

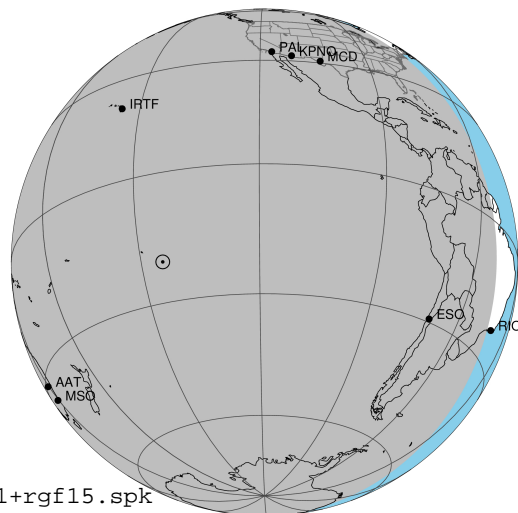
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-24T09:33:48.920
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4116870223636584576
 2Mass ID (if available) : 17435877-2252376

Jupiter 2031-05-24T09:33:48 K9.61 G14.84 Pgt

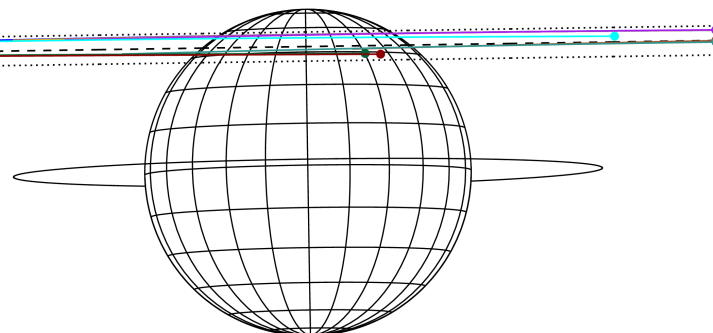
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s

RUWE (>1.4 is poor) : 0.94
 K magnitude : 9.608
 G magnitude : 14.843
 RP magnitude : 13.543
 BP magnitude : 16.759
 DUPflag : 0
 Distance (au) : 4.345
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -13.97
 Sun-Target sep (deg) : 156.30
 Sun-Moon sep (deg) : 169.27
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.89
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 17.507
 C/A sky separation (km) : 55170.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-24T09:33:48 K9.61 G14.84
 Pgt



Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 RIO
 ESO
 AAT
 MSO

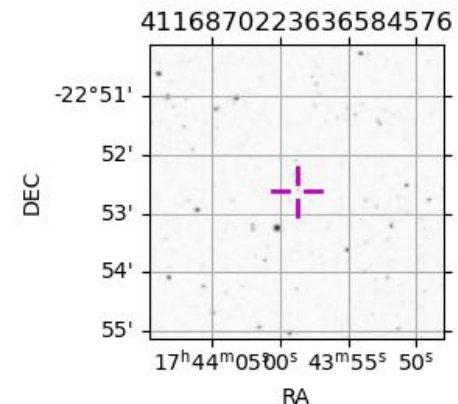


2031-05-24T09:33:48.9200 a: 17 43 58.7787 & -22 52 37.814 C/A ***** PA 180.86 deg v_sky -13.97 km/s D 04.34 AU

Credit: Styled after SORA/Lucky Star

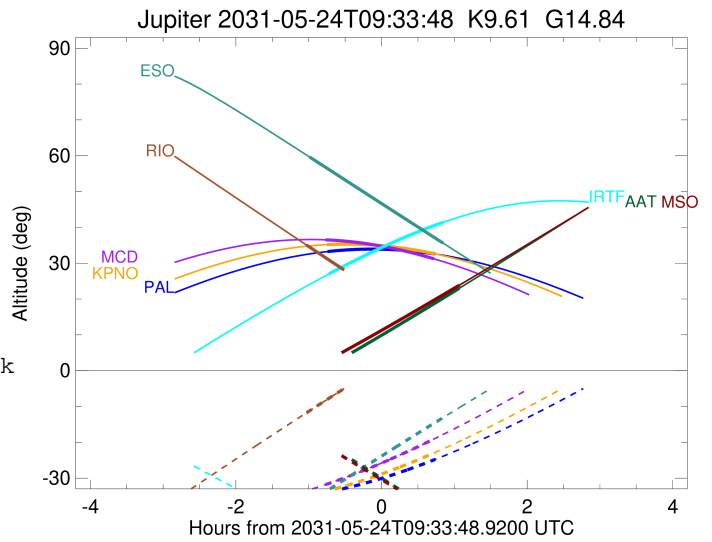
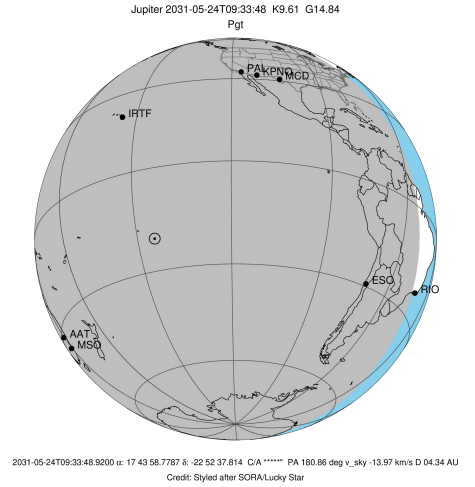
Observable events with sun below -5 deg and altitude above 5 deg

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 24 08:49 - MAY 24 10:18	Pie
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+ +	MAY 24 08:48 - MAY 24 10:17	Pie
MCD	McDonald Obs. 2.7m	30.7	256.0	+ +	MAY 24 08:47 - MAY 24 10:17	Pie
TEN	Teide Obs./Tenerife	28.3	343.5			Pnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ +	MAY 24 08:50 - MAY 24 10:24	Pie
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+	MAY 24 08:31 - MAY 24 08:31	Pin
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 24 08:34 - MAY 24 10:24	Pie
AAT	Siding Spring (AAT)	-31.3	149.1	+	MAY 24 10:37 - MAY 24 10:37	Pne
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8			Pnn
MSO	Mt. Stromlo Observatory	-35.3	149.0	+	MAY 24 10:38 - MAY 24 10:38	Pne



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-24T09:33:40.940
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       : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 9.608
G magnitude          : 14.843
RP magnitude         : 13.543
BP magnitude         : 16.759
DUPflag             : 0
Distance (au)        : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.97
Sun-Target sep (deg) : 156.30
Sun-Moon sep (deg)   : 169.14
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.185
C/A sky separation (km) : 60458.9
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
    
```

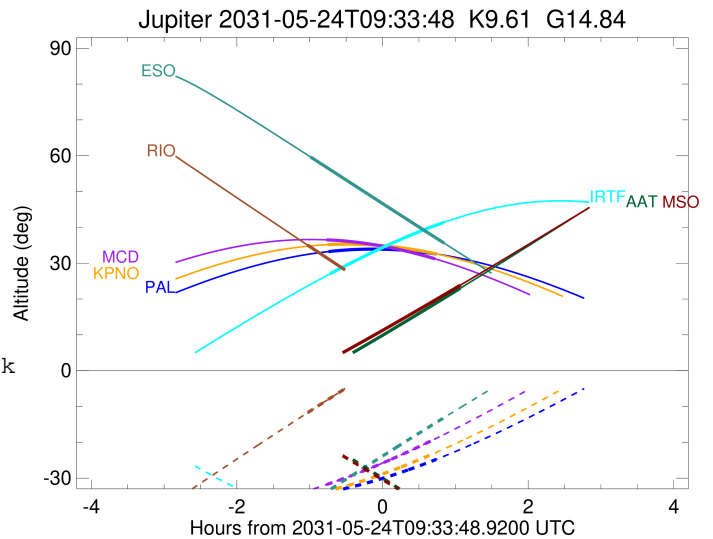
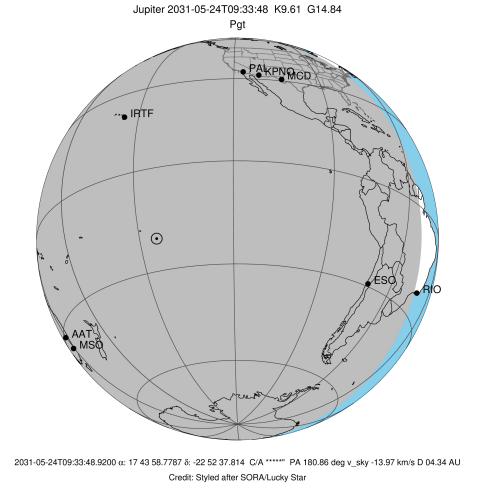


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T08:49:18.934	33.24	-33.88	71485.4	57.57	60.80
Jupiter	E	2031-05-24T10:18:02.203	32.57	-24.77	71485.4	57.63	60.85

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T09:33:10.150
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        : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.608
G magnitude           : 14.843
RP magnitude          : 13.543
BP magnitude          : 16.759
DUPflag              : 0
Distance (au)         : 4.345
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.97
Sun-Target sep (deg)  : 156.30
Sun-Moon sep (deg)    : 169.08
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.155
C/A sky separation (km) : 60362.9
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
    
```

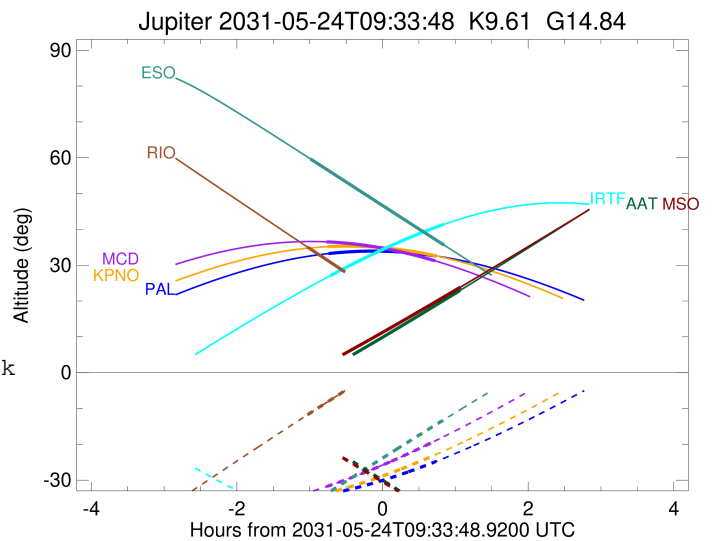
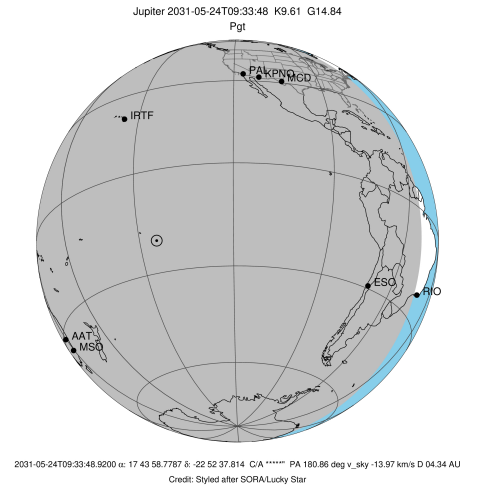


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T08:48:38.762	35.17	-33.61	71485.4	57.48	60.71
Jupiter	E	2031-05-24T10:17:42.028	32.61	-22.87	71485.4	57.43	60.66

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T09:32:25.590
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        : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.608
G magnitude           : 14.843
RP magnitude          : 13.543
BP magnitude          : 16.759
DUPflag              : 0
Distance (au)         : 4.345
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.97
Sun-Target sep (deg)  : 156.30
Sun-Moon sep (deg)   : 168.99
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 19.114
C/A sky separation (km) : 60236.0
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
    
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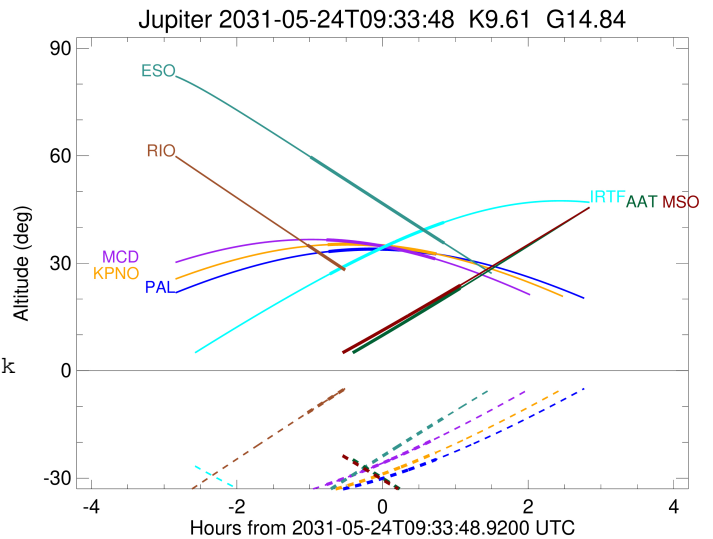
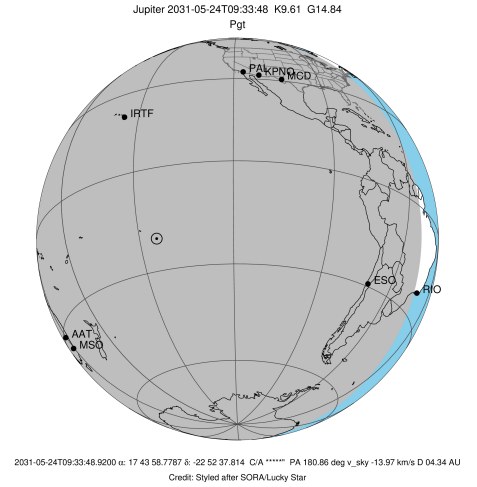


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T08:47:40.475	36.52	-31.80	71485.4	57.37	60.61
Jupiter	E	2031-05-24T10:17:13.001	31.21	-19.04	71485.4	57.16	60.41

```

target                : Jupiter
target radius (km)    : 71492.00
C/A epoch              : 2031-05-24T09:37:32.840
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        : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor)  : 0.94
K magnitude           : 9.608
G magnitude           : 14.843
RP magnitude          : 13.543
BP magnitude          : 16.759
DUPflag              : 0
Distance (au)         : 4.345
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -13.97
Sun-Target sep (deg)  : 156.30
Sun-Moon sep (deg)    : 169.69
B (ring opening deg)  : -2.61
PA of pole (deg)      : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 18.725
C/A sky separation (km) : 59008.0
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
    
```

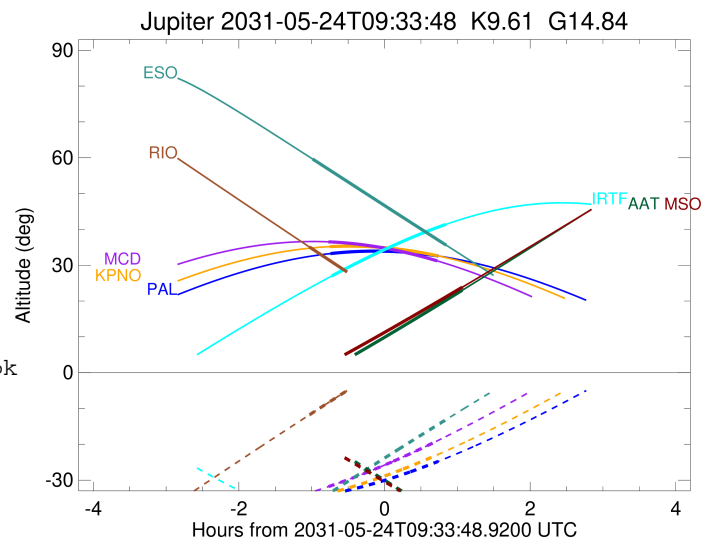
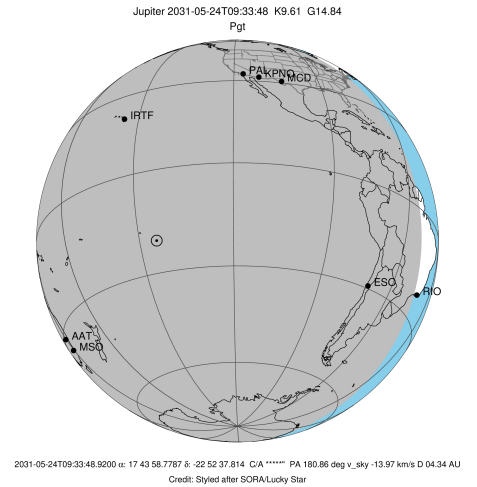


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T08:50:25.292	27.00	-44.13	71485.8	55.05	58.42
Jupiter	E	2031-05-24T10:24:29.118	41.40	-49.50	71485.6	55.93	59.25

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T09:27:46.200
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        : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.608
G magnitude           : 14.843
RP magnitude          : 13.543
BP magnitude          : 16.759
DUPflag              : 0
Distance (au)         : 4.345
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.97
Sun-Target sep (deg)  : 156.30
Sun-Moon sep (deg)   : 168.62
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 17.008
C/A sky separation (km) : 53596.6
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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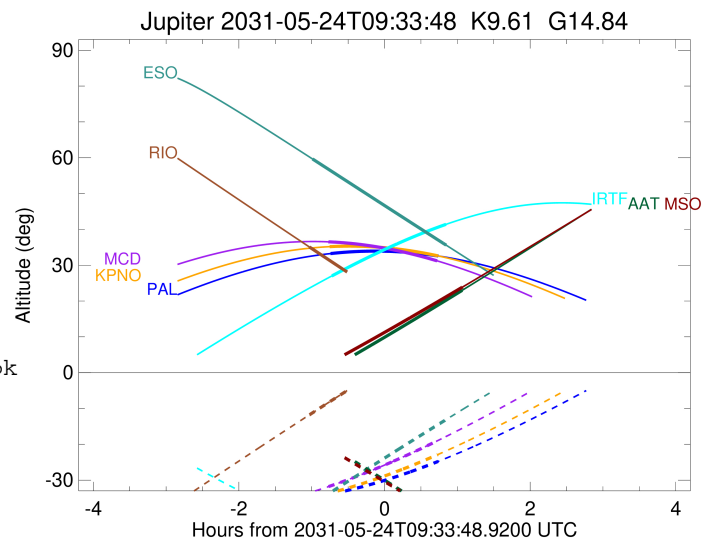
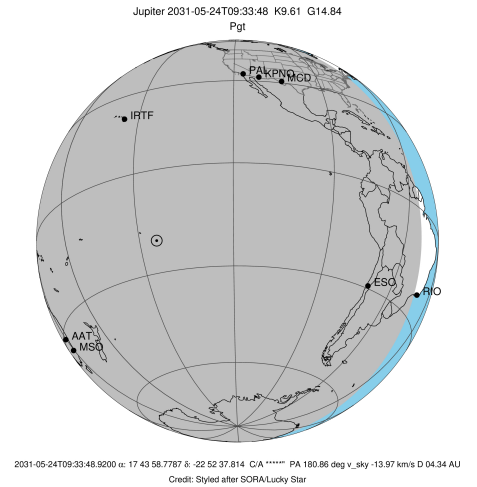


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T08:31:56.685	35.08	-11.77	71486.7	49.08	52.70
Jupiter	E	2031-05-24T10:23:56.995	10.26	11.96x	71486.9	47.86	51.51

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T09:29:26.690
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        : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.608
G magnitude           : 14.843
RP magnitude          : 13.543
BP magnitude          : 16.759
DUPflag              : 0
Distance (au)         : 4.345
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -13.97
Sun-Target sep (deg)  : 156.30
Sun-Moon sep (deg)    : 168.88
B (ring opening deg) : -2.61
PA of pole (deg)      : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 17.086
C/A sky separation (km) : 53842.3
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
    
```

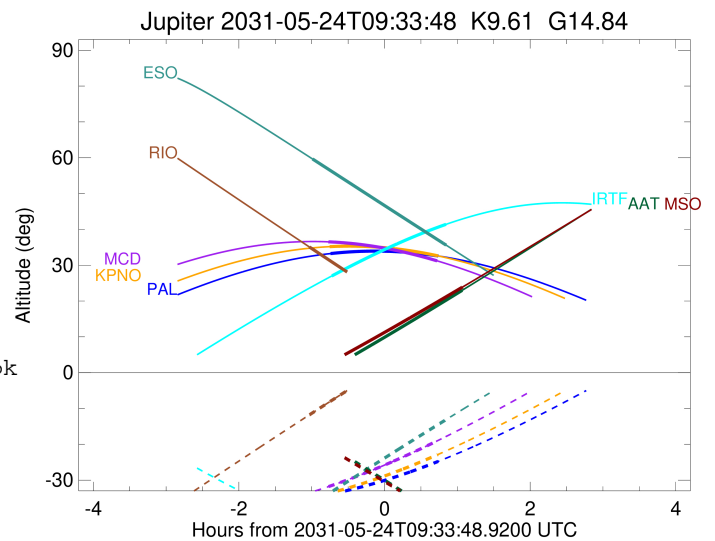
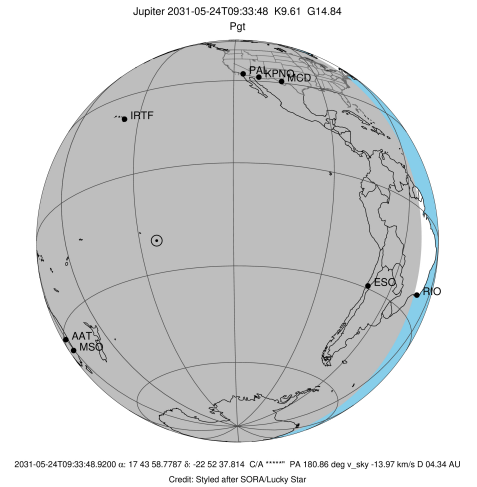


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T08:34:28.561	59.65	-36.67	71486.7	49.16	52.77
Jupiter	E	2031-05-24T10:24:38.967	35.58	-13.08	71486.8	48.33	51.96

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-24T09:39:35.710
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       : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.608
G magnitude           : 14.843
RP magnitude          : 13.543
BP magnitude          : 16.759
DUPflag              : 0
Distance (au)        : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.97
Sun-Target sep (deg) : 156.30
Sun-Moon sep (deg)  : 170.14
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 16.517
C/A sky separation (km) : 52050.4
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
    
```

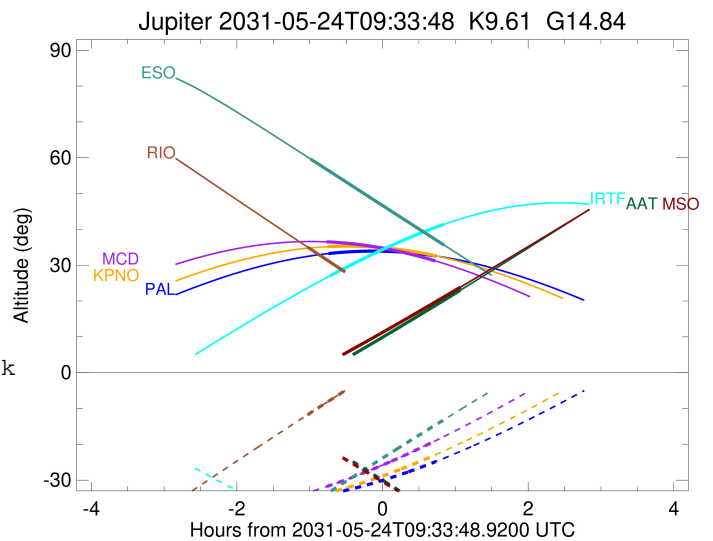
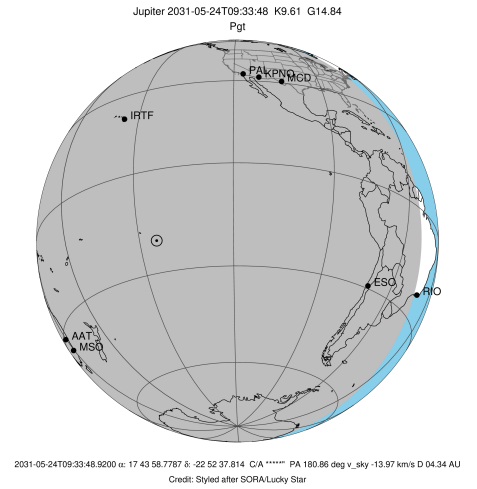


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-24T08:40:52.861	-0.51x	-18.86	71487.2	46.01	49.70
Jupiter	E	2031-05-24T10:37:51.972	22.99	-43.67	71487.0	47.32	50.98


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-24T09:39:19.900
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       : 4116870223636584576
2Mass ID (if available) : 17435877-2252376
ICRS Star Coord at Epoch: 17h 43m 58.77873s -22:52:37.81367s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 9.608
G magnitude           : 14.843
RP magnitude         : 13.543
BP magnitude         : 16.759
DUPflag              : 0
Distance (au)        : 4.345
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -13.97
Sun-Target sep (deg) : 156.30
Sun-Moon sep (deg)   : 170.12
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.89
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation ("): 16.407
C/A sky separation (km): 51704.7
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	2031-05-24T08:40:11.150	1.18x	-19.56	71487.2	45.64	49.33
Jupiter	E	2031-05-24T10:38:02.773	23.88	-43.51	71487.0	46.89	50.56