

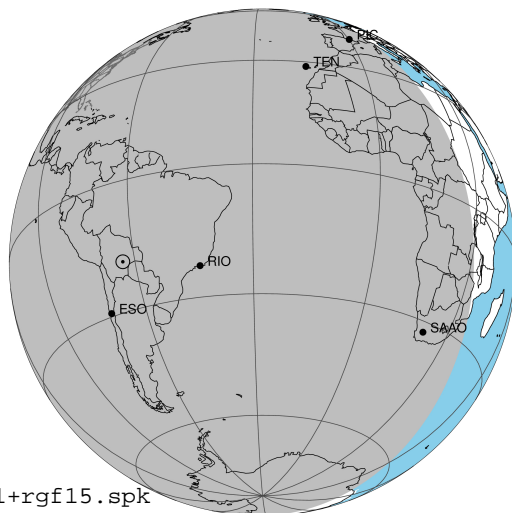
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-15T04:09:39.590
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068887231281727360
 2Mass ID (if available) : 17475159-2253445

Jupiter 2031-05-15T04:09:39 K8.84 G14.56 Pgt

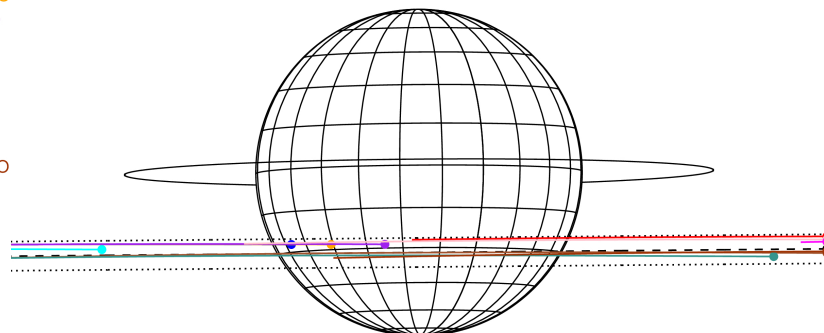
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s

RUWE (>1.4 is poor) : 0.90
 K magnitude : 8.839
 G magnitude : 14.562
 RP magnitude : 13.135
 BP magnitude : 17.182
 DUPflag : 0
 Distance (au) : 4.419
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -11.55
 Sun-Target sep (deg) : 146.52
 Sun-Moon sep (deg) : 74.12
 B (ring opening deg) : -2.60
 PA of pole (deg) : 0.47
 Pole direction: RA (deg): 268.05695
 Dec (deg): 64.49651
 C/A sky separation (") : 10.934
 C/A sky separation (km) : 35039.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-15T04:09:39 K8.84 G14.56
 Pgt



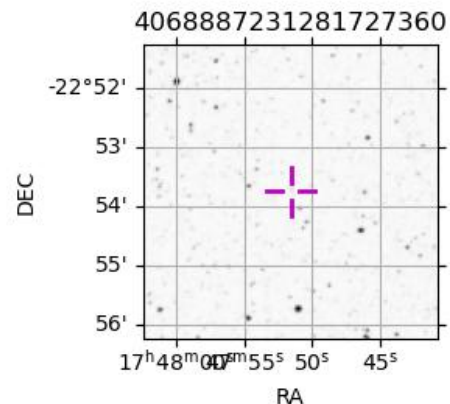
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 KAV
 RIO
 ESO
 SAAO



2031-05-15T04:09:39.5900 α: 17 47 51.5867 δ: -22 53 44.935 C/A ***** PA 0.52 deg v_sky -11.55 km/s D 04.42 AU
 Credit: Styled after SORA/Lucky Star

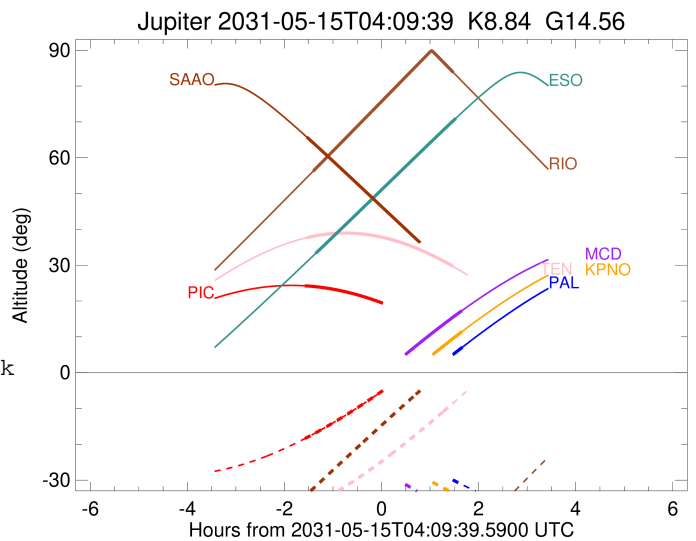
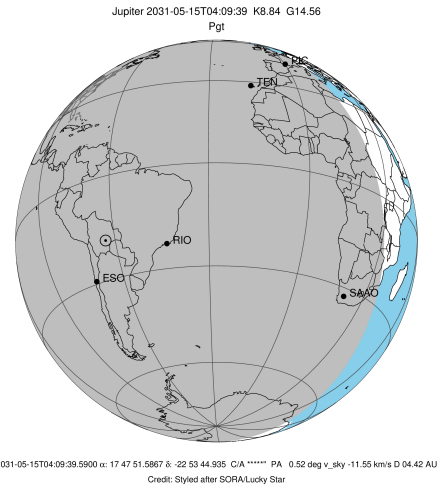
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	MAY 15 02:35 - MAY 15 02:35	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	MAY 15 05:49 - MAY 15 05:49	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 15 05:49 - MAY 15 05:49	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 15 05:48 - MAY 15 05:48	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+ +	MAY 15 02:37 - MAY 15 05:38	Pie
IRTF	Mauna Kea/IRTF	19.8	204.5			Pnn
KAV	Kavalur Observatory	12.6	78.8			Pnn
RIO	Rio de Janeiro	-22.9	316.8	+ +	MAY 15 02:45 - MAY 15 05:38	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+ +	MAY 15 02:48 - MAY 15 05:41	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	MAY 15 02:37 - MAY 15 02:37	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T04:06:25.730
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : PIC
Location              : Pic du Midi
Latitude (deg)        : 42.93656
E. Longitude (deg)    : 0.14231
Altitude (km)         : 2.890
Gaia source ID        : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude           : 8.839
G magnitude           : 14.562
RP magnitude          : 13.135
BP magnitude          : 17.182
DUPflag              : 0
Distance (au)         : 4.419
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg)  : 146.52
Sun-Moon sep (deg)    : 74.32
B (ring opening deg) : -2.60
PA of pole (deg)      : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 9.181
C/A sky separation (km) : 29422.0
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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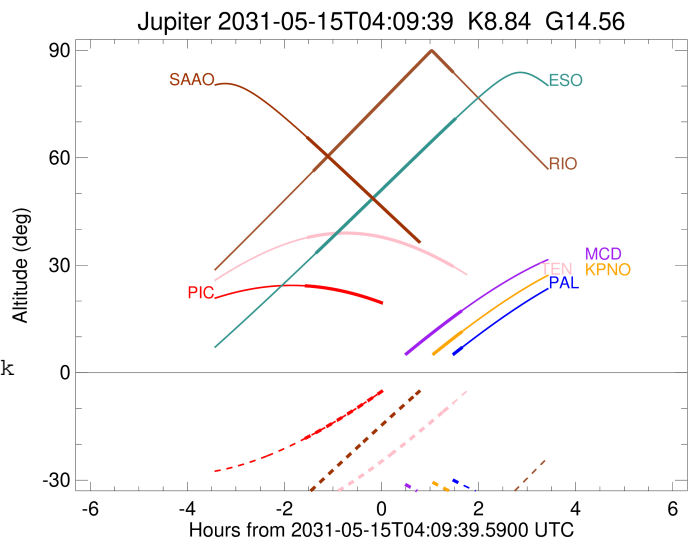
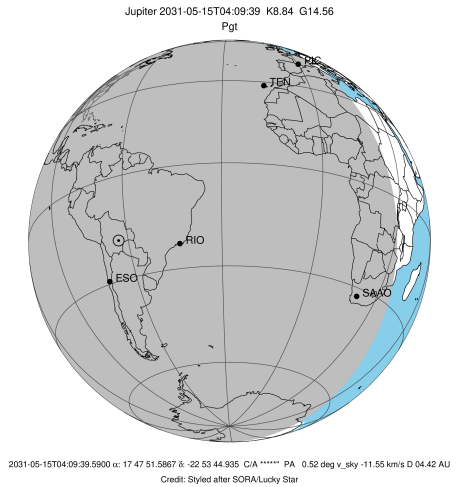


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T02:35:00.244	24.25	-18.39	71490.4	-24.07	-27.02
Jupiter	E	2031-05-15T05:38:11.935	9.82	9.54x	71490.4	-24.71	-27.71

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T04:17:58.410
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       : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude           : 8.839
G magnitude           : 14.562
RP magnitude          : 13.135
BP magnitude          : 17.182
DUPflag              : 0
Distance (au)        : 4.418
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg) : 146.52
Sun-Moon sep (deg)   : 74.14
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation ("): 9.909
C/A sky separation (km): 31754.1
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
    
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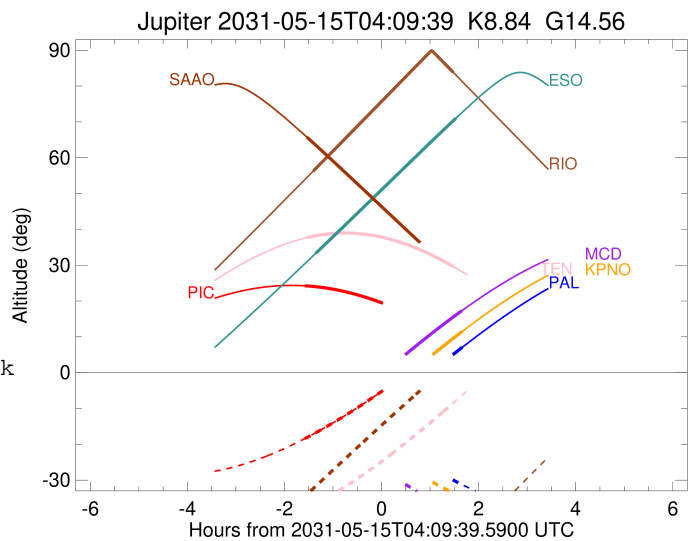
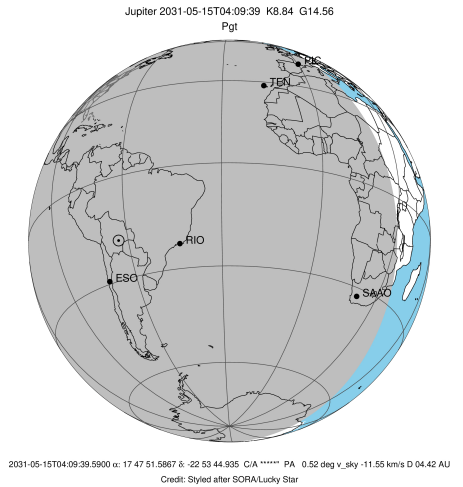


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T02:45:00.091	-28.81x	-1.88x	71490.1	-27.04	-30.22
Jupiter	E	2031-05-15T05:49:32.379	7.08	-31.27	71490.3	-25.67	-28.75

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-15T04:18:01.610
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       : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude           : 8.839
G magnitude           : 14.562
RP magnitude         : 13.135
BP magnitude         : 17.182
DUPflag              : 0
Distance (au)        : 4.418
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg) : 146.52
Sun-Moon sep (deg)   : 74.22
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 9.886
C/A sky separation (km) : 31679.0
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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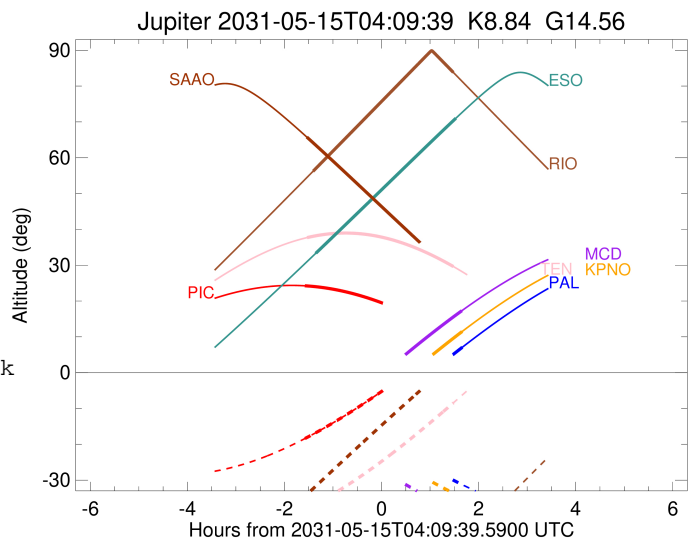
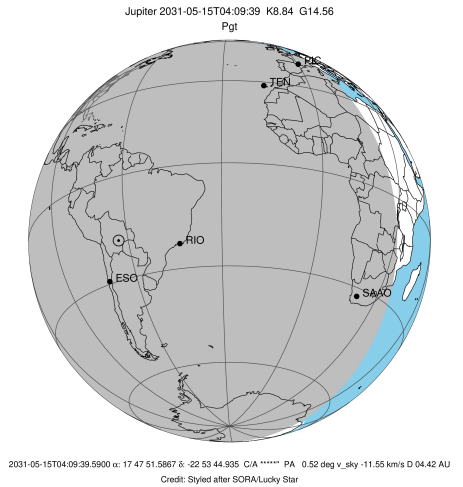


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T02:45:17.826	-24.12x	-6.54	71490.1	-26.99	-30.16
Jupiter	E	2031-05-15T05:49:21.270	11.49	-34.65	71490.3	-25.61	-28.69

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-15T04:17:54.320
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      : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude          : 8.839
G magnitude          : 14.562
RP magnitude         : 13.135
BP magnitude         : 17.182
DUPflag             : 0
Distance (au)       : 4.418
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg) : 146.52
Sun-Moon sep (deg)  : 74.32
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (" ) : 9.833
C/A sky separation (km) : 31511.8
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
    
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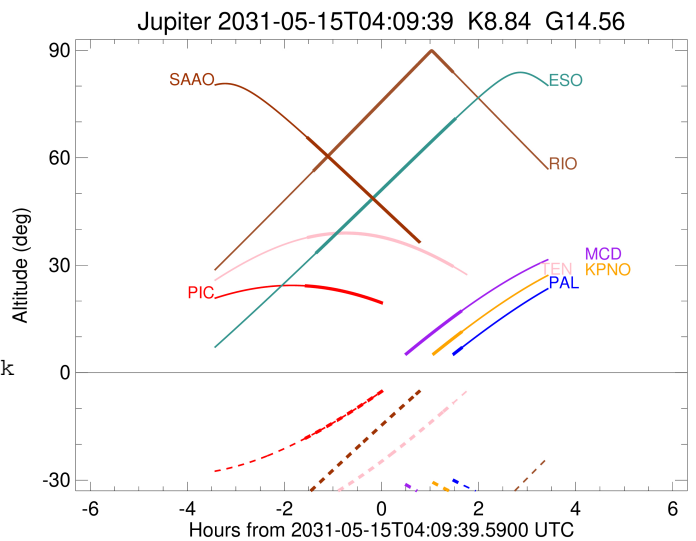
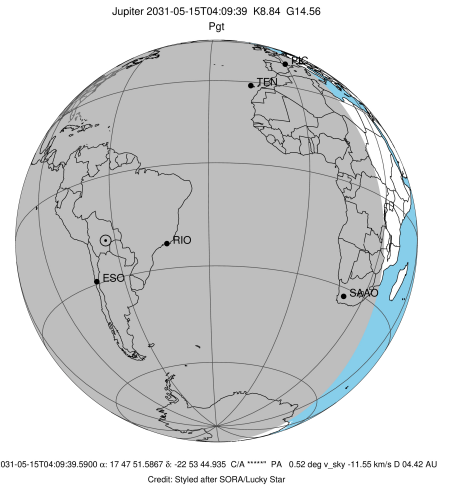


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T02:45:29.551	-17.48x	-12.87	71490.1	-26.85	-30.01
Jupiter	E	2031-05-15T05:48:56.996	17.29	-38.36	71490.3	-25.49	-28.56

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T04:08:04.860
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : TEN
Location              : Teide Obs./Tenerife
Latitude (deg)        : 28.30050
E. Longitude (deg)    : 343.48909
Altitude (km)         : 2.395
Gaia source ID        : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude           : 8.839
G magnitude           : 14.562
RP magnitude          : 13.135
BP magnitude          : 17.182
DUPflag              : 0
Distance (au)         : 4.419
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg)  : 146.52
Sun-Moon sep (deg)   : 74.63
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 9.397
C/A sky separation (km) : 30114.8
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
    
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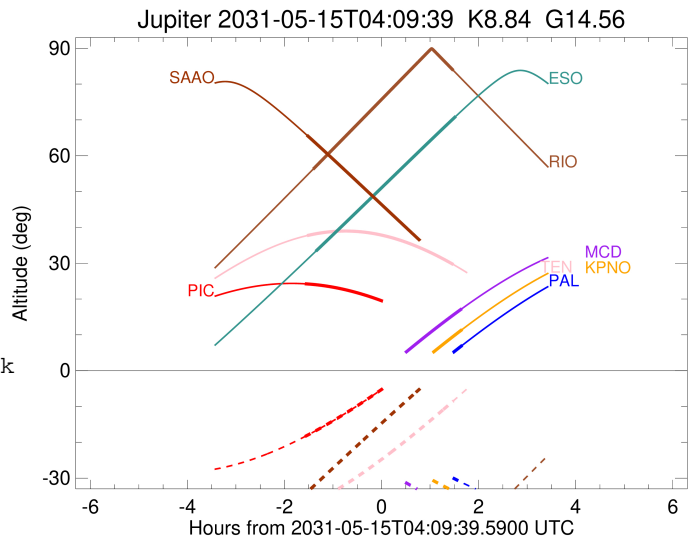
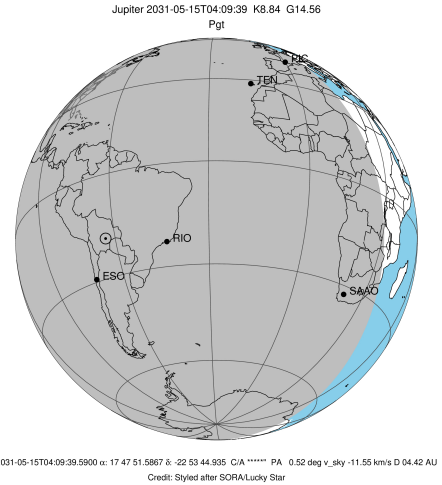


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T02:37:44.518	37.70	-37.71	71490.4	-24.86	-27.88
Jupiter	E	2031-05-15T05:38:31.041	29.62	-8.42	71490.3	-25.21	-28.25

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-15T04:12:02.380
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        : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude           : 8.839
G magnitude           : 14.562
RP magnitude          : 13.135
BP magnitude          : 17.182
DUPflag              : 0
Distance (au)         : 4.418
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg)  : 146.52
Sun-Moon sep (deg)    : 75.08
B (ring opening deg) : -2.60
PA of pole (deg)      : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 10.956
C/A sky separation (km) : 35109.2
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
    
```

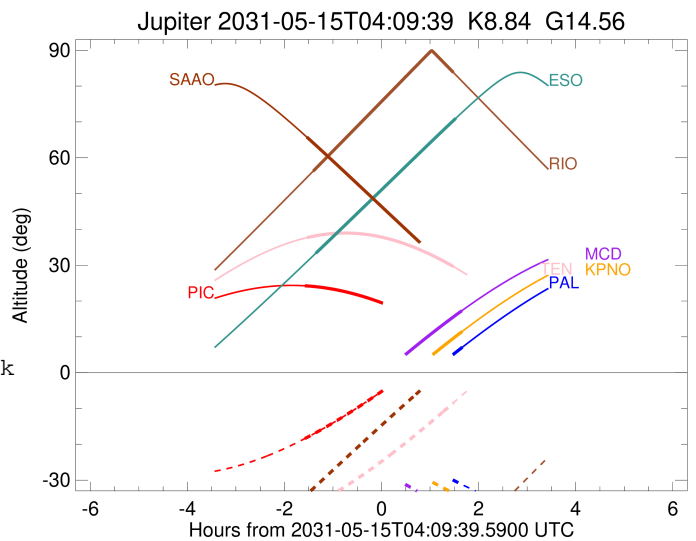
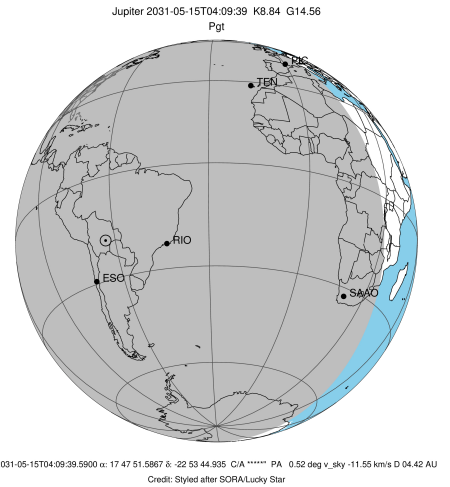


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T02:45:07.189	56.23	-85.92	71489.7	-29.69	-33.05
Jupiter	E	2031-05-15T05:38:31.813	83.79	-50.37	71489.8	-29.36	-32.69

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-15T04:15:27.500
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     : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude         : 8.839
G magnitude         : 14.562
RP magnitude        : 13.135
BP magnitude        : 17.182
DUPflag            : 0
Distance (au)      : 4.418
f0 (km)            : 0.00
g0 (km)            : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg) : 146.52
Sun-Moon sep (deg)  : 74.99
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (" ) : 11.326
C/A sky separation (km) : 36296.2
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
    
```

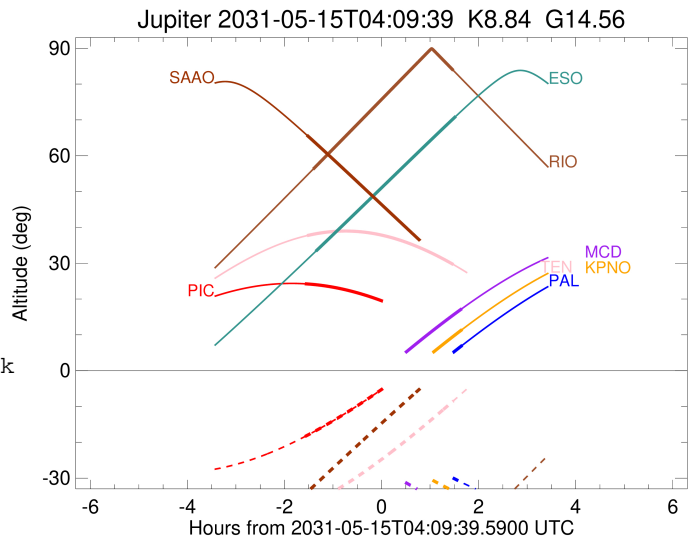
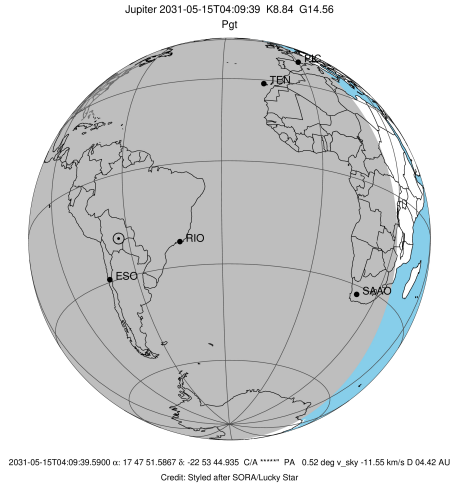


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-15T02:48:27.728	33.33	-62.75	71489.5	-31.05	-34.47
Jupiter	E	2031-05-15T05:41:34.647	71.01	-72.48	71489.7	-30.13	-33.50


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-15T04:03:27.900
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : SAAO
Location            : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)      : -32.37953
E. Longitude (deg)  : 20.81070
Altitude (km)       : 1.768
Gaia source ID      : 4068887231281727360
2Mass ID (if available) : 17475159-2253445
ICRS Star Coord at Epoch: 17h 47m 51.58672s -22:53:44.93510s
RUWE (>1.4 is poor) : 0.90
K magnitude          : 8.839
G magnitude          : 14.562
RP magnitude         : 13.135
BP magnitude         : 17.182
DUPflag             : 0
Distance (au)       : 4.419
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -11.55
Sun-Target sep (deg) : 146.52
Sun-Moon sep (deg)  : 74.64
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.47
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 11.457
C/A sky separation (km) : 36714.6
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	2031-05-15T02:37:20.016	65.76	-34.02	71489.6	-30.40	-33.79
Jupiter	E	2031-05-15T05:30:16.751	29.37	1.47x	71489.5	-31.53	-34.98