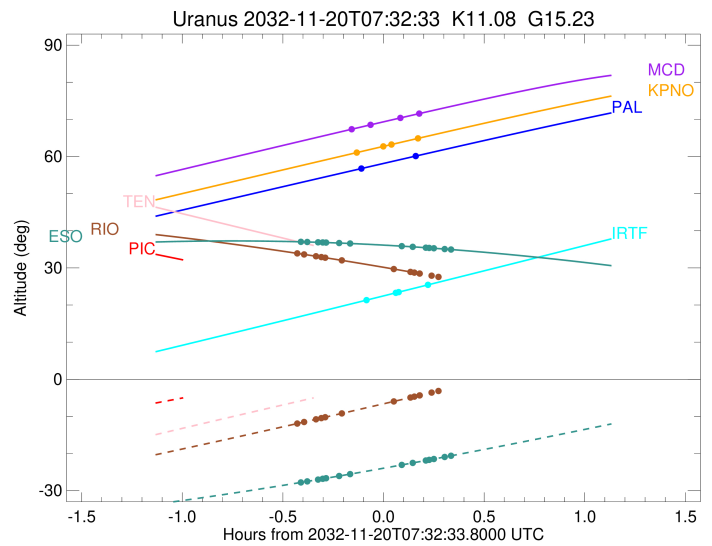
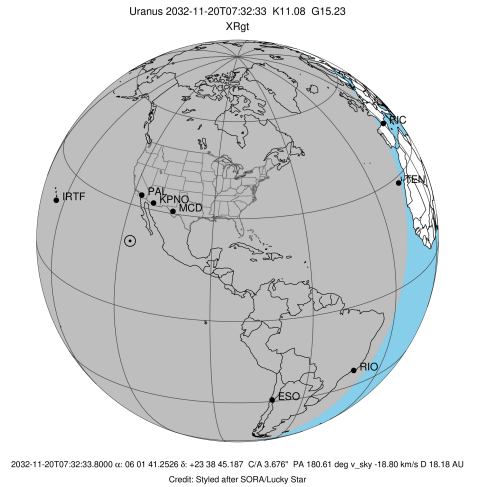



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-11-20T07:35:25.210
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : PAL
Location            : Palomar Mt (200")
Latitude (deg)      : 33.35622
E. Longitude (deg) : 243.13601
Altitude (km)       : 1.706
Gaia source ID      : 3424694123106970112
2Mass ID (if available) : 06014125+2338451
ICRS Star Coord at Epoch: 06h 01m 41.25256s +23:38:45.18656s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 11.083
G magnitude         : 15.233
RP magnitude        : 14.127
BP magnitude        : 16.515
DUPflag            : 0
Distance (au)       : 18.183
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -18.80
Sun-Target sep (deg) : 147.69
Sun-Moon sep (deg)  : 7.92
B (ring opening deg) : 75.03
PA of pole (deg)    : 57.92
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.773
C/A sky separation (km) : 49754.9
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural161.bsp
vgr2.ural161.bsp
peph.ural160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



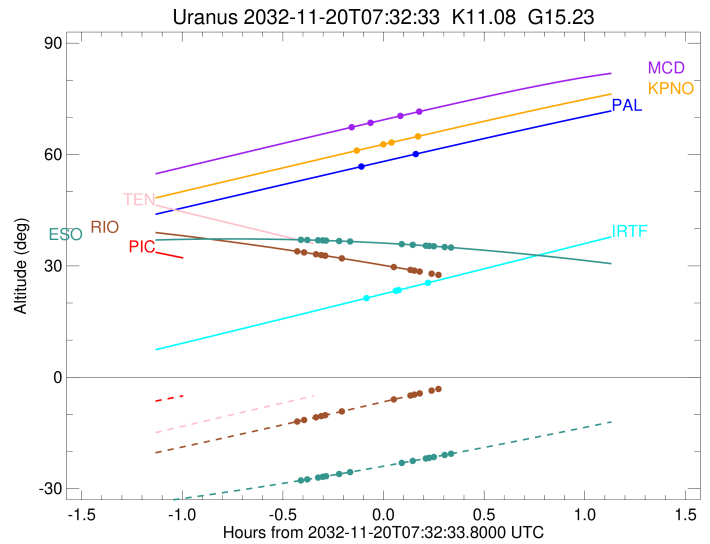
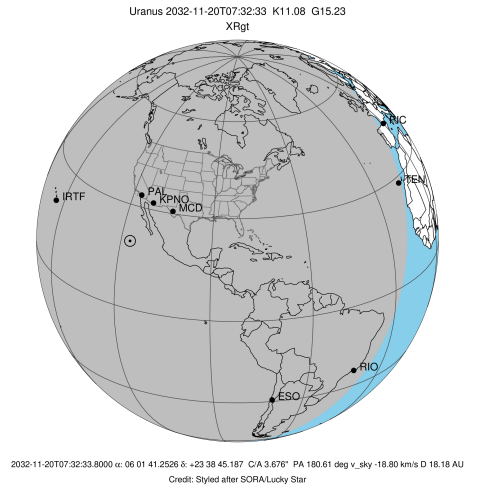
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-20T07:24:27.271		56.45	-76.51	51525.12	-4.25		

No planet occultations

epsilon	E	2032-11-20T07:43:17.443		60.36	-76.46	51424.63	4.25		
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target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-11-20T07:35:03.720
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : KPNO
Location            : Kitt Peak Natl Obs
Latitude (deg)      : 31.96333
E. Longitude (deg)  : 248.40000
Altitude (km)       : 2.120
Gaia source ID      : 3424694123106970112
2Mass ID (if available) : 06014125+2338451
ICRS Star Coord at Epoch: 06h 01m 41.25256s +23:38:45.18656s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 11.083
G magnitude          : 15.233
RP magnitude         : 14.127
BP magnitude         : 16.515
DUPflag             : 0
Distance (au)       : 18.183
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.80
Sun-Target sep (deg) : 147.69
Sun-Moon sep (deg)  : 7.86
B (ring opening deg) : 75.03
PA of pole (deg)    : 57.92
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.754
C/A sky separation (km) : 49510.9
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.bsp
ural161.bsp
vgr2.ural161.bsp
peph.ural160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

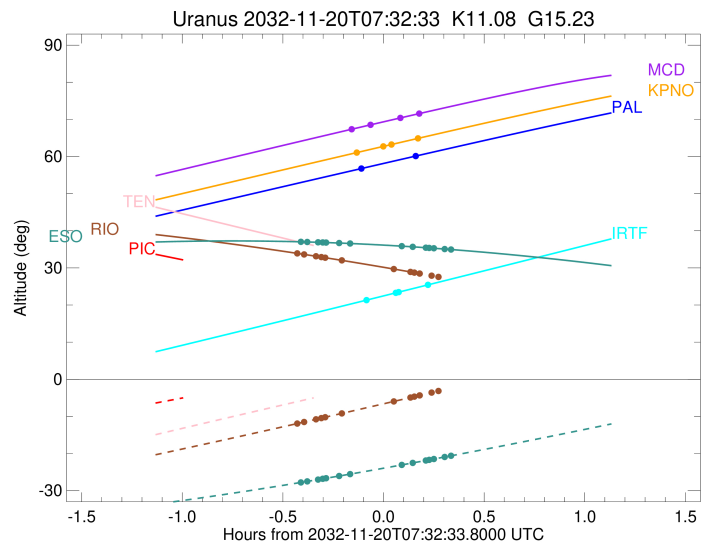
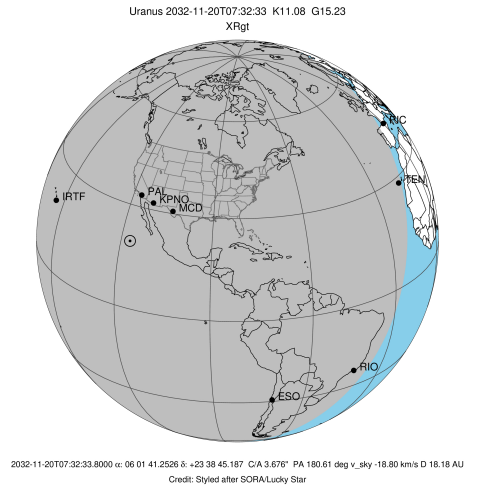


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-20T07:23:13.002		60.77	-77.78	51528.28	-4.66		
lambda	I	2032-11-20T07:33:02.664		62.84	-77.14	50026.87	-0.32		

No planet occultations

lambda	E	2032-11-20T07:34:24.248		63.13	-77.03	50026.88	0.32		
epsilon	E	2032-11-20T07:43:49.844		65.10	-76.08	51418.35	4.66		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-20T07:34:28.610
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3424694123106970112
 2Mass ID (if available) : 06014125+2338451
 ICRS Star Coord at Epoch: 06h 01m 41.25256s +23:38:45.18656s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 11.083
 G magnitude : 15.233
 RP magnitude : 14.127
 BP magnitude : 16.515
 DUPflag : 0
 Distance (au) : 18.183
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.80
 Sun-Target sep (deg) : 147.69
 Sun-Moon sep (deg) : 7.77
 B (ring opening deg) : 75.03
 PA of pole (deg) : 57.92
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.735
 C/A sky separation (km) : 49259.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



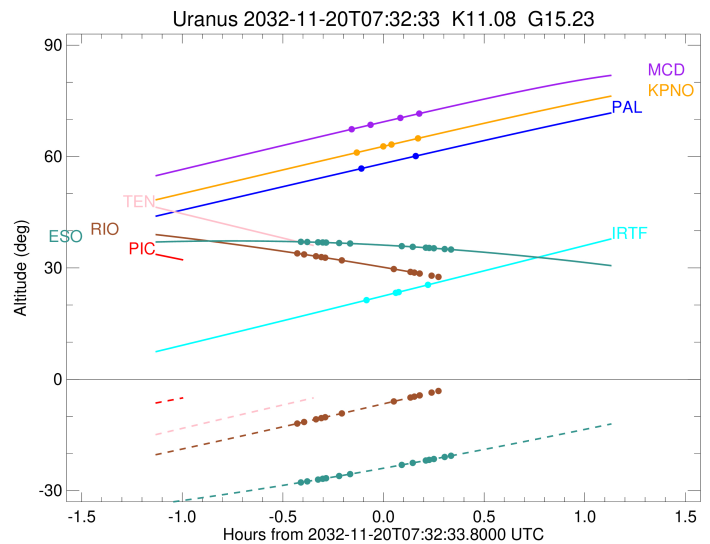
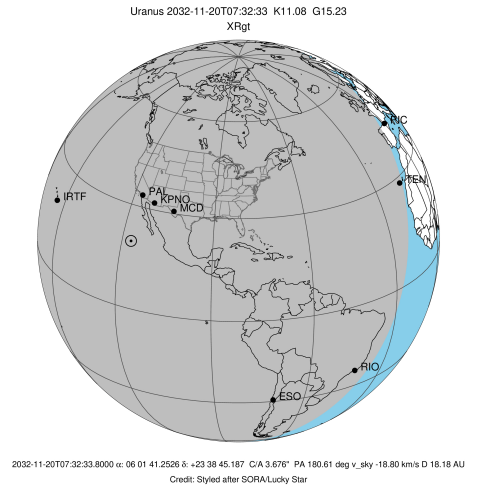
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-20T07:21:48.542		67.09	-76.01	51531.21	-5.05		
lambda	I	2032-11-20T07:28:49.131		68.56	-74.94	50026.71	-2.01		

No planet occultations

lambda	E	2032-11-20T07:37:28.707		70.38	-73.51	50026.71	2.01		
epsilon	E	2032-11-20T07:44:05.367		71.75	-72.34	51412.44	5.05		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-11-20T07:38:01.570
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg)  : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 3424694123106970112
2Mass ID (if available) : 06014125+2338451
ICRS Star Coord at Epoch: 06h 01m 41.25256s +23:38:45.18656s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 11.083
G magnitude          : 15.233
RP magnitude         : 14.127
BP magnitude         : 16.515
DUPflag             : 0
Distance (au)        : 18.183
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.80
Sun-Target sep (deg) : 147.69
Sun-Moon sep (deg)  : 8.14
B (ring opening deg) : 75.03
PA of pole (deg)    : 57.92
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.755
C/A sky separation (km) : 49521.1
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



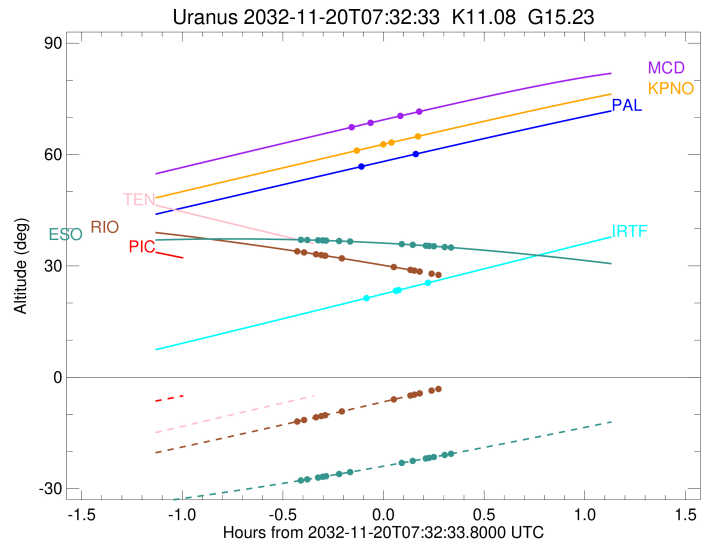
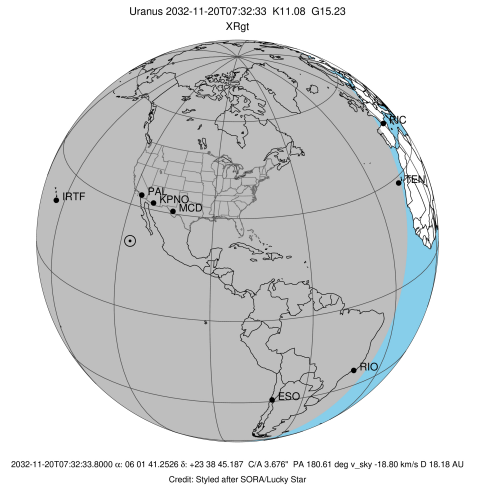
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-20T07:26:05.984		21.01	-52.11	51527.35	-4.57		
lambda	I	2032-11-20T07:39:49.622		24.09	-55.32	50038.57	-0.06		

No planet occultations

lambda	E	2032-11-20T07:33:53.421		22.75	-53.93	50038.64	0.07		
epsilon	E	2032-11-20T07:46:49.068		25.66	-56.95	51417.34	4.58		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-20T07:29:04.530
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 3424694123106970112
 2Mass ID (if available) : 06014125+2338451
 ICRS Star Coord at Epoch: 06h 01m 41.25256s +23:38:45.18656s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 11.083
 G magnitude : 15.233
 RP magnitude : 14.127
 BP magnitude : 16.515
 DUPflag : 0
 Distance (au) : 18.183
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.80
 Sun-Target sep (deg) : 147.69
 Sun-Moon sep (deg) : 6.59
 B (ring opening deg) : 75.03
 PA of pole (deg) : 57.92
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.360
 C/A sky separation (km) : 44310.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

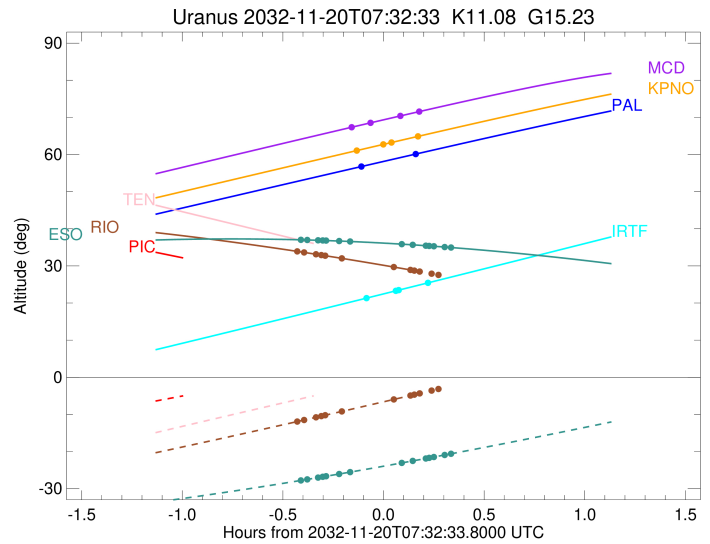
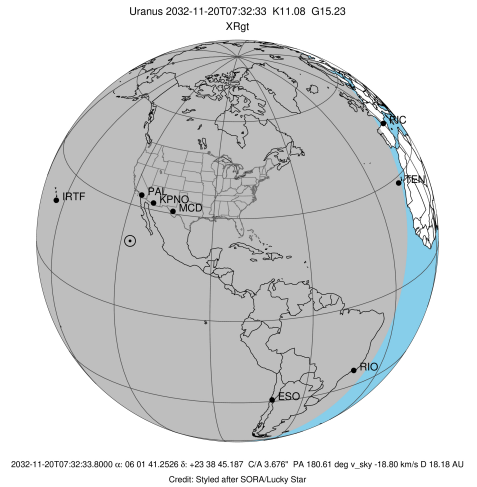


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-20T07:06:10.315		34.00	-12.07	51554.01	-9.74		
lambda	I	2032-11-20T07:08:55.043		33.63	-11.51	50026.71	-8.78		
delta	I	2032-11-20T07:12:28.345		33.13	-10.78	48300.35	-7.39		
gamma	I	2032-11-20T07:14:04.267		32.90	-10.45	47623.95	-6.71		
eta	I	2032-11-20T07:15:13.564		32.74	-10.21	47176.12	-6.21		
beta	I	2032-11-20T07:20:14.721		32.02	-9.18	45652.51	-3.86		

No planet occultations

beta	E	2032-11-20T07:35:30.433		29.71	-6.00	45646.19	3.86		
eta	E	2032-11-20T07:40:33.524		28.92	-4.93x	47176.12	6.20		
gamma	E	2032-11-20T07:41:42.538		28.74	-4.69x	47621.42	6.70		
delta	E	2032-11-20T07:43:18.980		28.48	-4.35x	48300.35	7.37		
lambda	E	2032-11-20T07:46:52.657		27.91	-3.60x	50026.71	8.76		
epsilon	E	2032-11-20T07:49:14.305		27.53	-3.10x	51327.66	9.72		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-20T07:31:28.530
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 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 : 3424694123106970112
 2Mass ID (if available) : 06014125+2338451
 ICRS Star Coord at Epoch: 06h 01m 41.25256s +23:38:45.18656s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 11.083
 G magnitude : 15.233
 RP magnitude : 14.127
 BP magnitude : 16.515
 DUPflag : 0
 Distance (au) : 18.183
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.80
 Sun-Target sep (deg) : 147.69
 Sun-Moon sep (deg) : 6.80
 B (ring opening deg) : 75.03
 PA of pole (deg) : 57.92
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.288
 C/A sky separation (km) : 43357.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-20T07:07:17.763		37.04	-27.89	51554.85	-10.38		
lambda	I	2032-11-20T07:09:51.243		36.98	-27.51	50026.71	-9.51		
delta	I	2032-11-20T07:13:04.832		36.89	-27.02	48300.35	-8.30		
gamma	I	2032-11-20T07:14:29.166		36.85	-26.81	47624.19	-7.73		
eta	I	2032-11-20T07:15:28.717		36.82	-26.65	47176.12	-7.31		
beta	I	2032-11-20T07:19:24.747		36.69	-26.05	45654.05	-5.55		
alpha	I	2032-11-20T07:22:42.677		36.57	-25.53	44710.04	-3.94		

No planet occultations

alpha	E	2032-11-20T07:37:52.022		35.87	-23.10	44697.85	3.94		
beta	E	2032-11-20T07:41:11.303		35.68	-22.55	45645.03	5.55		
eta	E	2032-11-20T07:45:08.990		35.44	-21.89	47176.12	7.31		
gamma	E	2032-11-20T07:46:08.182		35.38	-21.72	47621.30	7.73		
delta	E	2032-11-20T07:47:32.911		35.29	-21.49	48300.35	8.30		
lambda	E	2032-11-20T07:50:46.556		35.08	-20.94	50026.71	9.51		
epsilon	E	2032-11-20T07:52:56.636		34.93	-20.57	51312.87	10.38		