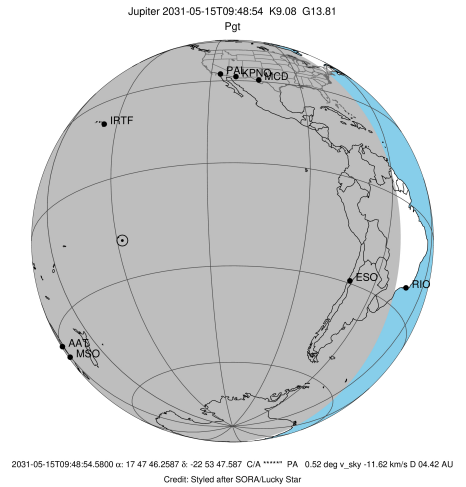


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T08:34:06.644	16.43	-43.76	71488.7	-36.49	-40.14
Jupiter	E	2031-05-15T11:15:27.334	42.71	-48.95	71488.9	-35.50	-39.12

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T09:40:14.380
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        : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.080
G magnitude           : 13.813
RP magnitude          : 12.605
BP magnitude          : 15.396
DUPflag              : 0
Distance (au)         : 4.416
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.62
Sun-Target sep (deg)  : 146.77
Sun-Moon sep (deg)   : 77.55
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 14.683
C/A sky separation (km) : 47031.3
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
    
```

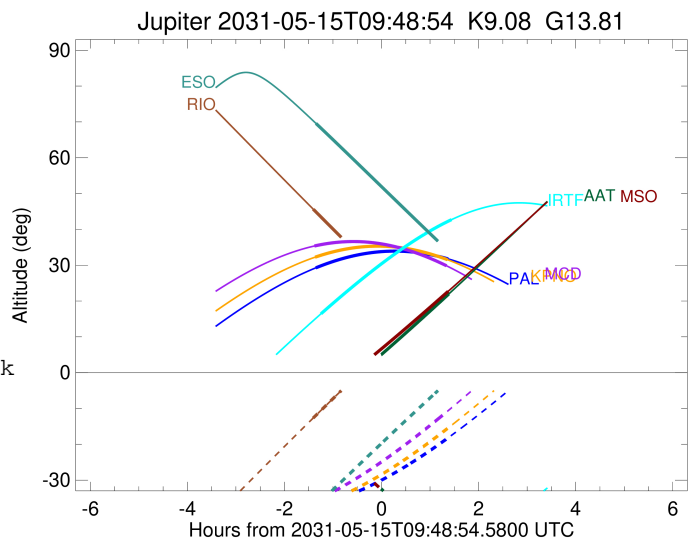
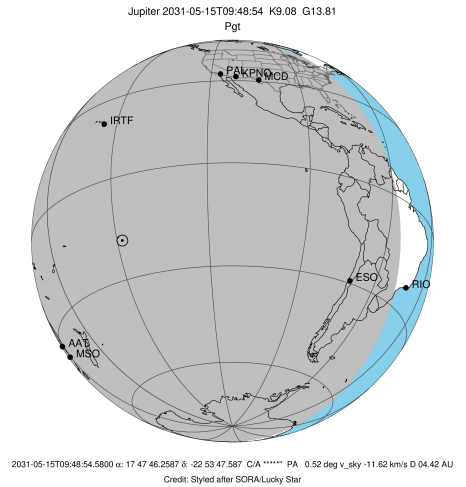


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T08:24:31.607	45.63	-12.65	71488.1	-40.37	-44.09
Jupiter	E	2031-05-15T10:56:43.789	11.65	19.60x	71487.8	-41.92	-45.63

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-15T09:43:08.010
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      : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 9.080
G magnitude          : 13.813
RP magnitude         : 12.605
BP magnitude         : 15.396
DUPflag             : 0
Distance (au)       : 4.416
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.62
Sun-Target sep (deg) : 146.77
Sun-Moon sep (deg)  : 77.93
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation ("): 14.629
C/A sky separation (km): 46857.8
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
    
```

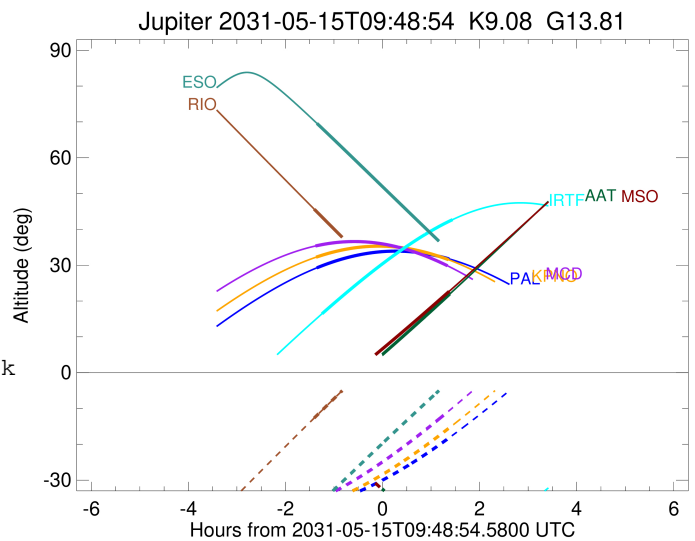
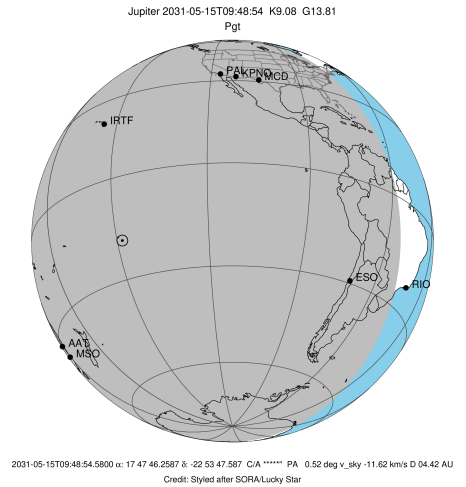


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T08:28:00.115	69.55	-37.26	71488.1	-40.48	-44.19
Jupiter	E	2031-05-15T10:58:44.131	36.69	-5.01	71487.9	-41.52	-45.24

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T09:57:35.980
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : AAT
Location              : Siding Spring (AAT)
Latitude (deg)        : -31.27703
E. Longitude (deg)    : 149.06608
Altitude (km)         : 1.164
Gaia source ID        : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor)  : 0.99
K magnitude           : 9.080
G magnitude           : 13.813
RP magnitude          : 12.605
BP magnitude          : 15.396
DUPflag              : 0
Distance (au)         : 4.416
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -11.62
Sun-Target sep (deg)  : 146.77
Sun-Moon sep (deg)    : 77.57
B (ring opening deg)  : -2.60
PA of pole (deg)      : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 15.285
C/A sky separation (km) : 48959.2
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
    
```



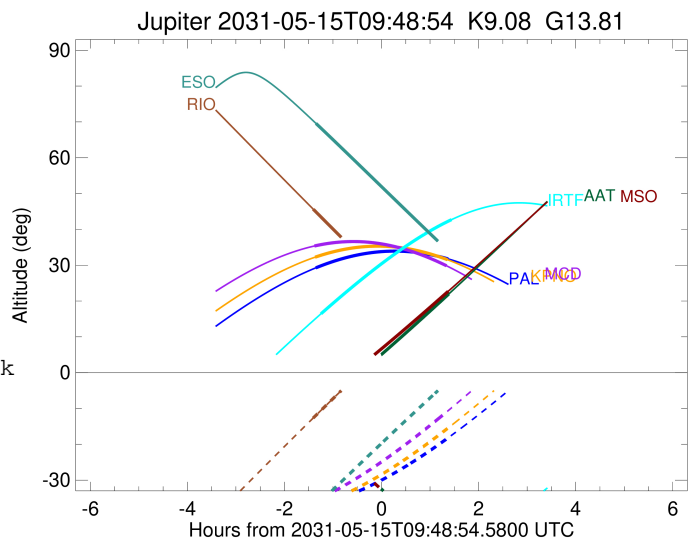
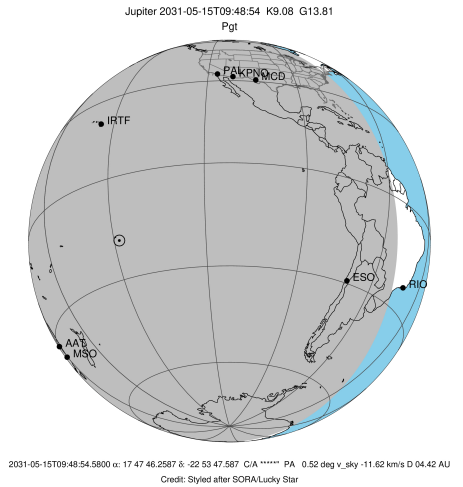
x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T08:42:07.690	-7.55x	-18.35	71487.5	-43.86	-47.58
Jupiter	E	2031-05-15T11:12:06.750	21.97	-50.29	71487.8	-42.46	-46.17



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T09:57:12.410
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : MSO
Location              : Mt. Stromlo Observatory
Latitude (deg)       : -35.32000
E. Longitude (deg)   : 149.00833
Altitude (km)        : 0.770
Gaia source ID       : 4068887192568516352
2Mass ID (if available) : 17474625-2253475
ICRS Star Coord at Epoch: 17h 47m 46.25873s -22:53:47.58672s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 9.080
G magnitude           : 13.813
RP magnitude          : 12.605
BP magnitude          : 15.396
DUPflag              : 0
Distance (au)        : 4.416
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.62
Sun-Target sep (deg) : 146.77
Sun-Moon sep (deg)   : 77.59
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.48
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 15.391
C/A sky separation (km) : 49297.9
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	2031-05-15T08:42:13.617	-5.39x	-19.07	71487.5	-44.20	-47.91
Jupiter	E	2031-05-15T11:11:16.713	22.70	-49.37	71487.7	-42.86	-46.58