

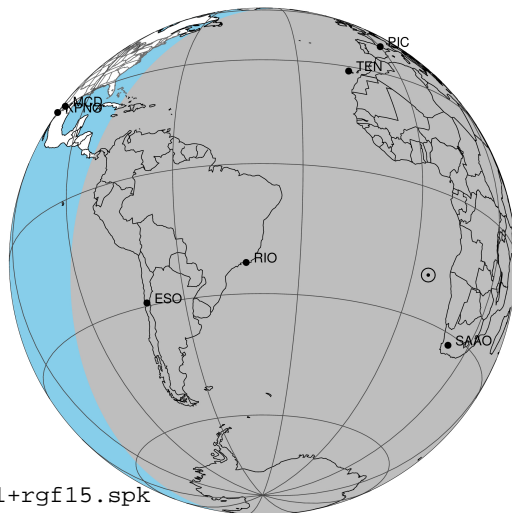
target : Jupiter  
 target radius (km) : 71492.00  
 C/A epoch : 2031-07-23T23:47:01.760  
 Event type : Pgt  
 : Jupiter occs: geocentric, topocentric  
 : Not a ringed target  
 Gaia source ID : 4114543145938524160  
 2Mass ID (if available) : 17143043-2239470

Jupiter 2031-07-23T23:47:01 K7.98 G13.62 Pgt

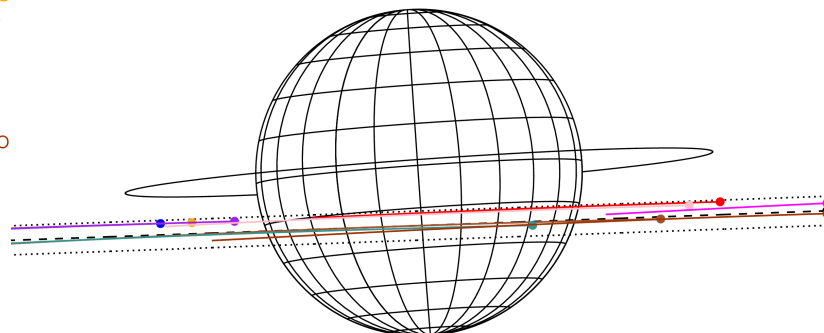
ICRS Star Coord at Epoch: 17h 14m 30.43133s -22:39:47.21473s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 7.979  
 G magnitude : 13.617  
 RP magnitude : 12.183  
 BP magnitude : 16.348  
 DUPflag : 0  
 Distance (au) : 4.458  
 f0 (km) : 0.00  
 g0 (km) : 0.00  
 skyplane vel. (km/s) : -9.33  
 Sun-Target sep (deg) : 139.01  
 Sun-Moon sep (deg) : 89.89  
 B (ring opening deg) : -2.53  
 PA of pole (deg) : 4.05  
 Pole direction: RA (deg): 268.05689  
 Dec (deg): 64.49652  
 C/A sky separation (") : 7.193  
 C/A sky separation (km) : 23258.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk

Jupiter 2031-07-23T23:47:01 K7.98 G13.62  
 Pgt



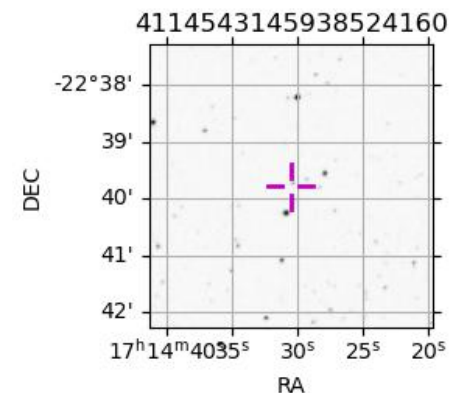
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 KAV  
 RIO  
 ESO  
 SAAO



2031-07-23T23:47:01.7600 α: 17 14 30.43133 δ: -22 39 47.215 C/A 7.204° PA 2.07 deg v\_sky - 9.33 km/s D 04.46 AU  
 Credit: Styled after SORA/Lucky Star

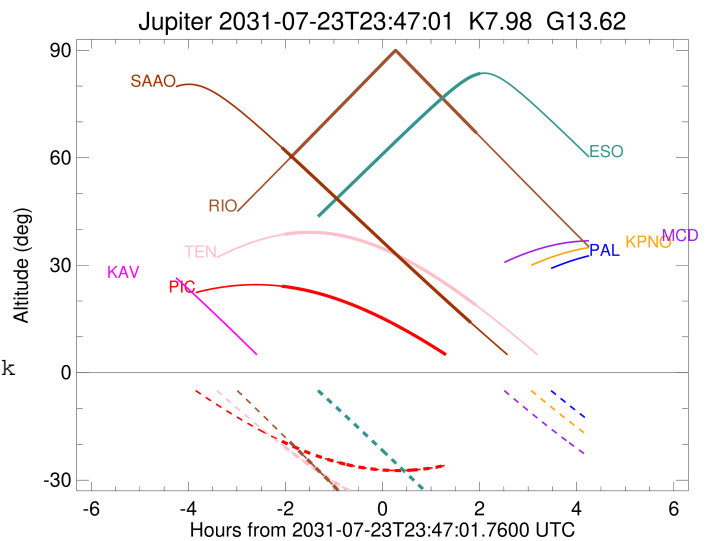
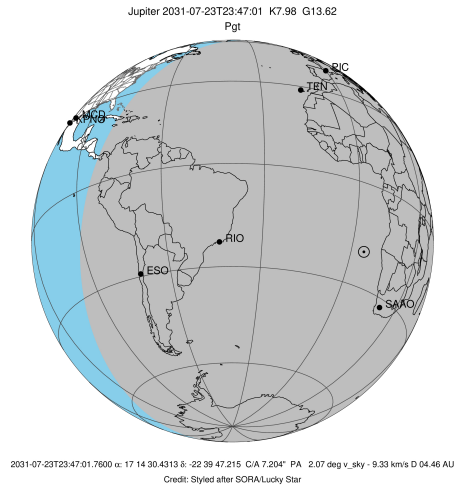
Observable events with sun below -5 deg and altitude above 5 deg

Obs	Location	lat	Elon	Target	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+	JUL 23 21:42 - JUL 23 21:42	Pin
PAL	Palomar Mt (200")	33.4	243.1			Pnn
PMO	Purple Mtn Obs. Nanking	32.1	118.8			Pnn
KPNO	Kitt Peak Natl Obs	32.0	248.4			Pnn
MCD	McDonald Obs. 2.7m	30.7	256.0			Pnn
TEN	Teide Obs./Tenerife	28.3	343.5	+ +	JUL 23 21:45 - JUL 24 01:42	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	+ +	JUL 23 21:52 - JUL 24 01:43	Pie
ESO	European Southern Obs. (3.6m)	-29.3	289.3	+	JUL 24 01:47 - JUL 24 01:47	Pne
AAT	Siding Spring (AAT)	-31.3	149.1			Pnn
SAAO	So. Afr. Astro. Obs. (Sutherland)	-32.4	20.8	+ +	JUL 23 21:42 - JUL 24 01:36	Pie
MSO	Mt. Stromlo Observatory	-35.3	149.0			Pnn



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target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-23T23:41:57.720
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        : 4114543145938524160
2Mass ID (if available) : 17143043-2239470
ICRS Star Coord at Epoch: 17h 14m 30.43133s -22:39:47.21473s
RUWE (>1.4 is poor)  : 1.06
K magnitude           : 7.979
G magnitude           : 13.617
RP magnitude          : 12.183
BP magnitude          : 16.348
DUPflag              : 0
Distance (au)         : 4.458
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -9.33
Sun-Target sep (deg)  : 139.01
Sun-Moon sep (deg)    : 90.13
B (ring opening deg)  : -2.53
PA of pole (deg)      : 4.05
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 5.492
C/A sky separation (km) : 17755.7
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
    
```

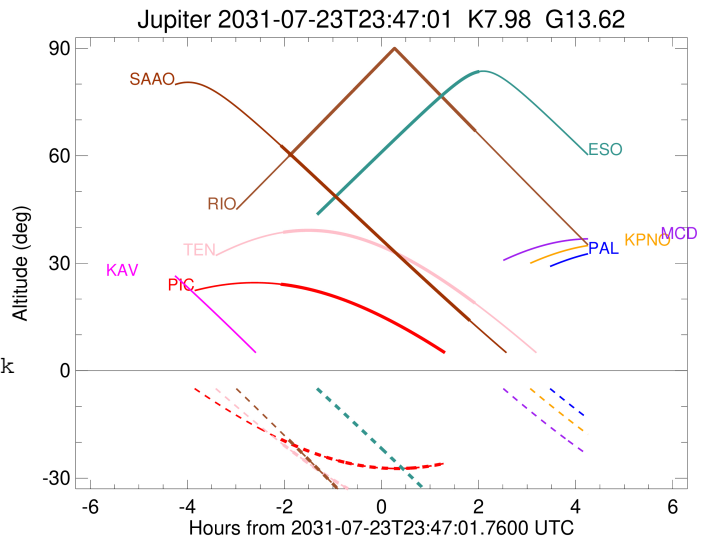
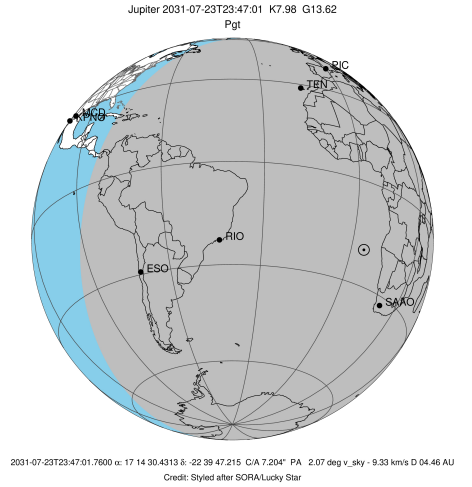


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-23T21:42:34.216	24.13	-19.14	71491.3	-16.09	-18.25
Jupiter	E	2031-07-24T01:43:02.460	-0.72x	-23.46	71491.6	-12.98	-14.76

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-23T23:43:25.900
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       : 4114543145938524160
2Mass ID (if available) : 17143043-2239470
ICRS Star Coord at Epoch: 17h 14m 30.43133s -22:39:47.21473s
RUWE (>1.4 is poor) : 1.06
K magnitude           : 7.979
G magnitude           : 13.617
RP magnitude          : 12.183
BP magnitude          : 16.348
DUPflag              : 0
Distance (au)         : 4.458
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -9.33
Sun-Target sep (deg) : 139.01
Sun-Moon sep (deg)   : 90.41
B (ring opening deg) : -2.53
PA of pole (deg)     : 4.05
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation ("): 5.692
C/A sky separation (km): 18404.5
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
    
```

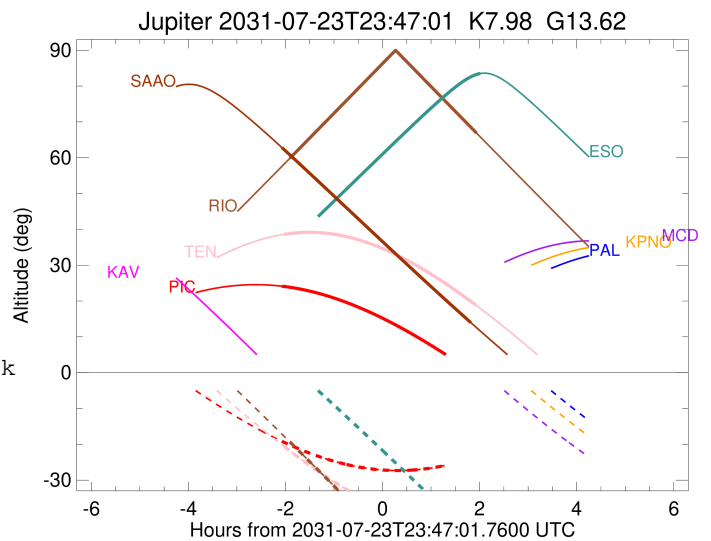
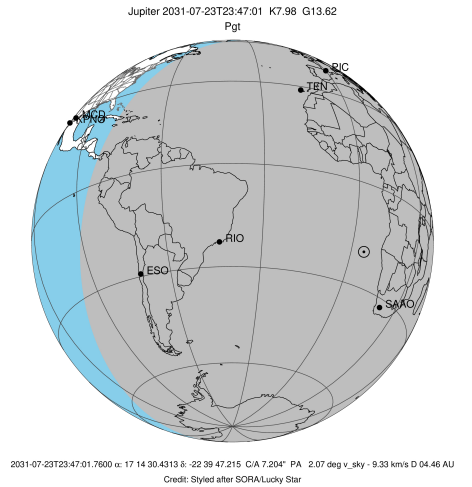


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-23T21:45:28.094	38.62	-20.61	71491.3	-16.84	-19.08
Jupiter	E	2031-07-24T01:42:38.615	18.83	-41.40	71491.5	-13.42	-15.25

```

target                : Jupiter
target radius (km)    : 71492.00
C/A epoch              : 2031-07-23T23:47:50.390
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        : 4114543145938524160
2Mass ID (if available) : 17143043-2239470
ICRS Star Coord at Epoch: 17h 14m 30.43133s -22:39:47.21473s
RUWE (>1.4 is poor)  : 1.06
K magnitude            : 7.979
G magnitude            : 13.617
RP magnitude           : 12.183
BP magnitude           : 16.348
DUPflag               : 0
Distance (au)         : 4.458
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s)  : -9.33
Sun-Target sep (deg)  : 139.01
Sun-Moon sep (deg)    : 90.81
B (ring opening deg)  : -2.53
PA of pole (deg)      : 4.05
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 7.201
C/A sky separation (km) : 23283.2
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
    
```

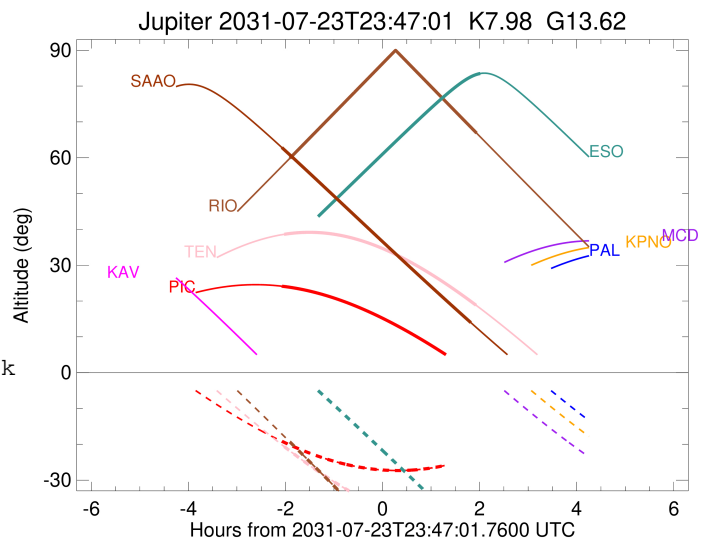
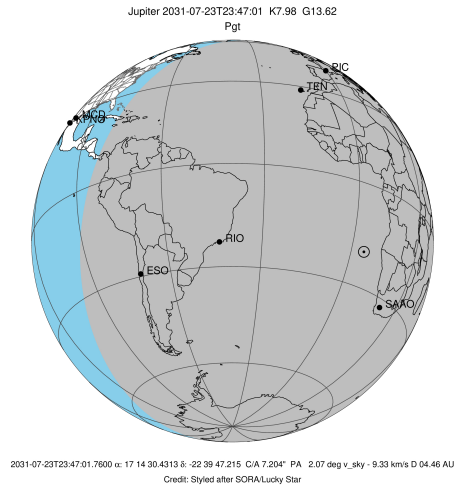


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-23T21:52:24.814	59.82	-19.31	71490.8	-21.34	-24.04
Jupiter	E	2031-07-24T01:43:22.033	66.86	-72.07	71491.2	-17.11	-19.38

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2031-07-23T23:52:22.880
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       : 4114543145938524160
2Mass ID (if available) : 17143043-2239470
ICRS Star Coord at Epoch: 17h 14m 30.43133s -22:39:47.21473s
RUWE (>1.4 is poor) : 1.06
K magnitude           : 7.979
G magnitude           : 13.617
RP magnitude         : 12.183
BP magnitude         : 16.348
DUPflag              : 0
Distance (au)        : 4.458
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -9.33
Sun-Target sep (deg) : 139.01
Sun-Moon sep (deg)   : 90.70
B (ring opening deg) : -2.53
PA of pole (deg)     : 4.05
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation ("): 7.532
C/A sky separation (km): 24353.8
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
    
```

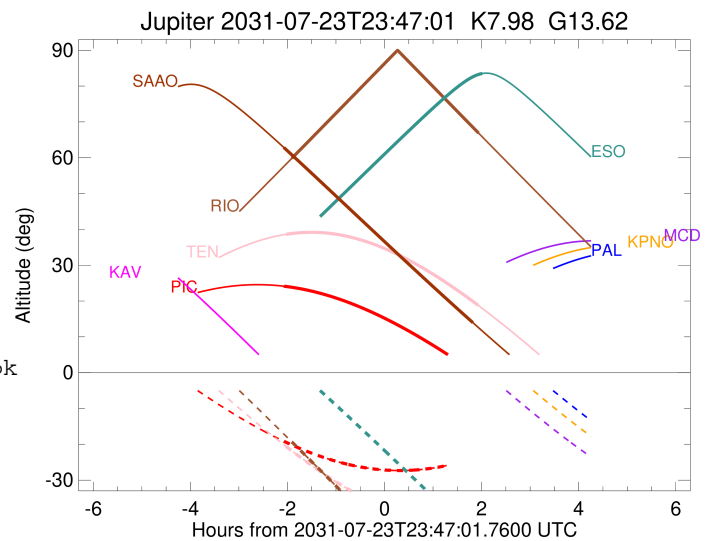
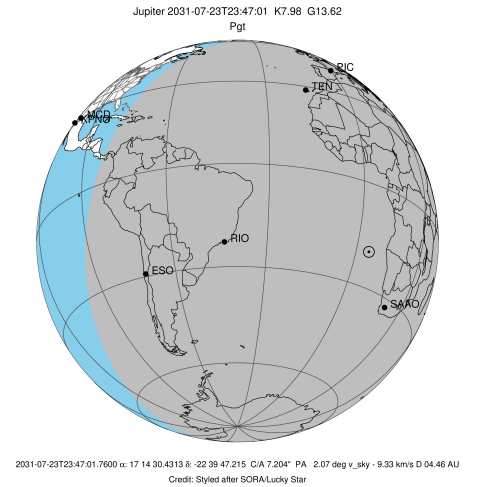


x: target alt < 5.0 deg or sun > -5.0 deg

Target	I/E	UTC	alt	alt-sun	radius	lat-geo	lat-geodetic
Jupiter	I	2031-07-23T21:56:08.237	36.76	1.34x	71490.7	-22.57	-25.39
Jupiter	E	2031-07-24T01:47:40.275	83.49	-47.90	71491.2	-17.60	-19.92

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2031-07-23T23:38:11.860
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       : 4114543145938524160
2Mass ID (if available) : 17143043-2239470
ICRS Star Coord at Epoch: 17h 14m 30.43133s -22:39:47.21473s
RUWE (>1.4 is poor) : 1.06
K magnitude           : 7.979
G magnitude           : 13.617
RP magnitude          : 12.183
BP magnitude          : 16.348
DUPflag              : 0
Distance (au)        : 4.458
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -9.33
Sun-Target sep (deg) : 139.01
Sun-Moon sep (deg)   : 90.43
B (ring opening deg) : -2.53
PA of pole (deg)     : 4.05
Pole direction: RA (deg): 268.05689
Dec (deg): 64.49652
C/A sky separation (") : 7.774
C/A sky separation (km) : 25133.3
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	2031-07-23T21:42:33.081	62.86	-71.71	71490.8	-21.98	-24.74
Jupiter	E	2031-07-24T01:36:13.555	13.97	-49.58	71491.0	-19.43	-21.95