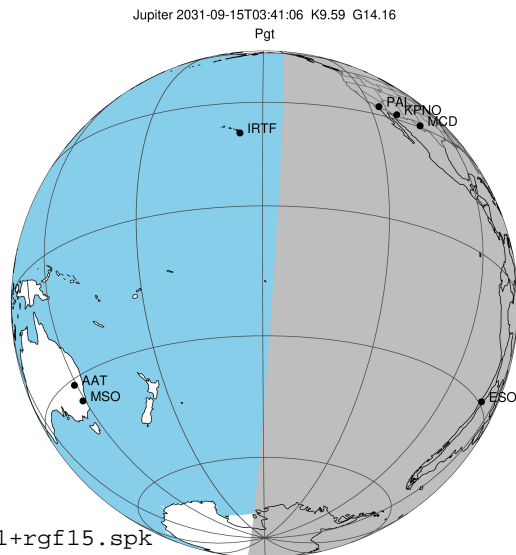


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-09-15T03:41:06.840
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4114498306478572416
 2Mass ID (if available) : 17164823-2250538

Jupiter 2031-09-15T03:41:06 K9.59 G14.16 Pgt

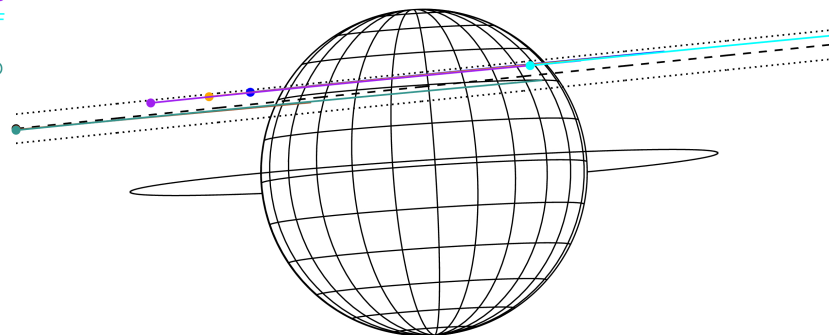
ICRS Star Coord at Epoch: 17h 16m 48.22397s -22:50:53.97244s

RUWE (>1.4 is poor) : 1.21
 K magnitude : 9.585
 G magnitude : 14.156
 RP magnitude : 12.964
 BP magnitude : 15.689
 DUPflag : 0
 Distance (au) : 5.180
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : 13.88
 Sun-Target sep (deg) : 88.37
 Sun-Moon sep (deg) : 107.08
 B (ring opening deg) : -2.38
 PA of pole (deg) : 3.80
 Pole direction: RA (deg): 268.05684
 Dec (deg): 64.49652
 C/A sky separation (") : 9.967
 C/A sky separation (km) : 37443.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



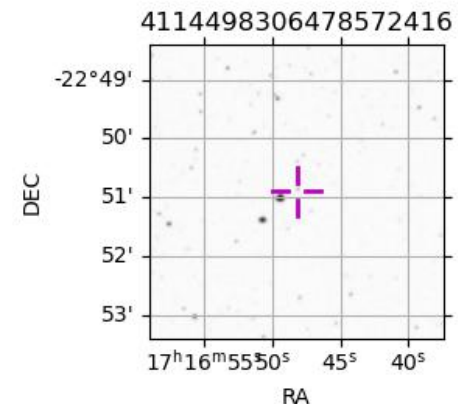
2031-09-15T03:41:06.8400 cc: 17 16 48.2240 s: -22 50 53.972 C/A 9.9577 PA 185.89 deg v_sky +13.88 km/s D 05.18 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 KPNO
 MCD
 IRTF
 RIO
 ESO



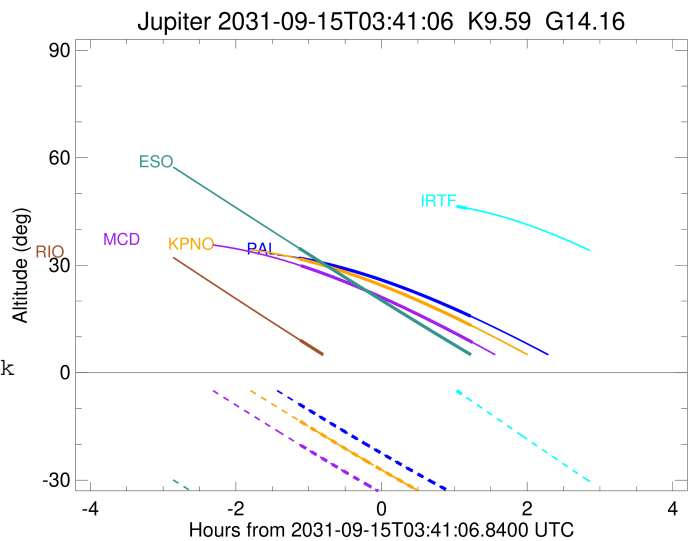
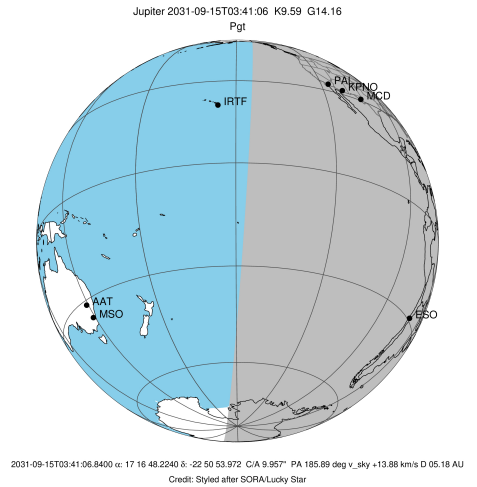
Observable events with sun below -5 deg and altitude above 5 deg

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	+ +	SEP 15 02:33 - SEP 15 04:54	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	SEP 15 02:33 - SEP 15 04:55	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	SEP 15 02:34 - SEP 15 04:56	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5		SEP 15 04:51 - SEP 15 04:51	Pne
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	SEP 15 02:34 - SEP 15 02:34	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	SEP 15 02:33 - SEP 15 02:33	Pin
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             : 2031-09-15T03:44:13.610
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        : 4114498306478572416
2Mass ID (if available) : 17164823-2250538
ICRS Star Coord at Epoch: 17h 16m 48.22397s -22:50:53.97244s
RUWE (>1.4 is poor) : 1.21
K magnitude           : 9.585
G magnitude           : 14.156
RP magnitude          : 12.964
BP magnitude          : 15.689
DUPflag              : 0
Distance (au)         : 5.180
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : 13.88
Sun-Target sep (deg) : 88.37
Sun-Moon sep (deg)   : 107.33
B (ring opening deg) : -2.38
PA of pole (deg)     : 3.80
Pole direction: RA (deg): 268.05684
Dec (deg): 64.49652
C/A sky separation (" ) : 11.354
C/A sky separation (km) : 42655.7
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
    
```

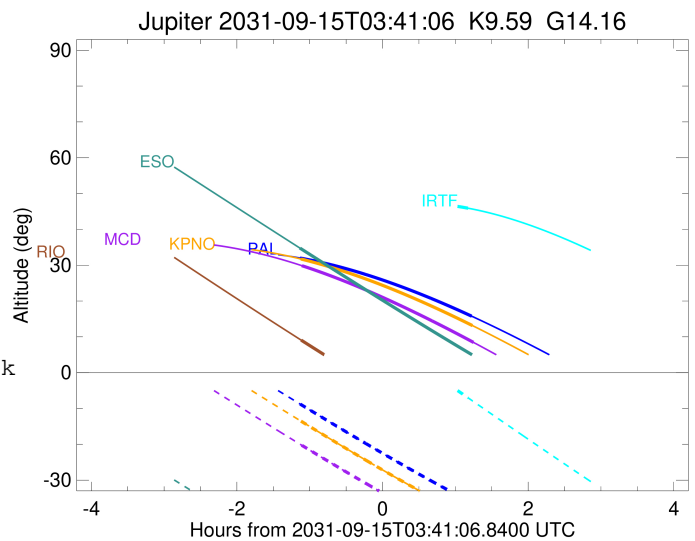
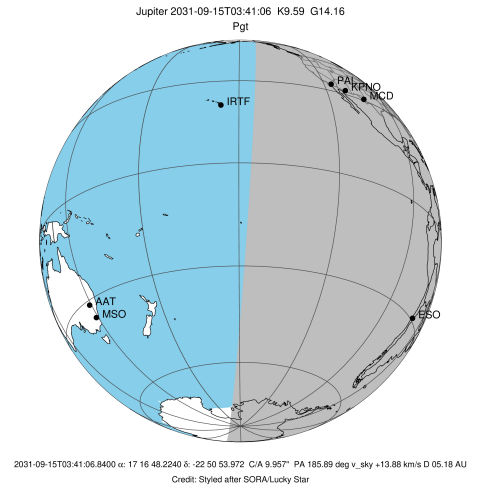


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-09-15T02:33:23.135	31.98	-8.79	71489.5	34.62	38.21
Jupiter	E	2031-09-15T04:54:36.653	15.76	-36.23	71489.0	38.37	42.06

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-09-15T03:44:51.330
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       : 4114498306478572416
2Mass ID (if available) : 17164823-2250538
ICRS Star Coord at Epoch: 17h 16m 48.22397s -22:50:53.97244s
RUWE (>1.4 is poor) : 1.21
K magnitude           : 9.585
G magnitude           : 14.156
RP magnitude         : 12.964
BP magnitude         : 15.689
DUPflag              : 0
Distance (au)        : 5.180
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : 13.88
Sun-Target sep (deg) : 88.37
Sun-Moon sep (deg)  : 107.29
B (ring opening deg) : -2.38
PA of pole (deg)    : 3.80
Pole direction: RA (deg): 268.05684
Dec (deg): 64.49652
C/A sky separation (" ) : 11.311
C/A sky separation (km) : 42492.6
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
    
```

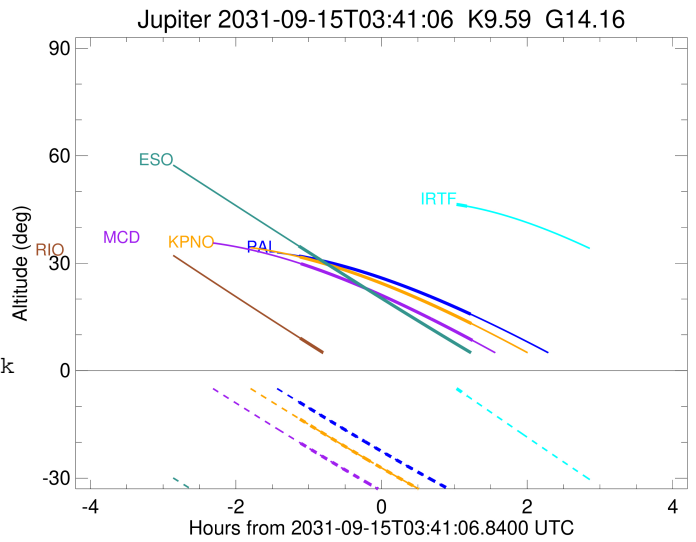
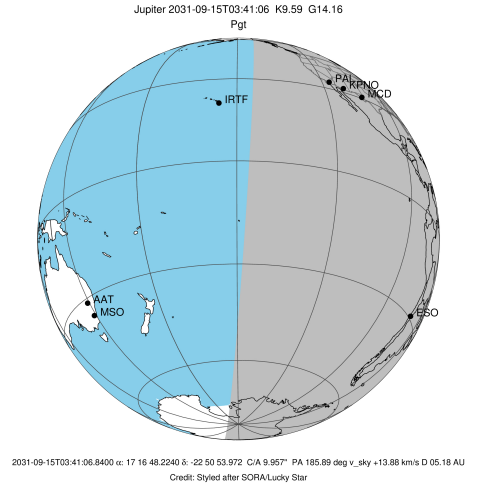


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-09-15T02:33:55.243	31.72	-13.52	71489.5	34.53	38.11
Jupiter	E	2031-09-15T04:55:16.577	13.14	-40.74	71489.0	38.15	41.83

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-09-15T03:45:40.330
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        : 4114498306478572416
2Mass ID (if available) : 17164823-2250538
ICRS Star Coord at Epoch: 17h 16m 48.22397s -22:50:53.97244s
RUWE (>1.4 is poor) : 1.21
K magnitude           : 9.585
G magnitude           : 14.156
RP magnitude          : 12.964
BP magnitude          : 15.689
DUPflag              : 0
Distance (au)         : 5.180
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : 13.88
Sun-Target sep (deg)  : 88.37
Sun-Moon sep (deg)    : 107.22
B (ring opening deg) : -2.38
PA of pole (deg)      : 3.80
Pole direction: RA (deg): 268.05684
Dec (deg): 64.49652
C/A sky separation (") : 11.250
C/A sky separation (km) : 42266.3
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
    
```

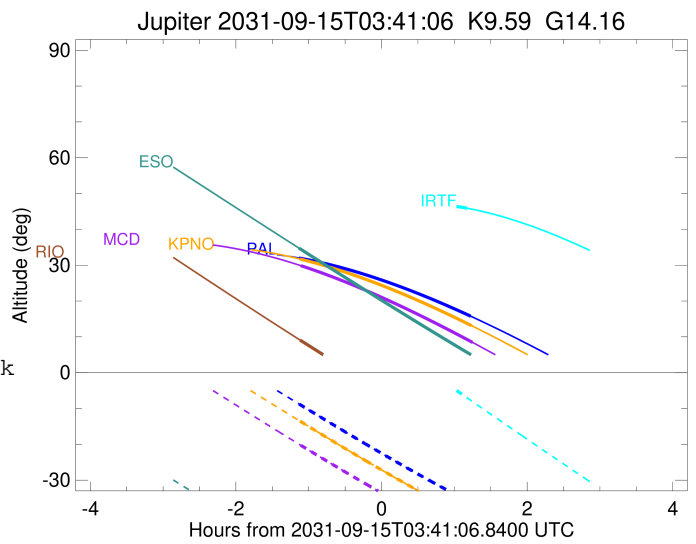
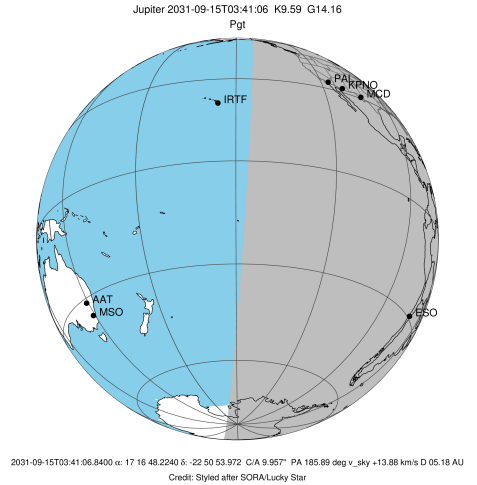


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-09-15T02:34:39.722	29.86	-20.28	71489.5	34.39	37.97
Jupiter	E	2031-09-15T04:56:05.736	8.45	-46.57	71489.1	37.85	41.52

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-09-15T03:39:34.690
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        : 4114498306478572416
2Mass ID (if available) : 17164823-2250538
ICRS Star Coord at Epoch: 17h 16m 48.22397s -22:50:53.97244s
RUWE (>1.4 is poor) : 1.21
K magnitude           : 9.585
G magnitude           : 14.156
RP magnitude          : 12.964
BP magnitude          : 15.689
DUPflag              : 0
Distance (au)         : 5.180
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : 13.88
Sun-Target sep (deg) : 88.37
Sun-Moon sep (deg)   : 107.74
B (ring opening deg) : -2.38
PA of pole (deg)     : 3.80
Pole direction: RA (deg): 268.05684
Dec (deg): 64.49652
C/A sky separation (") : 11.089
C/A sky separation (km) : 41659.7
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
    
```

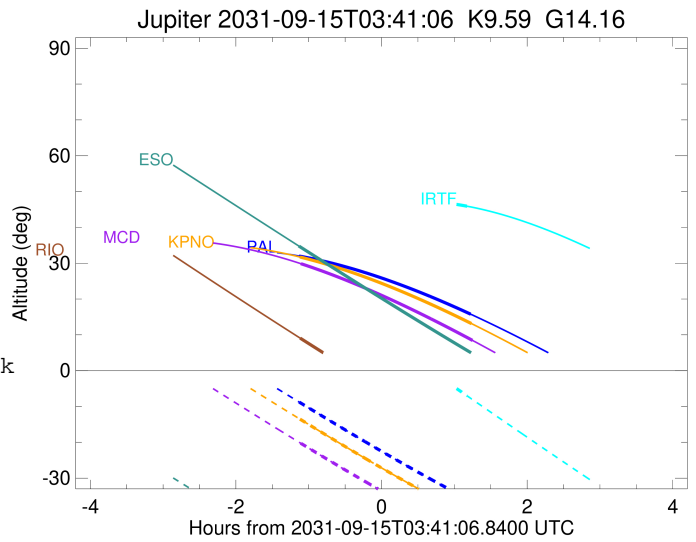
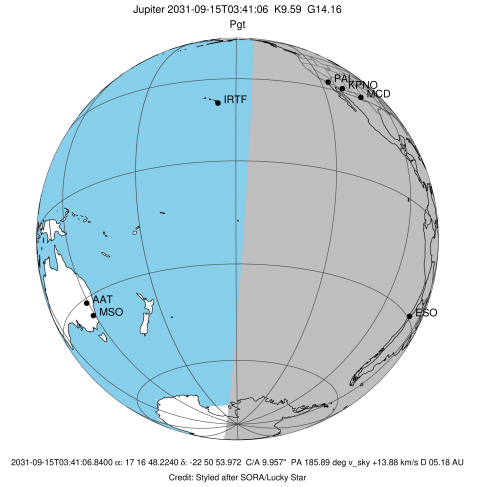


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-09-15T02:27:31.406	41.21	26.85x	71489.7	33.15	36.68
Jupiter	E	2031-09-15T04:51:36.948	45.90	-7.02	71489.1	37.84	41.51

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-09-15T03:48:39.260
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       : 4114498306478572416
2Mass ID (if available) : 17164823-2250538
ICRS Star Coord at Epoch: 17h 16m 48.22397s -22:50:53.97244s
RUWE (>1.4 is poor) : 1.21
K magnitude           : 9.585
G magnitude           : 14.156
RP magnitude          : 12.964
BP magnitude          : 15.689
DUPflag              : 0
Distance (au)         : 5.180
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : 13.88
Sun-Target sep (deg) : 88.37
Sun-Moon sep (deg)   : 106.77
B (ring opening deg) : -2.38
PA of pole (deg)     : 3.80
Pole direction: RA (deg): 268.05684
Dec (deg): 64.49652
C/A sky separation (") : 9.324
C/A sky separation (km) : 35030.3
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
    
```

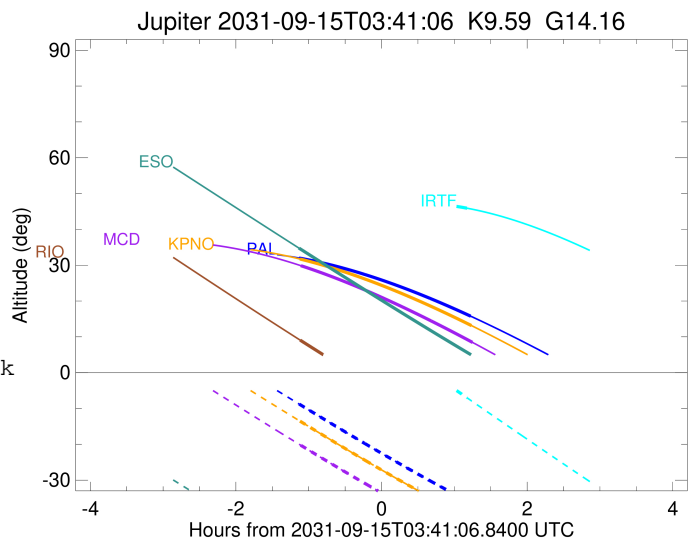
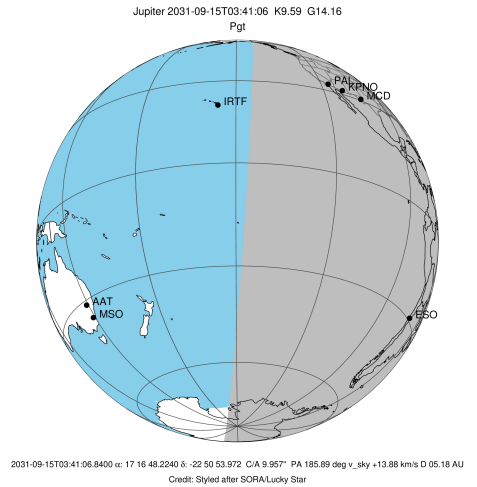


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-09-15T02:34:02.940	9.09	-70.08	71490.3	27.92	31.17
Jupiter	E	2031-09-15T05:02:24.317	-20.91x	-52.04	71490.0	30.72	34.13

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-09-15T03:48:26.180
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        : 4114498306478572416
2Mass ID (if available) : 17164823-2250538
ICRS Star Coord at Epoch: 17h 16m 48.22397s -22:50:53.97244s
RUWE (>1.4 is poor) : 1.21
K magnitude           : 9.585
G magnitude           : 14.156
RP magnitude          : 12.964
BP magnitude          : 15.689
DUPflag              : 0
Distance (au)         : 5.180
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : 13.88
Sun-Target sep (deg) : 88.37
Sun-Moon sep (deg)   : 107.15
B (ring opening deg) : -2.38
PA of pole (deg)     : 3.80
Pole direction: RA (deg): 268.05684
Dec (deg): 64.49652
C/A sky separation (") : 9.449
C/A sky separation (km) : 35500.4
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	2031-09-15T02:33:03.647	34.77	-50.54	71490.3	28.22	31.48
Jupiter	E	2031-09-15T05:02:57.132	3.38x	-63.35	71489.9	31.18	34.62