

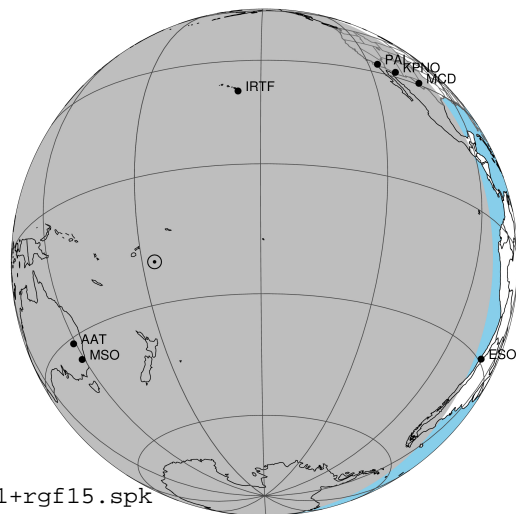
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-22T11:43:19.350
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116890706397768448
 2Mass ID (if available) : 17445081-2252462

Jupiter 2031-05-22T11:43:19 K9.77 G14.68 Pgt

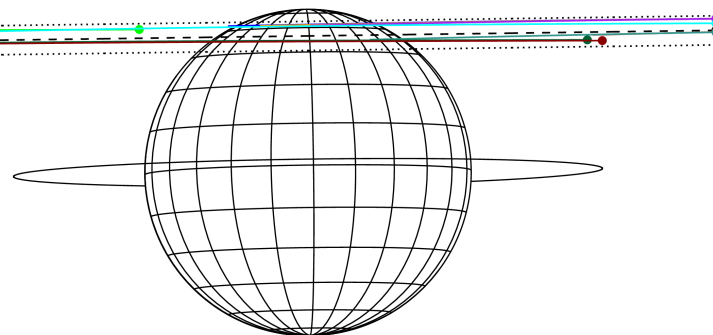
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s

RUWE (>1.4 is poor) : 0.94
 K magnitude : 9.767
 G magnitude : 14.684
 RP magnitude : 13.408
 BP magnitude : 16.280
 DUPflag : 0
 Distance (au) : 4.358
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -13.53
 Sun-Target sep (deg) : 154.26
 Sun-Moon sep (deg) : 167.39
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.80
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 18.922
 C/A sky separation (km) : 59812.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-22T11:43:19 K9.77 G14.68
 Pgt



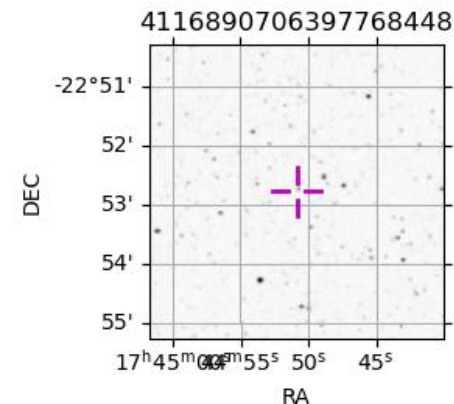
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 RIO
 ESO
 AAT
 MSO



2031-05-22T11:43:19.3500 a: 17 44 50.8082 & -22 52 46.680 C/A ***** PA 180.79 deg v_sky -13.53 km/s D 04.36 AU
 Credit: Styled after SORA/Lucky Star

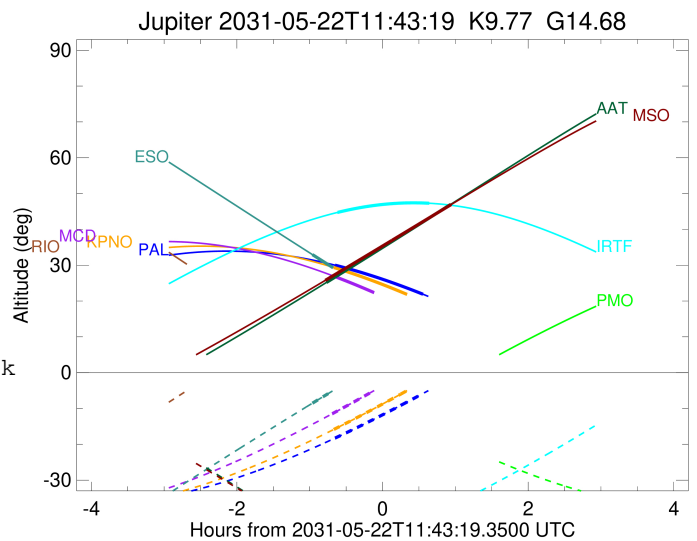
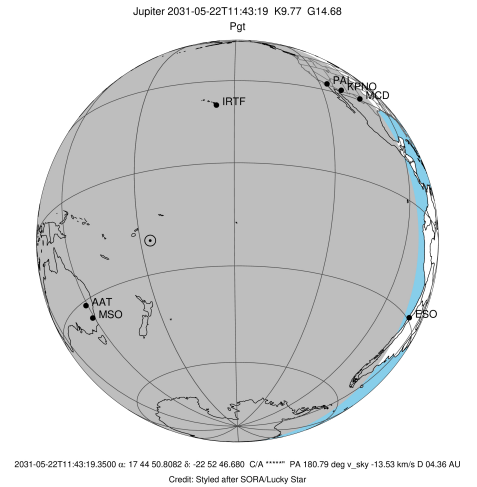
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+ +	MAY 22 11:04 - MAY 22 12:16	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 22 11:03 - MAY 22 11:03	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 22 11:01 - MAY 22 11:01	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 22 11:06 - MAY 22 12:21	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8			Pnn
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	MAY 22 10:45 - MAY 22 10:45	Pin
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	MAY 22 10:57 - MAY 22 12:39	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	MAY 22 10:56 - MAY 22 12:39	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-22T11:40:23.540
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        : 4116890706397768448
2Mass ID (if available) : 17445081-2252462
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.767
G magnitude           : 14.684
RP magnitude          : 13.408
BP magnitude          : 16.280
DUPflag              : 0
Distance (au)         : 4.358
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.53
Sun-Target sep (deg)  : 154.26
Sun-Moon sep (deg)    : 167.77
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.80
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 20.508
C/A sky separation (km) : 64825.4
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
    
```

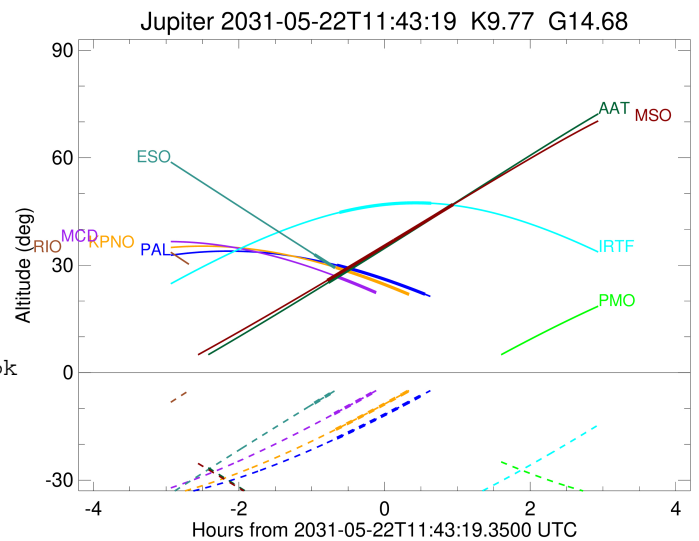
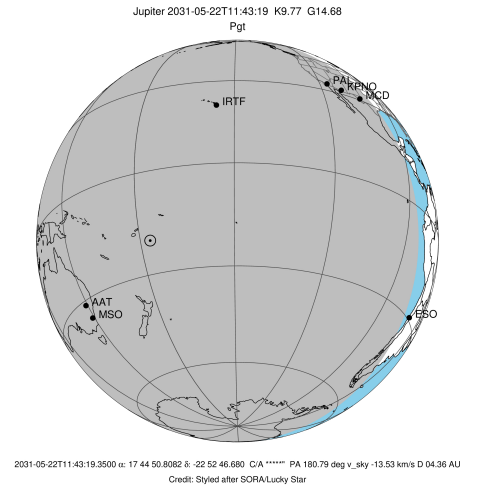


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-22T11:04:08.529	30.01	-18.28	71484.3	65.20	67.86
Jupiter	E	2031-05-22T12:16:42.527	21.89	-5.81	71484.4	64.60	67.31

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-22T11:39:54.750
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        : 4116890706397768448
2Mass ID (if available) : 17445081-2252462
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.767
G magnitude           : 14.684
RP magnitude          : 13.408
BP magnitude          : 16.280
DUPflag              : 0
Distance (au)         : 4.358
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.53
Sun-Target sep (deg)  : 154.26
Sun-Moon sep (deg)   : 167.84
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.80
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 20.447
C/A sky separation (km) : 64632.7
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
    
```

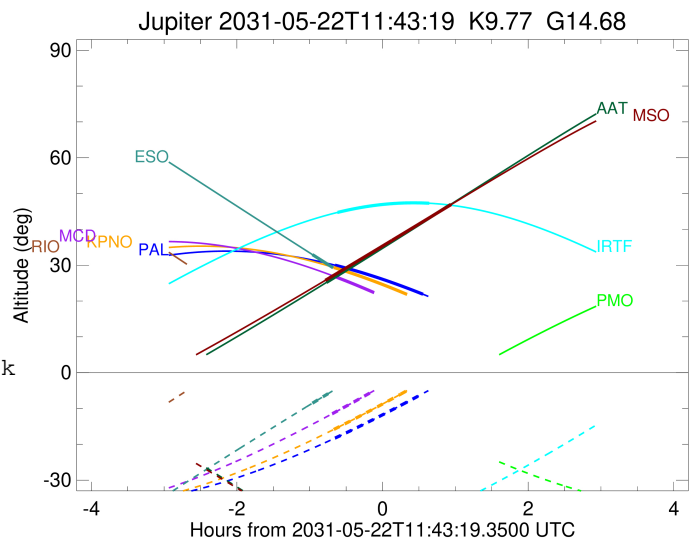
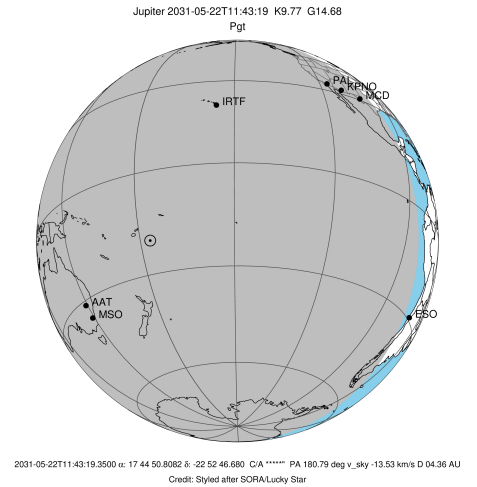


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-22T11:03:08.312	29.36	-15.86	71484.4	64.89	67.58
Jupiter	E	2031-05-22T12:16:46.088	19.91	-2.50x	71484.5	64.19	66.93

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-22T11:39:16.970
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       : 4116890706397768448
2Mass ID (if available) : 17445081-2252462
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.767
G magnitude           : 14.684
RP magnitude          : 13.408
BP magnitude          : 16.280
DUPflag              : 0
Distance (au)         : 4.358
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.53
Sun-Target sep (deg) : 154.26
Sun-Moon sep (deg)   : 167.91
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.80
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 20.364
C/A sky separation (km) : 64370.9
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
    
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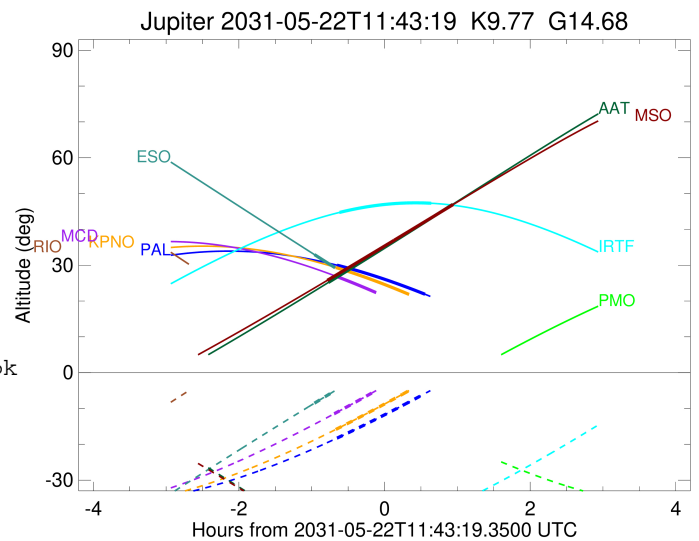
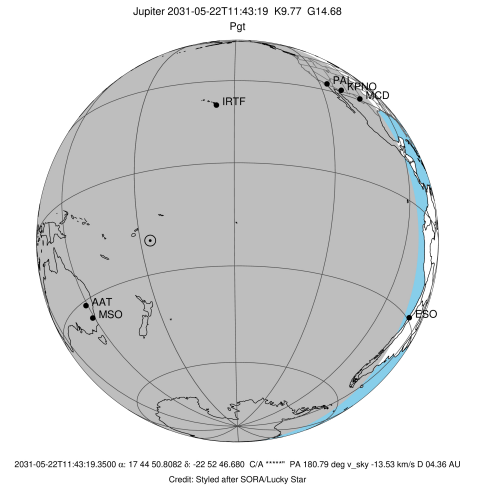


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-22T11:01:47.128	27.11	-11.49	71484.4	64.48	67.20
Jupiter	E	2031-05-22T12:16:53.028	15.97	2.92x	71484.5	63.64	66.42

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-22T11:44:03.030
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        : 4116890706397768448
2Mass ID (if available) : 17445081-2252462
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.767
G magnitude           : 14.684
RP magnitude          : 13.408
BP magnitude          : 16.280
DUPflag              : 0
Distance (au)         : 4.358
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.53
Sun-Target sep (deg)  : 154.26
Sun-Moon sep (deg)   : 167.37
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.80
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 20.281
C/A sky separation (km) : 64109.7
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
    
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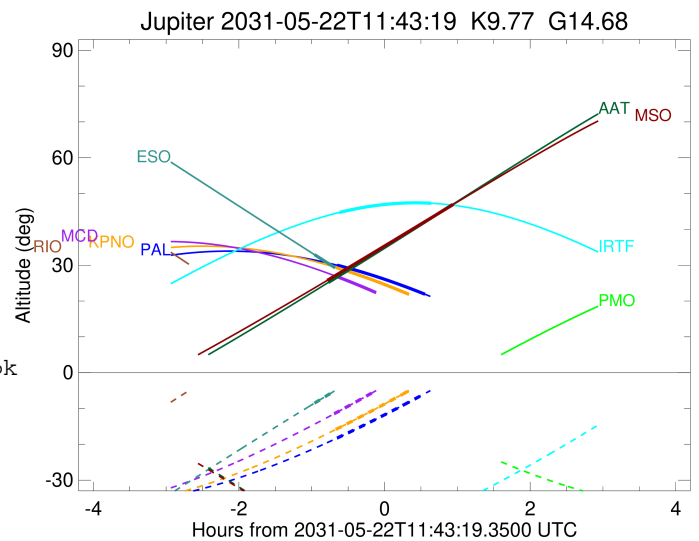
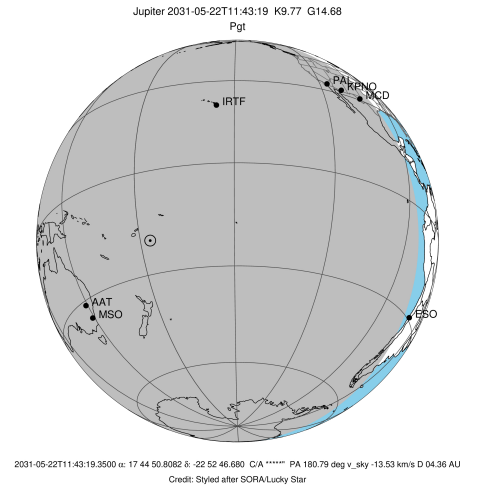


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-22T11:06:12.788	44.72	-48.24	71484.5	63.47	66.27
Jupiter	E	2031-05-22T12:21:51.116	47.28	-39.81	71484.5	63.67	66.46

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-22T11:37:24.340
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       : 4116890706397768448
2Mass ID (if available) : 17445081-2252462
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.767
G magnitude           : 14.684
RP magnitude          : 13.408
BP magnitude          : 16.280
DUPflag              : 0
Distance (au)        : 4.358
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.53
Sun-Target sep (deg) : 154.26
Sun-Moon sep (deg)   : 168.24
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.80
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 18.193
C/A sky separation (km): 57509.7
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
    
```

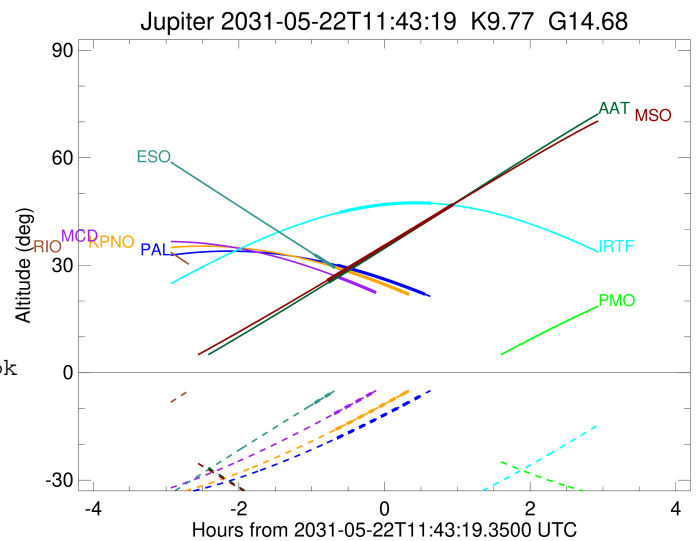
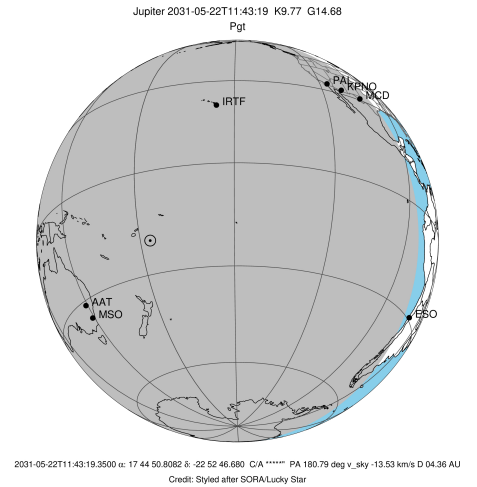


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-22T10:45:35.116	32.95	-8.52	71485.9	54.09	57.50
Jupiter	E	2031-05-22T12:29:31.497	10.98	12.02x	71486.1	52.83	56.31

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-22T11:48:26.560
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      : 4116890706397768448
2Mass ID (if available) : 17445081-2252462
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s
RUWE (>1.4 is poor) : 0.94
K magnitude         : 9.767
G magnitude         : 14.684
RP magnitude        : 13.408
BP magnitude        : 16.280
DUPflag            : 0
Distance (au)       : 4.358
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -13.53
Sun-Target sep (deg) : 154.26
Sun-Moon sep (deg)  : 166.87
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.80
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 18.277
C/A sky separation (km) : 57774.9
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
    
```

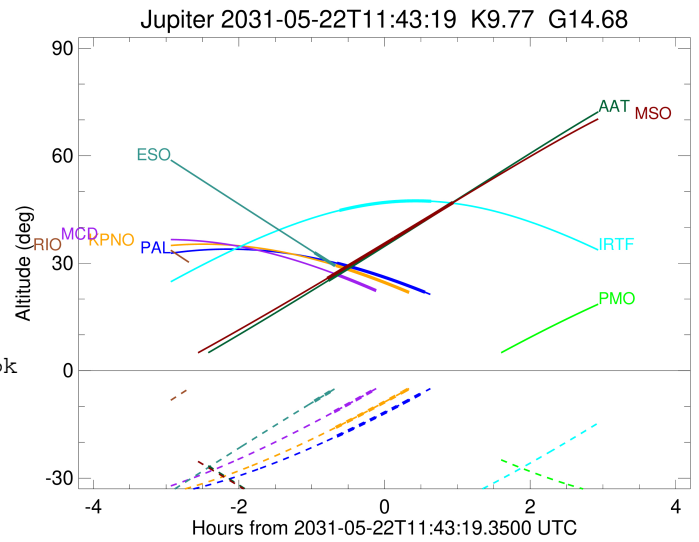
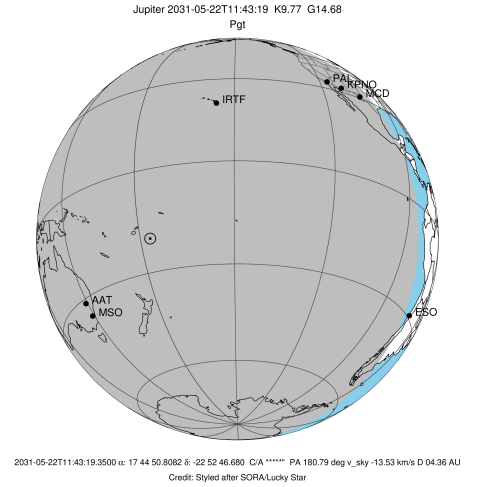


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-22T10:57:07.322	25.18	-47.67	71486.0	53.23	56.69
Jupiter	E	2031-05-22T12:39:27.460	46.96	-68.92	71485.9	54.38	57.78

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-22T11:48:12.900
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       : 4116890706397768448
2Mass ID (if available) : 17445081-2252462
ICRS Star Coord at Epoch: 17h 44m 50.80823s -22:52:46.67955s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.767
G magnitude           : 14.684
RP magnitude          : 13.408
BP magnitude          : 16.280
DUPflag              : 0
Distance (au)        : 4.358
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.53
Sun-Target sep (deg) : 154.26
Sun-Moon sep (deg)   : 166.90
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.80
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 18.153
C/A sky separation (km): 57381.2
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	2031-05-22T10:56:12.749	25.77	-47.05	71486.1	52.72	56.20
Jupiter	E	2031-05-22T12:39:54.951	46.93	-66.94	71485.9	53.82	57.25