

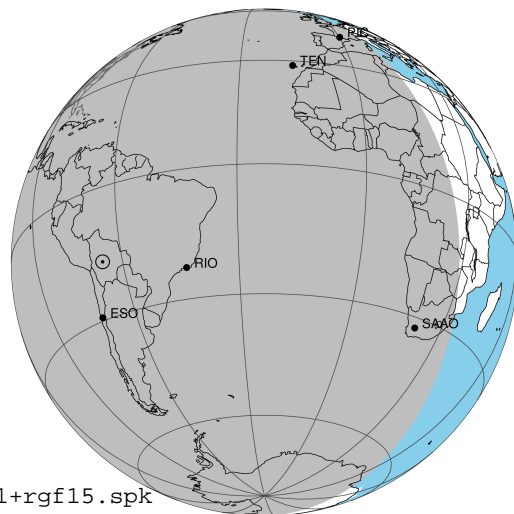
target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2031-05-09T04:19:28.730
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 4068898192043999232
 2Mass ID (if available) : 17495479-2253575

Jupiter 2031-05-09T04:19:28 K8.30 G14.15 Pgt

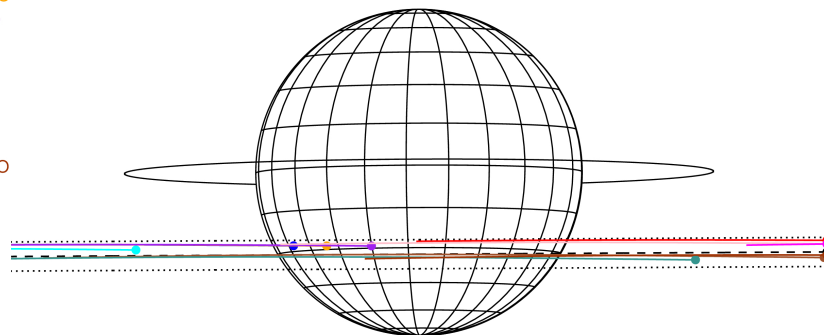
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s

RUWE (>1.4 is poor) : 0.98
 K magnitude : 8.301
 G magnitude : 14.149
 RP magnitude : 12.753
 BP magnitude : 16.623
 DUPflag : 0
 Distance (au) : 4.477
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -9.62
 Sun-Target sep (deg) : 140.26
 Sun-Moon sep (deg) : 12.05
 B (ring opening deg) : -2.60
 PA of pole (deg) : 0.25
 Pole direction: RA (deg): 268.05695
 Dec (deg): 64.49651
 C/A sky separation (") : 11.024
 C/A sky separation (km) : 35799.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk

Jupiter 2031-05-09T04:19:28 K8.30 G14.15
 Pgt



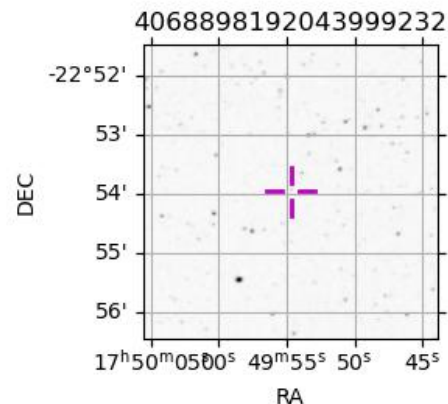
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 KAV
 RIO
 ESO
 SAAO



2031-05-09T04:19:28.7300 α: 17 49 54.7810 δ: -22 53 57.684 C/A ***** PA 0.32 deg v_sky - 9.62 km/s D 04.48 AU
 Credit: Styled after SORA/Lucky Star

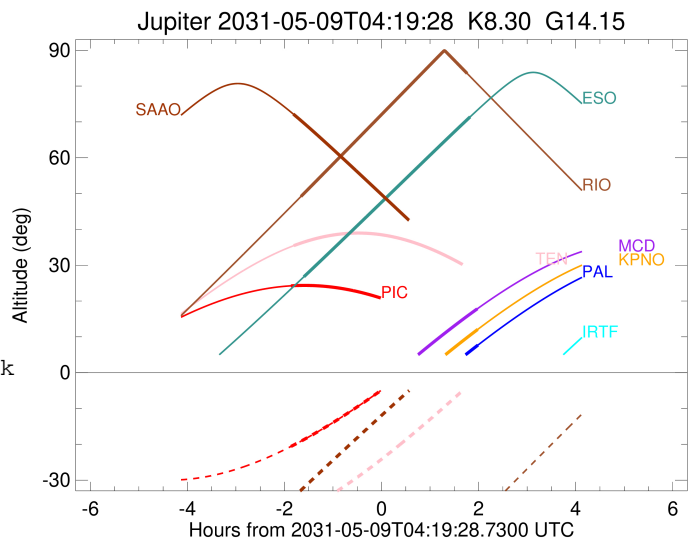
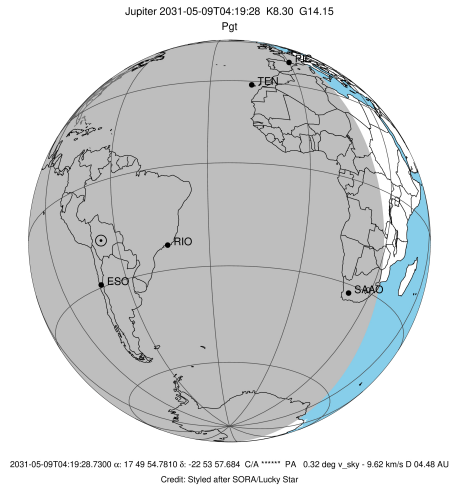
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	MAY 09 02:27 - MAY 09 02:27	Pin
PAL	Palomar Mt (200")	33.4	243.1	+	MAY 09 06:18 - MAY 09 06:18	Pne
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	MAY 09 06:18 - MAY 09 06:18	Pne
MCD	McDonald Obs. 2.7m	30.7	256.0	+	MAY 09 06:17 - MAY 09 06:17	Pne
TEN	Teide Obs./Tenerife	28.3	343.5	+	MAY 09 02:31 - MAY 09 02:31	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 09 02:39 - MAY 09 06:05	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	MAY 09 02:43 - MAY 09 06:09	Pie
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+	MAY 09 02:30 - MAY 09 02:30	Pin
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-09T04:16:03.800
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      : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude          : 8.301
G magnitude          : 14.149
RP magnitude         : 12.753
BP magnitude         : 16.623
DUPflag             : 0
Distance (au)       : 4.477
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg) : 140.26
Sun-Moon sep (deg)  : 12.36
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 9.280
C/A sky separation (km) : 30135.9
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
    
```

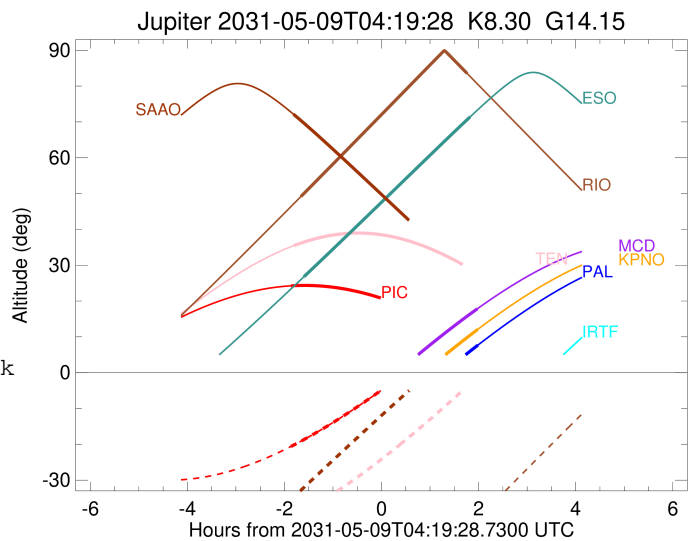
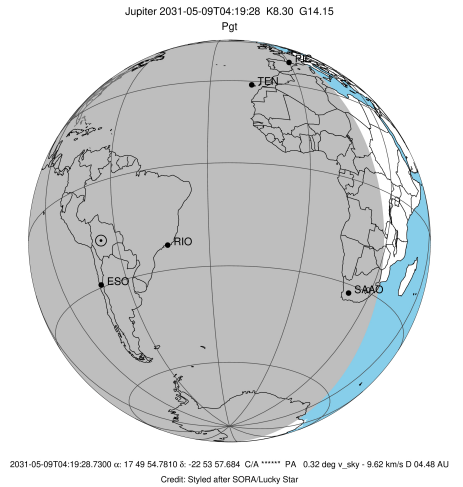


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-09T02:27:28.713	24.24	-20.60	71490.4	-24.71	-27.72
Jupiter	E	2031-05-09T06:05:04.772	9.65	13.30x	71490.3	-25.43	-28.49

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-09T04:29:37.550
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        : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 8.301
G magnitude           : 14.149
RP magnitude          : 12.753
BP magnitude          : 16.623
DUPflag               : 0
Distance (au)         : 4.477
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg)  : 140.26
Sun-Moon sep (deg)   : 11.14
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 10.047
C/A sky separation (km) : 32624.6
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
    
```

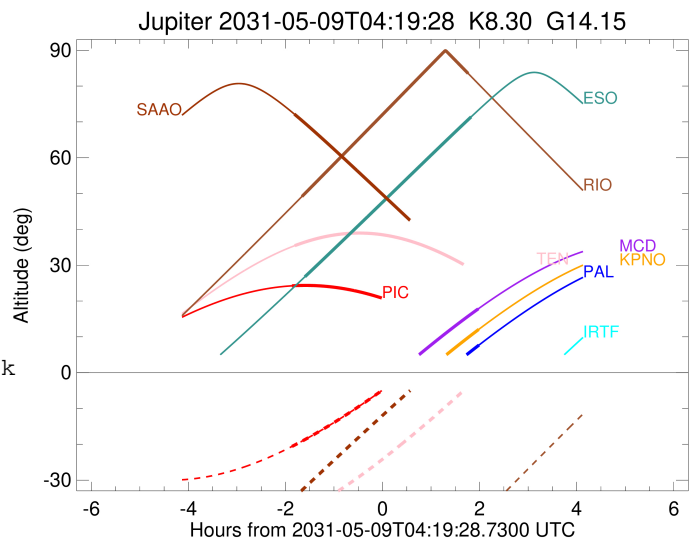
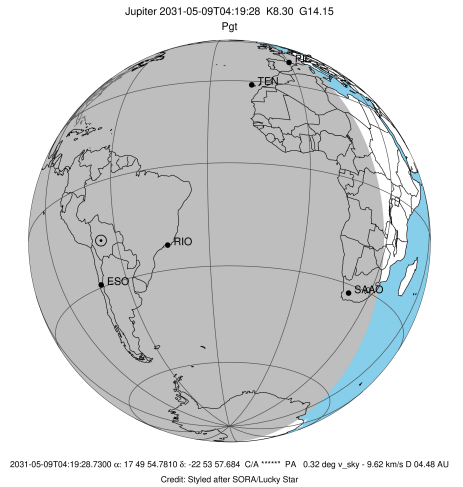


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-09T02:38:06.333	-35.57x	-1.41x	71490.0	-27.92	-31.16
Jupiter	E	2031-05-09T06:18:41.127	7.70	-35.56	71490.2	-26.33	-29.46

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-09T04:29:44.790
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        : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 8.301
G magnitude           : 14.149
RP magnitude          : 12.753
BP magnitude          : 16.623
DUPflag              : 0
Distance (au)         : 4.477
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg)  : 140.26
Sun-Moon sep (deg)    : 11.14
B (ring opening deg) : -2.60
PA of pole (deg)      : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 10.024
C/A sky separation (km) : 32550.1
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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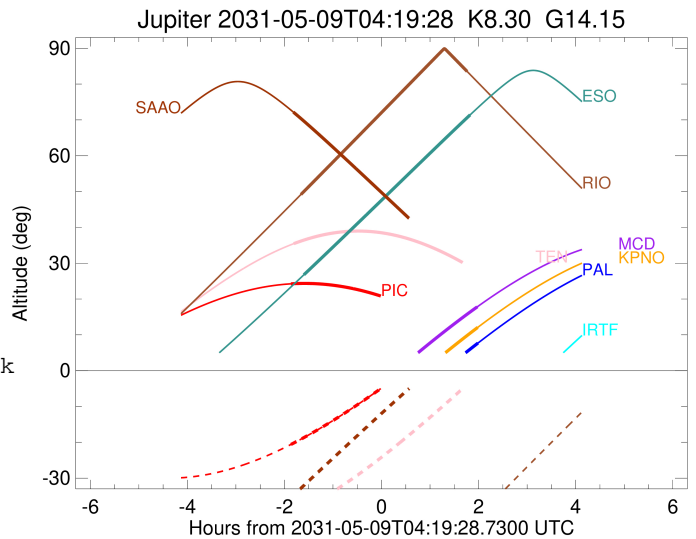
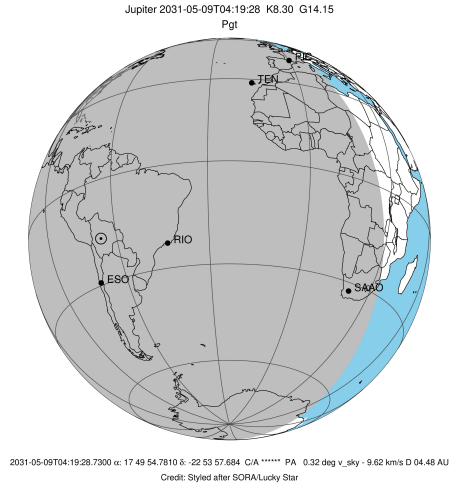


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-09T02:38:34.809	-30.88x	-6.13	71490.0	-27.88	-31.12
Jupiter	E	2031-05-09T06:18:27.089	12.08	-38.52	71490.2	-26.28	-29.40

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-09T04:29:40.600
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       : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude          : 8.301
G magnitude          : 14.149
RP magnitude         : 12.753
BP magnitude         : 16.623
DUPflag             : 0
Distance (au)       : 4.477
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg) : 140.26
Sun-Moon sep (deg)  : 11.16
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 9.972
C/A sky separation (km) : 32381.5
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
    
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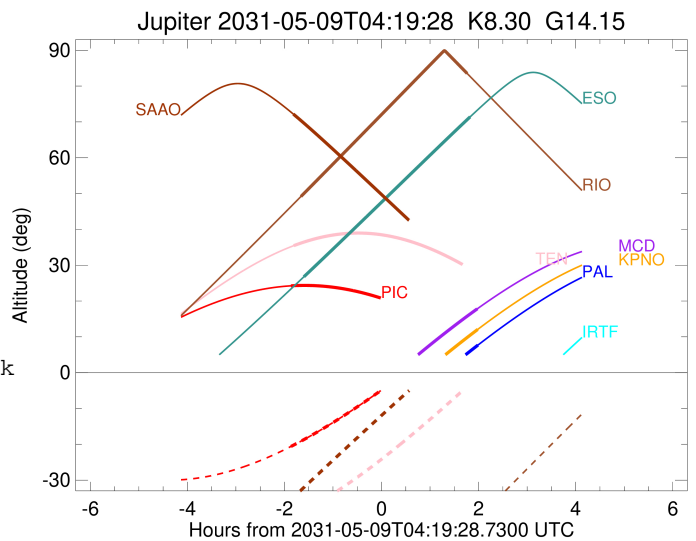
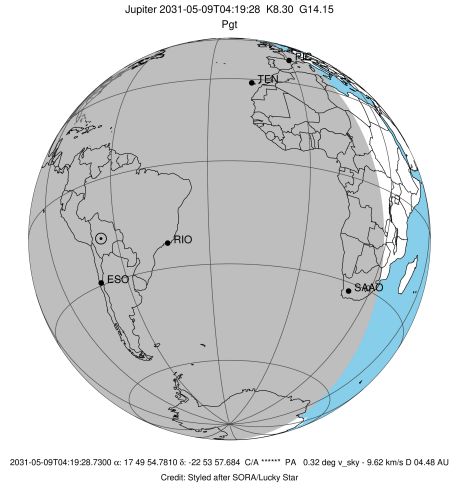


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-09T02:38:59.348	-24.19x	-12.57	71490.0	-27.75	-30.98
Jupiter	E	2031-05-09T06:17:57.085	17.83	-41.46	71490.2	-26.16	-29.28

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-09T04:18:13.780
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       : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude          : 8.301
G magnitude          : 14.149
RP magnitude         : 12.753
BP magnitude         : 16.623
DUPflag             : 0
Distance (au)        : 4.477
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg) : 140.26
Sun-Moon sep (deg)   : 12.24
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 9.502
C/A sky separation (km) : 30856.2
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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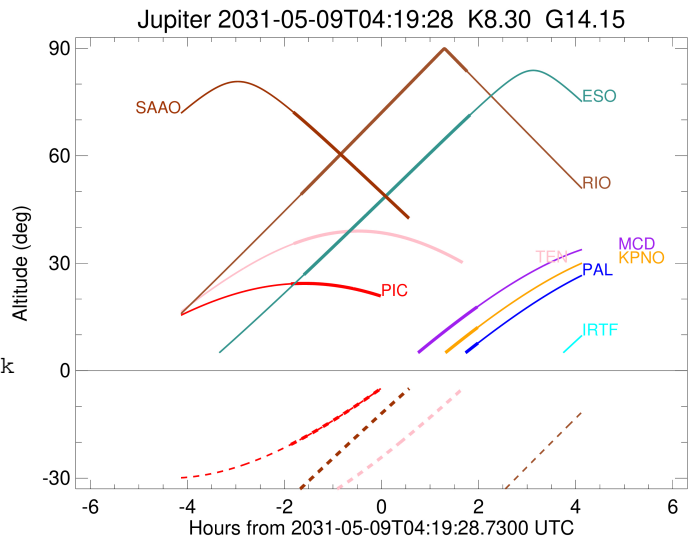
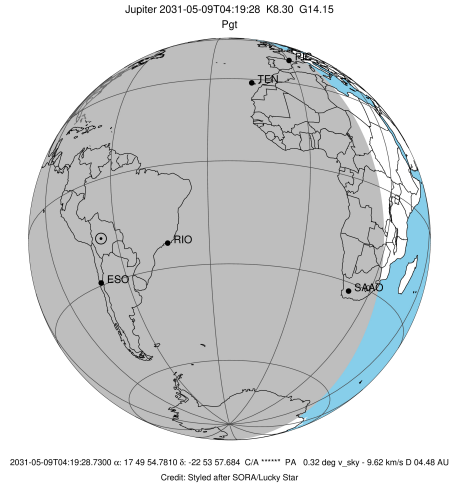


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-09T02:31:00.884	35.45	-39.79	71490.3	-25.58	-28.65
Jupiter	E	2031-05-09T06:05:26.130	29.45	-3.85x	71490.2	-25.92	-29.02

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-05-09T04:23:04.000
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      : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude         : 8.301
G magnitude         : 14.149
RP magnitude        : 12.753
BP magnitude        : 16.623
DUPflag            : 0
Distance (au)       : 4.477
f0 (km)             : 0.00
g0 (km)             : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg) : 140.26
Sun-Moon sep (deg)  : 11.95
B (ring opening deg) : -2.60
PA of pole (deg)    : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 11.058
C/A sky separation (km) : 35907.3
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
    
```

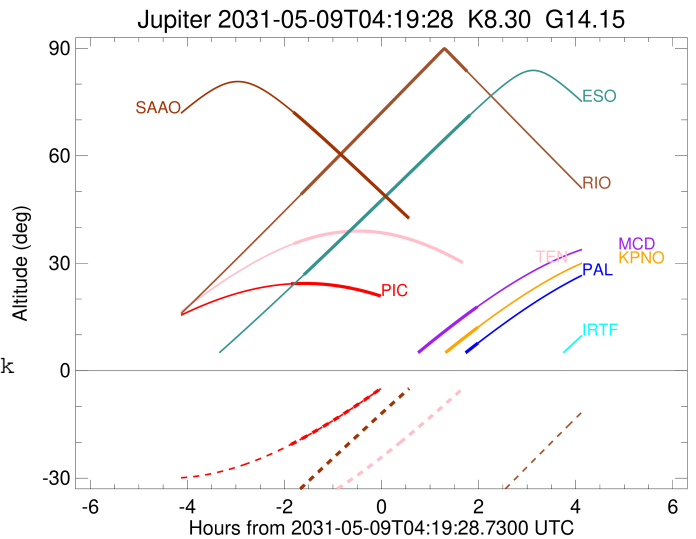
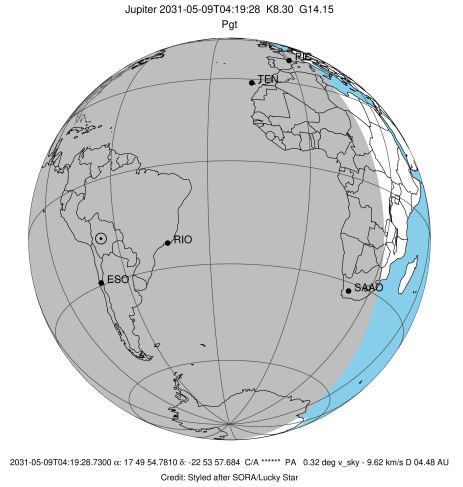


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-09T02:39:54.093	49.17	-84.09	71489.6	-30.55	-33.95
Jupiter	E	2031-05-09T06:05:21.559	83.51	-43.85	71489.7	-30.09	-33.46

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-09T04:27:02.860
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        : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 8.301
G magnitude           : 14.149
RP magnitude          : 12.753
BP magnitude          : 16.623
DUPflag              : 0
Distance (au)         : 4.477
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg) : 140.26
Sun-Moon sep (deg)   : 11.60
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 11.436
C/A sky separation (km) : 37136.7
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
    
```

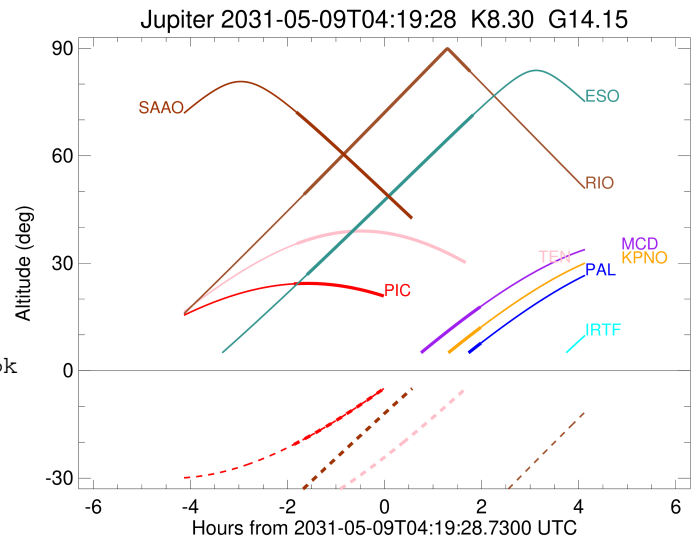
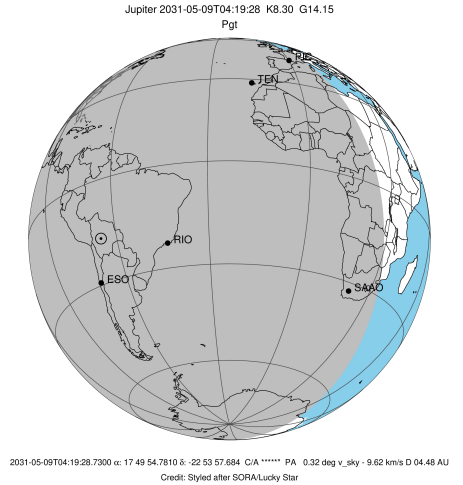


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-05-09T02:43:30.129	26.76	-60.97	71489.4	-31.97	-35.44
Jupiter	E	2031-05-09T06:08:59.704	71.39	-66.35	71489.6	-30.85	-34.27


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-05-09T04:12:26.980
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        : 4068898192043999232
2Mass ID (if available) : 17495479-2253575
ICRS Star Coord at Epoch: 17h 49m 54.78100s -22:53:57.68399s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 8.301
G magnitude           : 14.149
RP magnitude          : 12.753
BP magnitude          : 16.623
DUPflag              : 0
Distance (au)         : 4.477
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -9.62
Sun-Target sep (deg)  : 140.26
Sun-Moon sep (deg)   : 12.83
B (ring opening deg) : -2.60
PA of pole (deg)     : 0.25
Pole direction: RA (deg): 268.05695
Dec (deg): 64.49651
C/A sky separation (") : 11.511
C/A sky separation (km) : 37381.0
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	2031-05-09T02:30:27.850	72.18	-34.80	71489.5	-30.99	-34.41
Jupiter	E	2031-05-09T05:55:27.188	29.47	7.18x	71489.3	-32.29	-35.78