

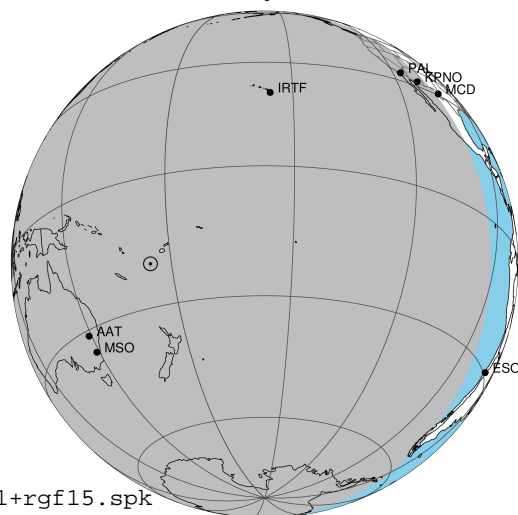
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-21T12:18:33.370
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068852390557284480
 2Mass ID (if available) : 17451666-2252530

Jupiter 2031-05-21T12:18:33 K9.02 G14.63 Pgt

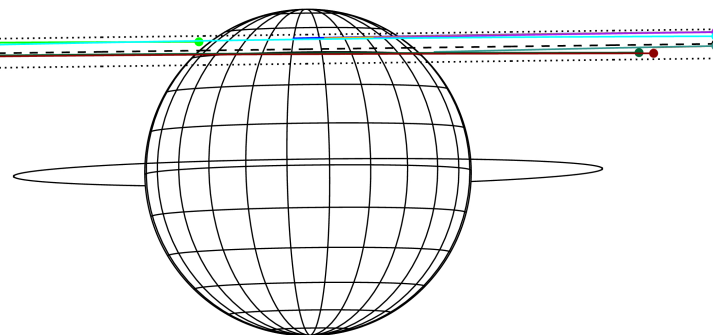
ICRS Star Coord at Epoch: 17h 45m 16.66404s -22:52:53.29806s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.022
 G magnitude : 14.633
 RP magnitude : 13.261
 BP magnitude : 16.953
 DUPflag : 0
 Distance (au) : 4.366
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -13.29
 Sun-Target sep (deg) : 153.22
 Sun-Moon sep (deg) : 155.57
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.75
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 17.064
 C/A sky separation (km) : 54028.9
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-21T12:18:33 K9.02 G14.63
 Pgt



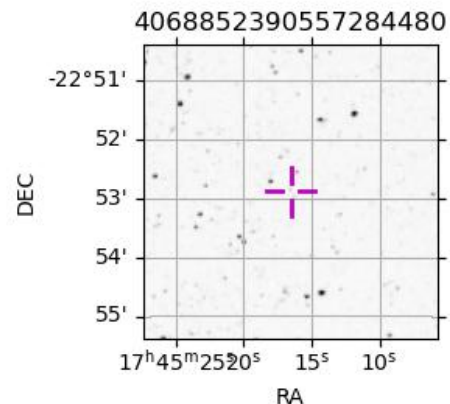
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 RIO
 ESO
 AAT
 MSO



2031-05-21T12:18:33.3700 a: 17 45 16.6640 s: -22 52 53.298 C/A ***** PA 180.75 deg v_sky -13.29 km/s D 04.37 AU
 Credit: Styled after SORA/Lucky Star

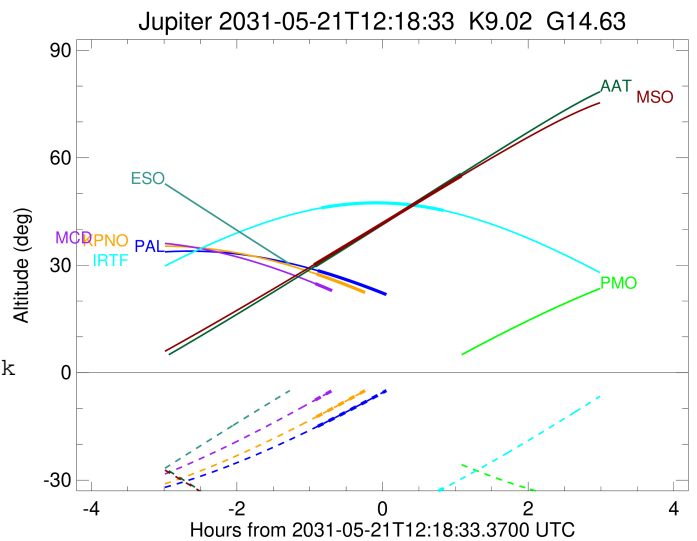
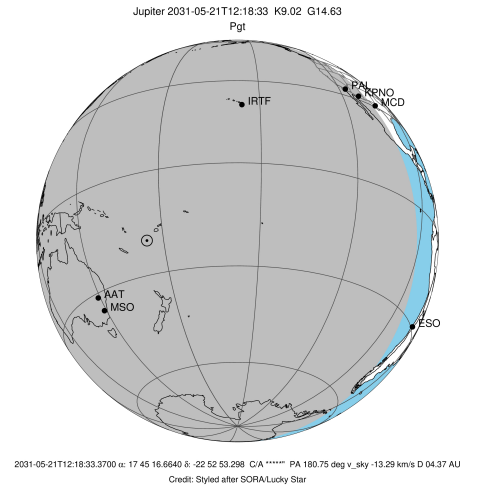
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1			Pnn
PAL	Palomar Mt (200")	33.4	243.1	+	MAY 21 11:25 - MAY 21 11:25	Pin
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 21 11:24 - MAY 21 11:24	Pin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 21 11:23 - MAY 21 11:23	Pin
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 21 11:28 - MAY 21 13:08	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			Pnn
AAT	Siding Spring (AAT)	-31.3	149.1	+ +	MAY 21 11:23 - MAY 21 13:23	Pie
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+ +	MAY 21 11:22 - MAY 21 13:23	Pie



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-21T12:14:54.370
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        : 4068852390557284480
2Mass ID (if available) : 17451666-2252530
ICRS Star Coord at Epoch: 17h 45m 16.66404s -22:52:53.29806s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.022
G magnitude           : 14.633
RP magnitude          : 13.261
BP magnitude          : 16.953
DUPflag              : 0
Distance (au)         : 4.366
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.29
Sun-Target sep (deg) : 153.22
Sun-Moon sep (deg)   : 156.13
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.75
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 18.598
C/A sky separation (km): 58888.1
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
    
```

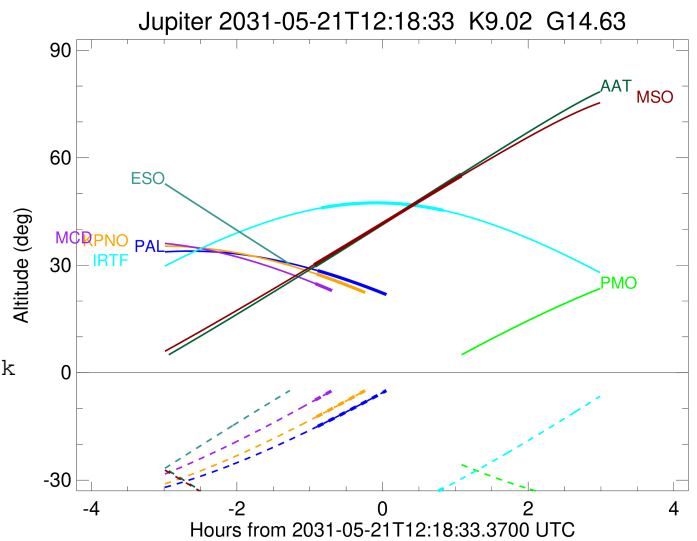
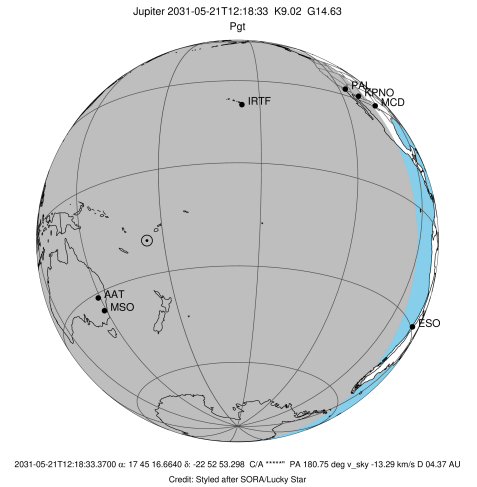


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-21T11:25:13.758	28.47	-14.97	71485.6	55.71	59.04
Jupiter	E	2031-05-21T13:04:44.428	15.48	3.15x	71485.8	54.94	58.31

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-21T12:14:26.700
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       : 4068852390557284480
2Mass ID (if available) : 17451666-2252530
ICRS Star Coord at Epoch: 17h 45m 16.66404s -22:52:53.29806s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.022
G magnitude           : 14.633
RP magnitude          : 13.261
BP magnitude          : 16.953
DUPflag              : 0
Distance (au)         : 4.366
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.29
Sun-Target sep (deg)  : 153.22
Sun-Moon sep (deg)   : 156.18
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.75
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 18.530
C/A sky separation (km): 58672.6
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
    
```

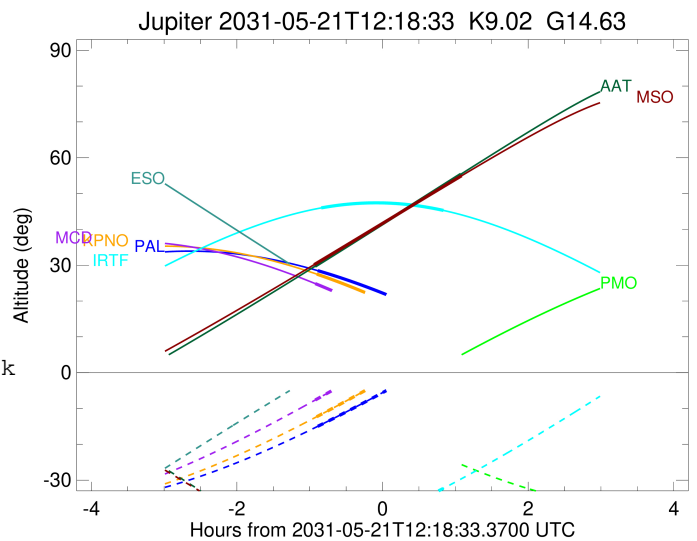
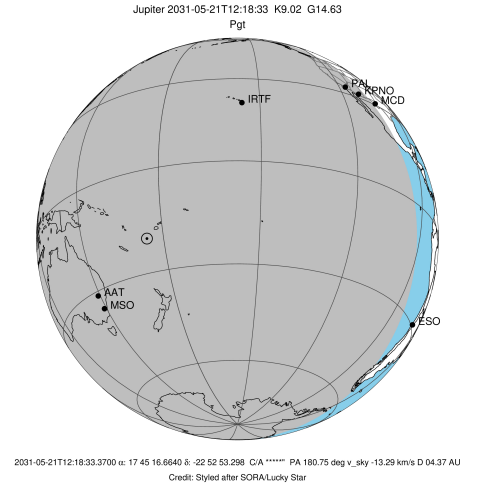


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-21T11:24:20.051	27.51	-12.30	71485.7	55.46	58.80
Jupiter	E	2031-05-21T13:04:44.391	12.95	6.80x	71485.8	54.59	57.98

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-21T12:13:51.570
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        : 4068852390557284480
2Mass ID (if available) : 17451666-2252530
ICRS Star Coord at Epoch: 17h 45m 16.66404s -22:52:53.29806s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.022
G magnitude           : 14.633
RP magnitude          : 13.261
BP magnitude          : 16.953
DUPflag              : 0
Distance (au)         : 4.366
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.29
Sun-Target sep (deg)  : 153.22
Sun-Moon sep (deg)    : 156.22
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.75
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 18.438
C/A sky separation (km) : 58380.9
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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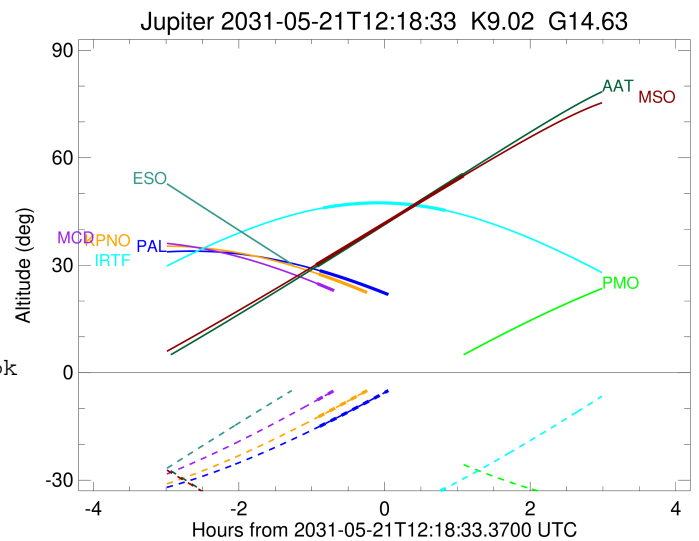
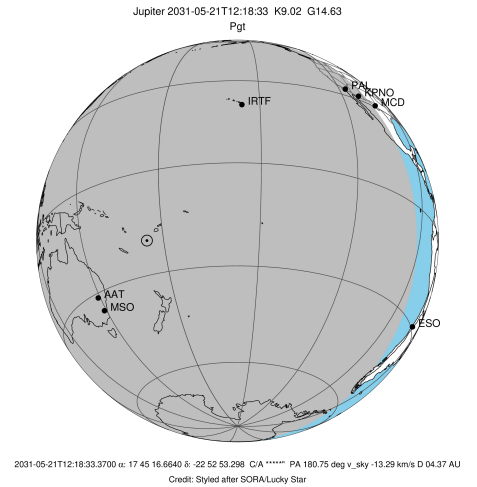


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-21T11:23:08.054	24.86	-7.63	71485.7	55.12	58.49
Jupiter	E	2031-05-21T13:04:48.272	8.38	12.59x	71485.9	54.12	57.53

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-21T12:18:26.200
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       : 4068852390557284480
2Mass ID (if available) : 17451666-2252530
ICRS Star Coord at Epoch: 17h 45m 16.66404s -22:52:53.29806s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.022
G magnitude           : 14.633
RP magnitude          : 13.261
BP magnitude          : 16.953
DUPflag              : 0
Distance (au)        : 4.366
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.29
Sun-Target sep (deg) : 153.22
Sun-Moon sep (deg)   : 155.84
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.75
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 18.428
C/A sky separation (km) : 58347.4
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
    
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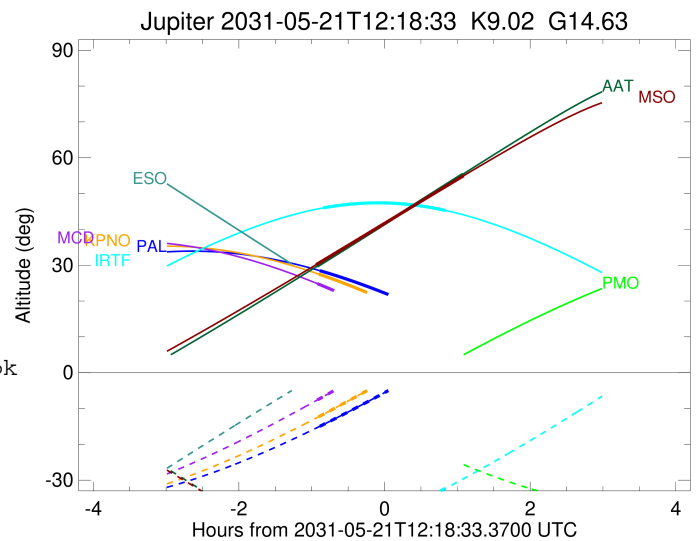
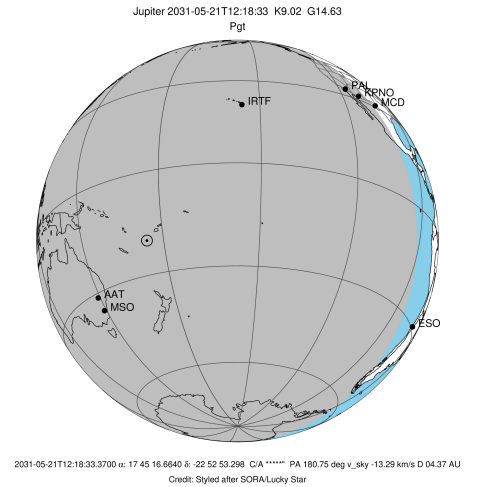


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-21T11:28:11.237	45.99	-46.60	71485.8	54.54	57.94
Jupiter	E	2031-05-21T13:08:39.808	45.30	-32.31	71485.8	54.55	57.94

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-21T12:23:23.060
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        : 4068852390557284480
2Mass ID (if available) : 17451666-2252530
ICRS Star Coord at Epoch: 17h 45m 16.66404s -22:52:53.29806s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 9.022
G magnitude           : 14.633
RP magnitude          : 13.261
BP magnitude          : 16.953
DUPflag              : 0
Distance (au)         : 4.366
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.29
Sun-Target sep (deg)  : 153.22
Sun-Moon sep (deg)    : 155.25
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.75
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (" ) : 16.497
C/A sky separation (km) : 52235.0
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
    
```

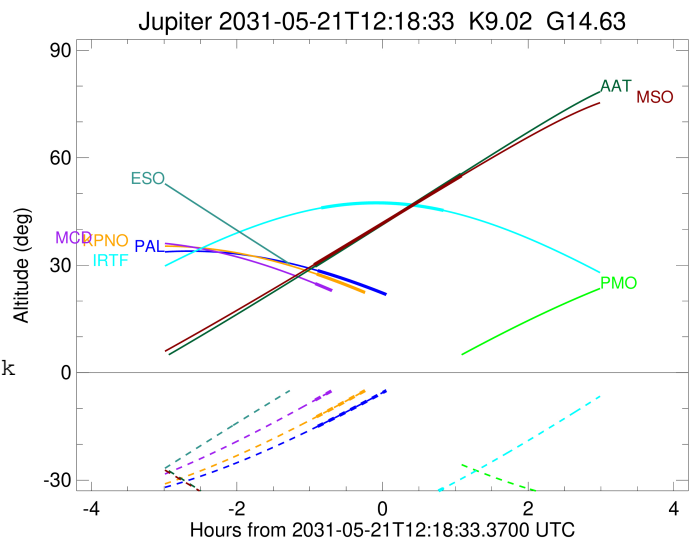
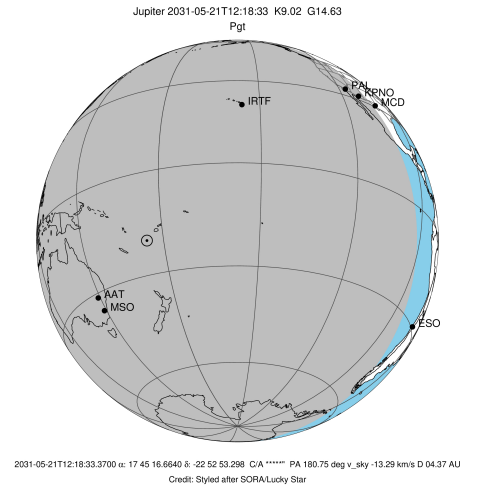


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-21T11:23:00.644	29.71	-53.12	71487.1	46.30	49.99
Jupiter	E	2031-05-21T13:23:21.477	55.44	-76.30	71487.0	47.35	51.01

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-21T12:23:10.260
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       : 4068852390557284480
2Mass ID (if available) : 17451666-2252530
ICRS Star Coord at Epoch: 17h 45m 16.66404s -22:52:53.29806s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 9.022
G magnitude          : 14.633
RP magnitude         : 13.261
BP magnitude         : 16.953
DUPflag             : 0
Distance (au)        : 4.366
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.29
Sun-Target sep (deg) : 153.22
Sun-Moon sep (deg)  : 155.28
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.75
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 16.370
C/A sky separation (km) : 51830.7
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	2031-05-21T11:22:13.469	30.15	-52.20	71487.2	45.86	49.55
Jupiter	E	2031-05-21T13:23:43.548	54.96	-73.01	71487.0	46.86	50.53