

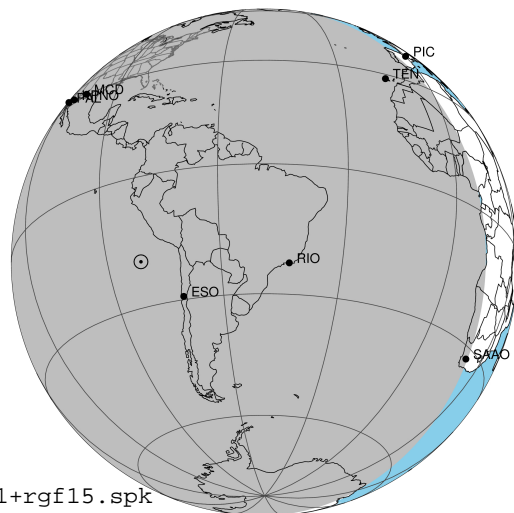
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-19T05:18:29.980
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068854997502729344
 2Mass ID (if available) : 17461537-2253078

Jupiter 2031-05-19T05:18:29 K8.63 G13.18 Pgt

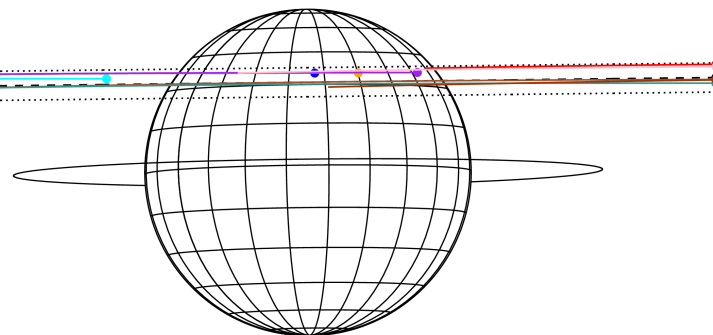
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s

RUWE (>1.4 is poor) : 0.78
 K magnitude : 8.626
 G magnitude : 13.178
 RP magnitude : 11.999
 BP magnitude : 14.701
 DUPflag : 0
 Distance (au) : 4.384
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -12.70
 Sun-Target sep (deg) : 150.79
 Sun-Moon sep (deg) : 127.06
 B (ring opening deg) : -2.61
 PA of pole (deg) : 0.64
 Pole direction: RA (deg): 268.05694
 Dec (deg): 64.49651
 C/A sky separation (") : 12.438
 C/A sky separation (km) : 39544.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-19T05:18:29 K8.63 G13.18
 Pgt



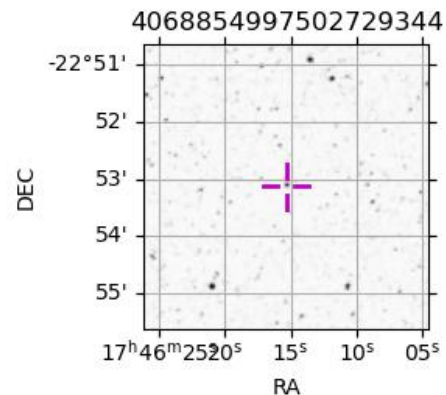
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 SAAO



2031-05-19T05:18:29.9800 a: 17 46 15.3732 s: -22 53 07.872 C/A ***** PA 180.66 deg v_sky -12.70 km/s D 04.38 AU
 Credit: Styled after SORA/Lucky Star

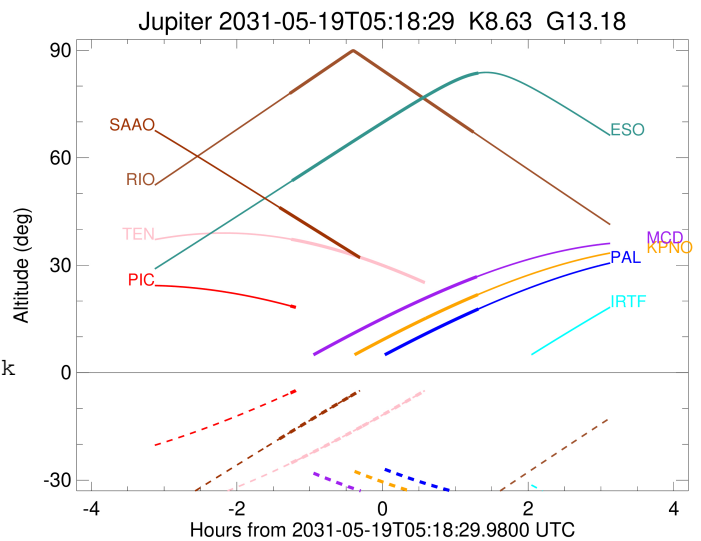
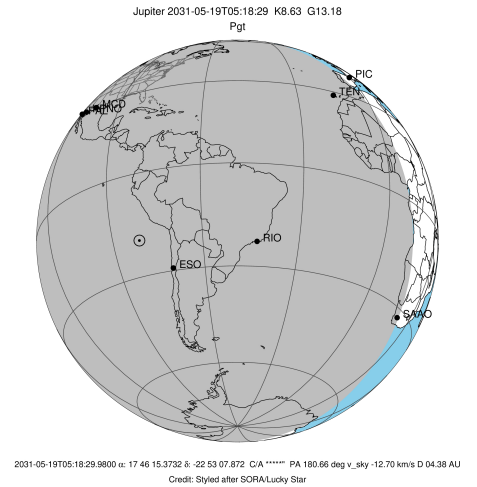
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	MAY 19 04:02 - MAY 19 04:02	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	MAY 19 06:37 - MAY 19 06:37	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 19 06:37 - MAY 19 06:37	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 19 06:36 - MAY 19 06:36	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	MAY 19 04:03 - MAY 19 04:03	Pin
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 19 04:02 - MAY 19 06:33	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	MAY 19 04:03 - MAY 19 06:37	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	MAY 19 03:53 - MAY 19 03:53	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-19T05:14:24.450
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        : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.626
G magnitude           : 13.178
RP magnitude          : 11.999
BP magnitude          : 14.701
DUPflag              : 0
Distance (au)         : 4.384
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg) : 150.79
Sun-Moon sep (deg)   : 127.52
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 14.081
C/A sky separation (km) : 44766.6
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
    
```

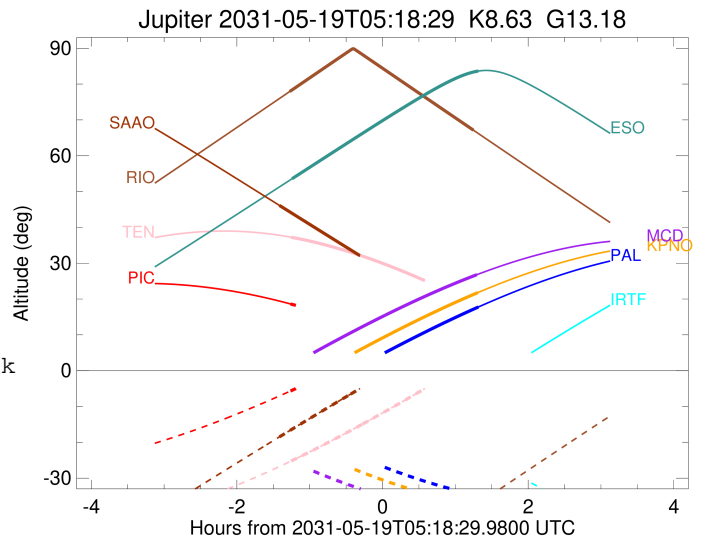
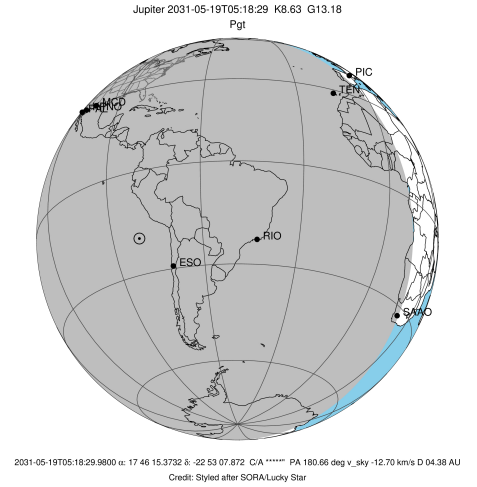


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T04:02:38.961	18.63	-5.68	71488.3	39.10	42.80
Jupiter	E	2031-05-19T06:26:31.542	0.34x	18.74x	71488.4	38.21	41.90

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-19T05:24:19.370
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        : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.626
G magnitude           : 13.178
RP magnitude          : 11.999
BP magnitude          : 14.701
DUPflag              : 0
Distance (au)         : 4.384
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg)  : 150.79
Sun-Moon sep (deg)    : 126.70
B (ring opening deg)  : -2.61
PA of pole (deg)      : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 13.701
C/A sky separation (km) : 43559.7
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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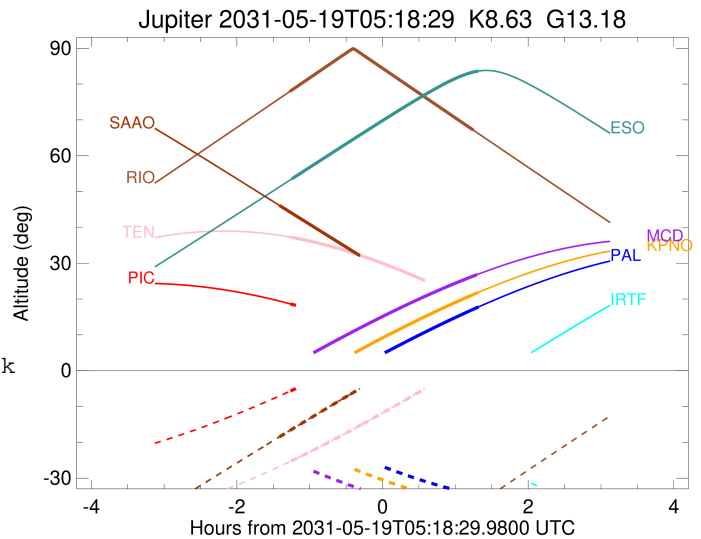
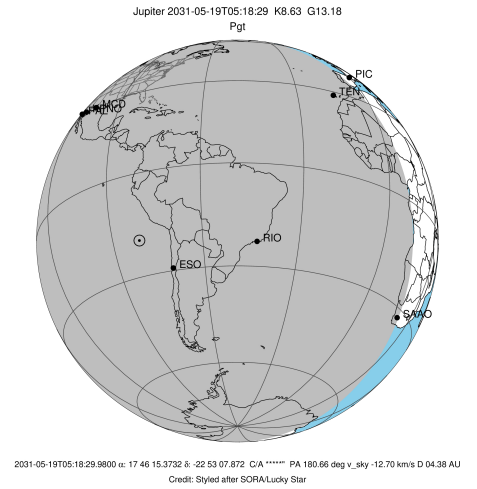


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T04:10:26.566	-8.11x	-16.59	71488.7	36.86	40.51
Jupiter	E	2031-05-19T06:37:30.142	17.77	-34.76	71488.5	38.04	41.72

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T05:24:09.160
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      : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude         : 8.626
G magnitude         : 13.178
RP magnitude        : 11.999
BP magnitude        : 14.701
DUPflag            : 0
Distance (au)       : 4.384
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg) : 150.79
Sun-Moon sep (deg)  : 126.77
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 13.722
C/A sky separation (km) : 43626.2
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
    
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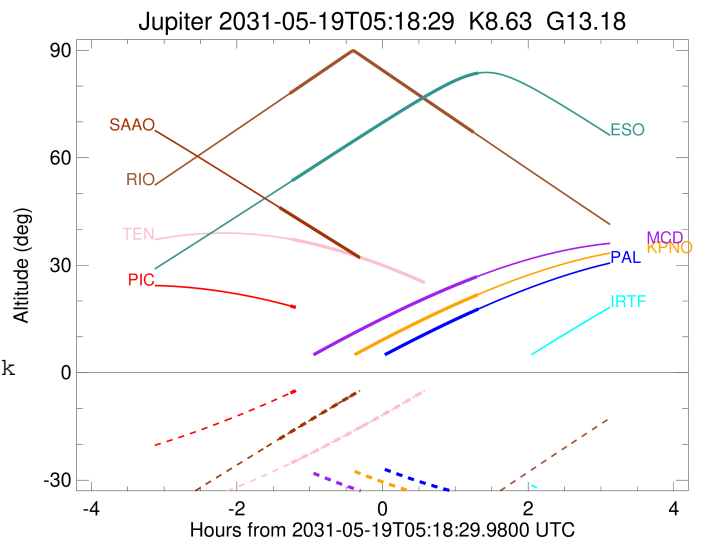
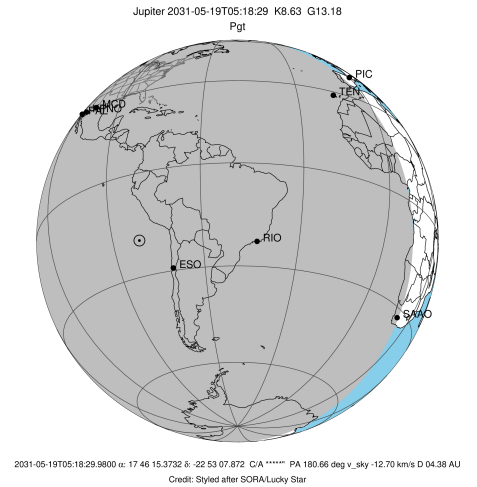


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T04:10:32.198	-3.46x	-20.91	71488.6	36.94	40.59
Jupiter	E	2031-05-19T06:37:05.581	21.79	-37.32	71488.5	38.08	41.76

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T05:23:46.130
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      : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude          : 8.626
G magnitude          : 13.178
RP magnitude         : 11.999
BP magnitude         : 14.701
DUPflag             : 0
Distance (au)        : 4.384
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg) : 150.79
Sun-Moon sep (deg)  : 126.88
B (ring opening deg) : -2.61
PA of pole (deg)    : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 13.765
C/A sky separation (km) : 43764.1
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
    
```

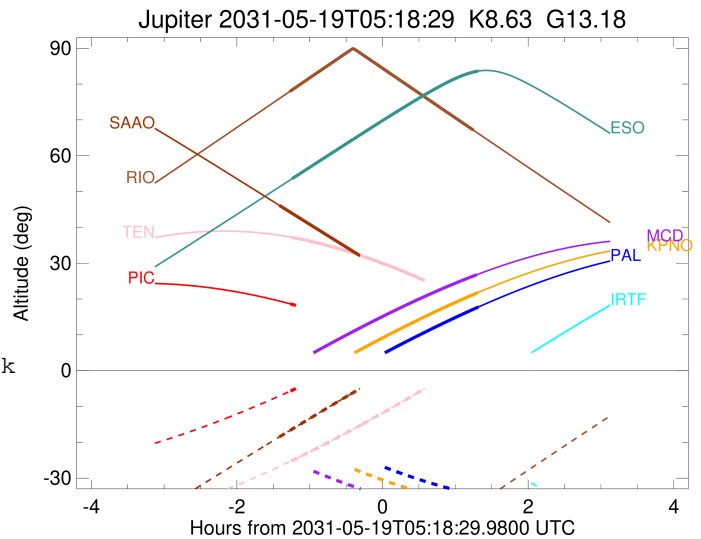
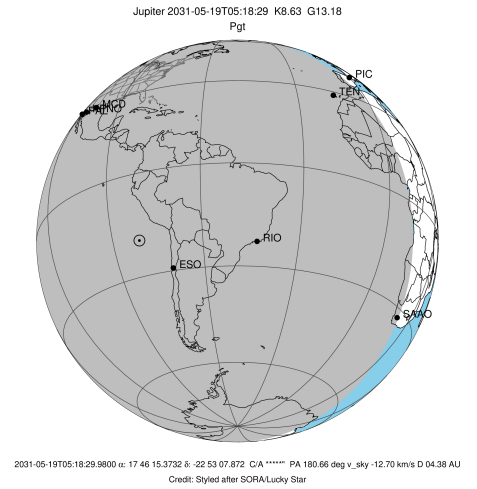


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T04:10:33.746	2.91x	-26.46	71488.6	37.10	40.76
Jupiter	E	2031-05-19T06:36:20.965	26.80	-39.61	71488.5	38.17	41.85

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T05:15:00.730
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       : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.626
G magnitude           : 13.178
RP magnitude          : 11.999
BP magnitude          : 14.701
DUPflag              : 0
Distance (au)         : 4.384
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg)  : 150.79
Sun-Moon sep (deg)   : 127.71
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 13.901
C/A sky separation (km) : 44195.8
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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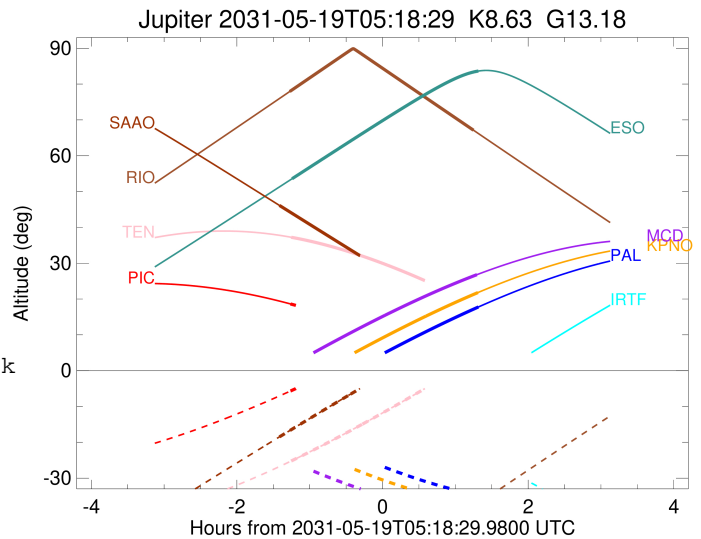
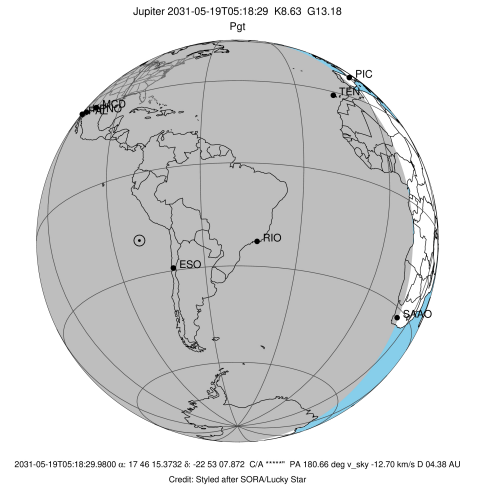


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T04:03:16.130	37.23	-25.21	71488.4	38.42	42.10
Jupiter	E	2031-05-19T06:27:02.839	19.82	1.80x	71488.5	37.67	41.34

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T05:17:45.850
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       : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.626
G magnitude           : 13.178
RP magnitude          : 11.999
BP magnitude          : 14.701
DUPflag              : 0
Distance (au)        : 4.384
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg) : 150.79
Sun-Moon sep (deg)   : 127.85
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 12.441
C/A sky separation (km) : 39552.6
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
    
```

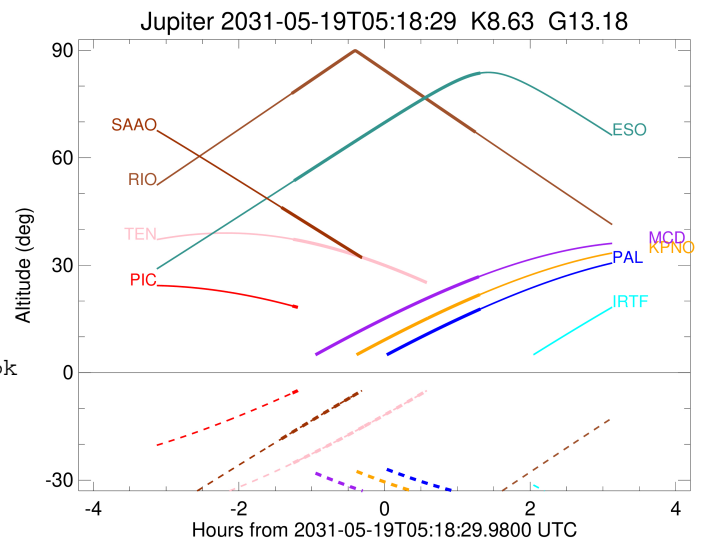
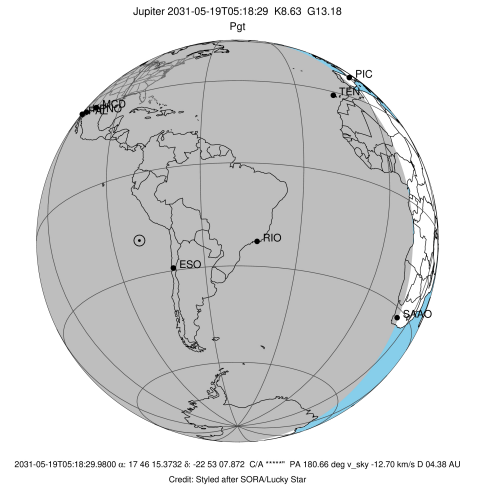


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T04:02:00.814	77.91	-72.81	71489.2	33.51	37.05
Jupiter	E	2031-05-19T06:33:31.156	67.11	-37.99	71489.2	33.35	36.89

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-19T05:20:51.780
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       : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude          : 8.626
G magnitude          : 13.178
RP magnitude         : 11.999
BP magnitude         : 14.701
DUPflag             : 0
Distance (au)        : 4.384
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg) : 150.79
Sun-Moon sep (deg)   : 127.57
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 12.172
C/A sky separation (km) : 38697.5
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
    
```

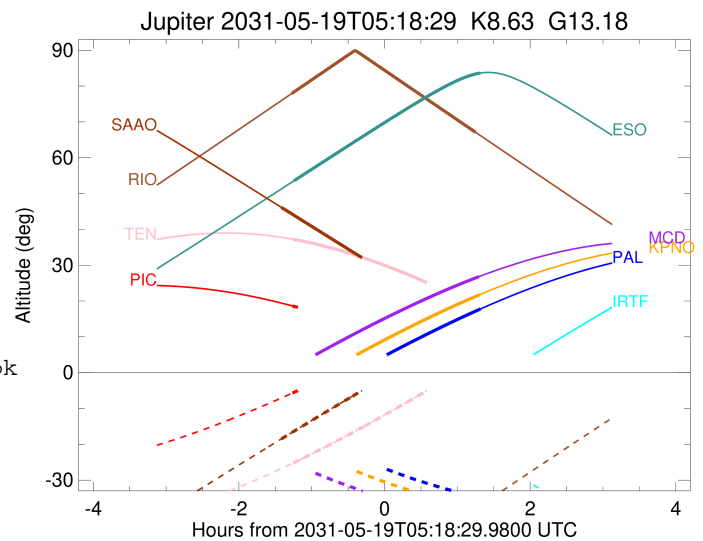
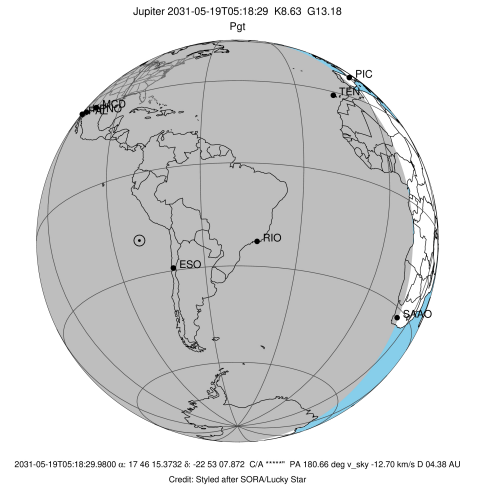


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-19T04:03:57.925	53.57	-77.64	71489.3	32.39	35.88
Jupiter	E	2031-05-19T06:37:24.471	83.62	-61.65	71489.3	32.86	36.38


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-19T05:12:25.430
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        : 4068854997502729344
2Mass ID (if available) : 17461537-2253078
ICRS Star Coord at Epoch: 17h 46m 15.37325s -22:53:07.87209s
RUWE (>1.4 is poor) : 0.78
K magnitude           : 8.626
G magnitude           : 13.178
RP magnitude          : 11.999
BP magnitude          : 14.701
DUPflag              : 0
Distance (au)         : 4.384
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -12.70
Sun-Target sep (deg) : 150.79
Sun-Moon sep (deg)   : 127.85
B (ring opening deg) : -2.61
PA of pole (deg)     : 0.64
Pole direction: RA (deg): 268.05694
Dec (deg): 64.49651
C/A sky separation (") : 11.709
C/A sky separation (km) : 37225.4
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	2031-05-19T03:53:30.774	46.14	-18.49	71489.4	31.93	35.40
Jupiter	E	2031-05-19T06:32:00.309	13.15	12.38x	71489.6	30.66	34.06