

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2047-11-19T11:36:10.760
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3866154088970921216
 2Mass ID (if available) : 10475319+0827415

ICRS Star Coord at Epoch: 10h 47m 53.21222s +08:27:41.13988s

RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.918
 G magnitude : 16.498
 RP magnitude : 16.012
 BP magnitude : 16.826
 DUPflag : 0
 Distance (au) : 18.512
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.94
 Sun-Target sep (deg) : 76.23
 Sun-Moon sep (deg) : 103.69
 B (ring opening deg) : 7.32
 PA of pole (deg) : 104.34

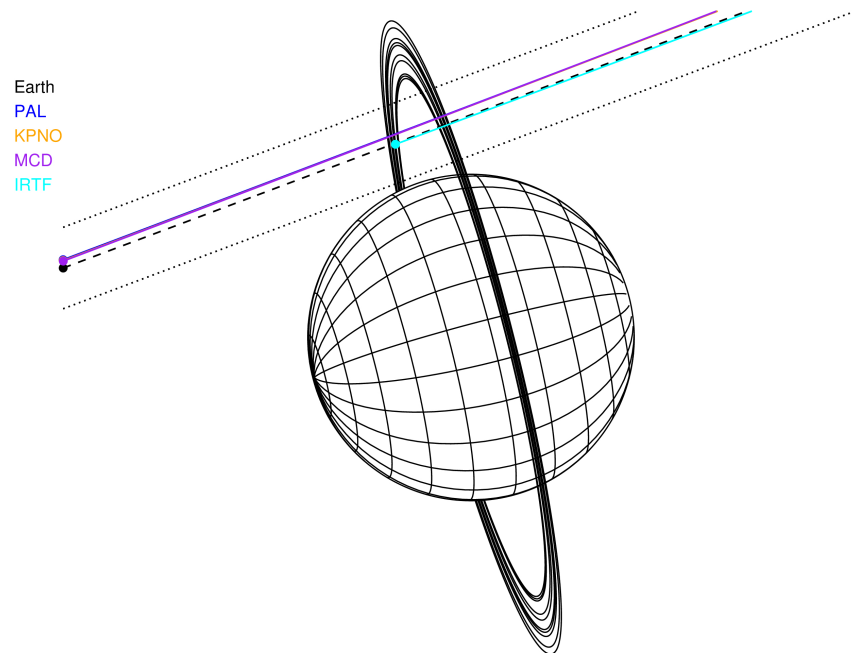
a(km) ring

- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



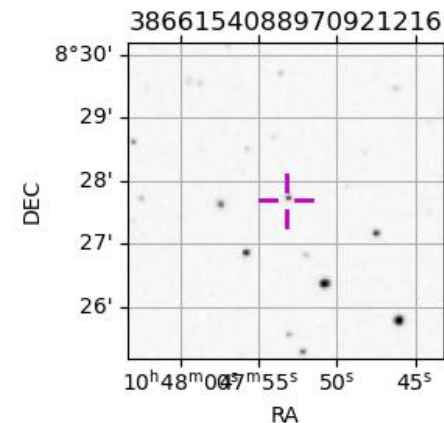
2047-11-19T11:36:10.7600 ex: 10 47 53.21222 s: +08 27 41.140 C/A 2.425° PA 200.59 deg v_sky +13.94 km/s D 18.51 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2047-11-19T11:36:10 K14.92 G16.50 XRgt

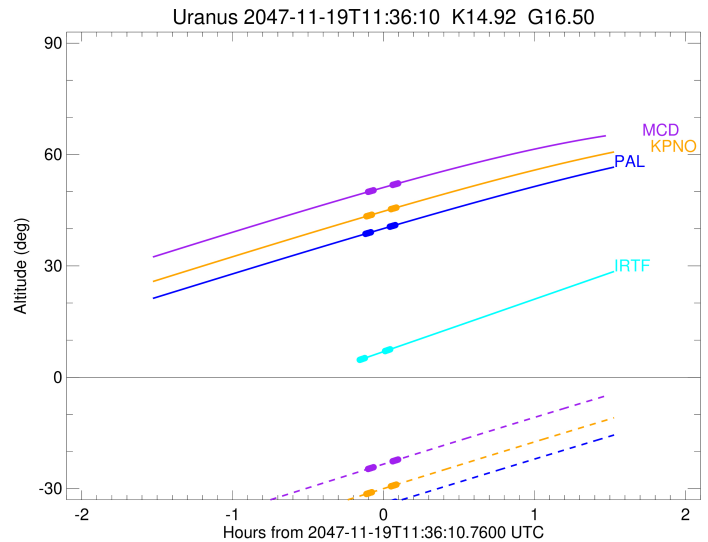
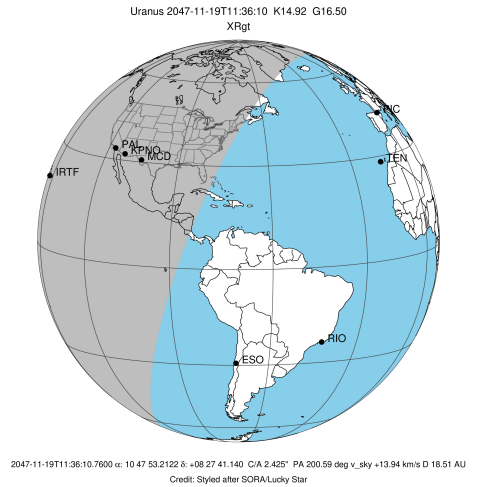


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	NOV 19 11:29 - NOV 19 11:40	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	NOV 19 11:29 - NOV 19 11:41	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	NOV 19 11:30 - NOV 19 11:42	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	++++		+++++	NOV 19 11:28 - NOV 19 11:38	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European Southern Obs	-29.3	289.3					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2047-11-19T11:30:18.970
 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 : 3866154088970921216
 2Mass ID (if available) : 10475319+0827415
 ICRS Star Coord at Epoch: 10h 47m 53.21222s +08:27:41.13988s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.918
 G magnitude : 16.498
 RP magnitude : 16.012
 BP magnitude : 16.826
 DUPflag : 0
 Distance (au) : 18.512
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.94
 Sun-Target sep (deg) : 76.23
 Sun-Moon sep (deg) : 104.13
 B (ring opening deg) : 7.32
 PA of pole (deg) : 104.34
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.532
 C/A sky separation (km) : 33998.3
 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



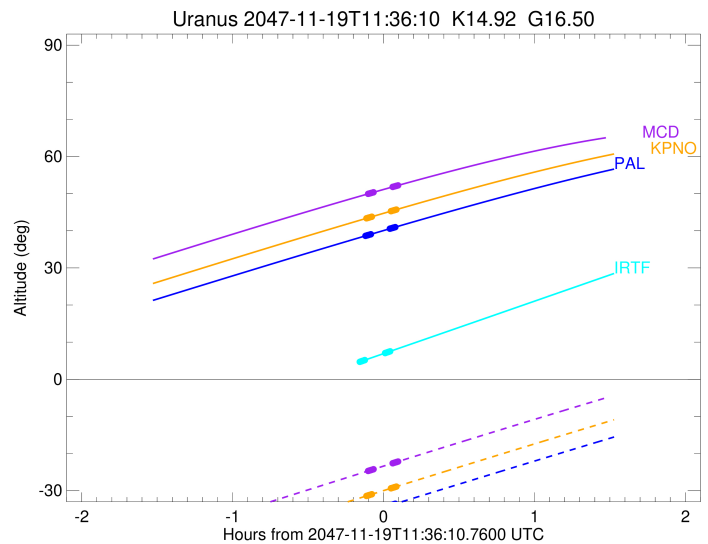
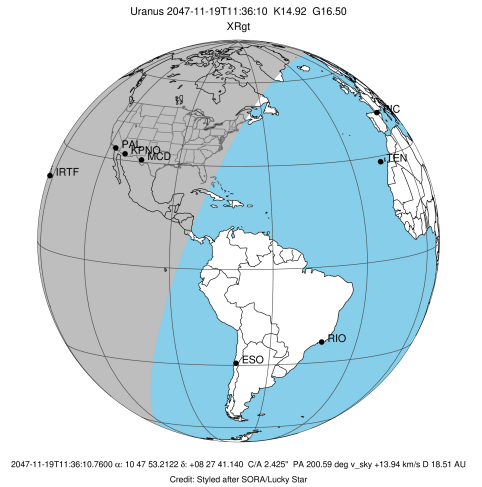
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2047-11-19T11:29:05.494		38.65	-36.00	50746.39	-78.96		
lambda	I	2047-11-19T11:29:14.671		38.68	-35.97	50026.71	-77.93		
delta	I	2047-11-19T11:29:37.181		38.75	-35.89	48300.35	-75.39		
gamma	I	2047-11-19T11:29:46.144		38.78	-35.86	47629.41	-74.30		
eta	I	2047-11-19T11:29:52.276		38.80	-35.84	47176.12	-73.53		
beta	I	2047-11-19T11:30:13.709		38.87	-35.76	45642.81	-70.65		
alpha	I	2047-11-19T11:30:27.231		38.92	-35.71	44732.47	-68.98		
4	I	2047-11-19T11:30:57.948		39.02	-35.61	42600.52	-63.39		
5	I	2047-11-19T11:31:07.575		39.05	-35.57	42232.62	-62.59		
6	I	2047-11-19T11:31:10.157		39.06	-35.57	41876.94	-61.13		

No planet occultations

6	E	2047-11-19T11:38:44.675		40.57	-33.98	41864.89	61.10		
5	E	2047-11-19T11:38:47.909		40.58	-33.97	42158.25	62.55		
4	E	2047-11-19T11:38:54.880		40.60	-33.95	42612.85	63.35		
alpha	E	2047-11-19T11:39:25.487		40.70	-33.84	44751.35	68.93		
beta	E	2047-11-19T11:39:39.125		40.74	-33.79	45650.69	70.59		
eta	E	2047-11-19T11:40:00.045		40.81	-33.72	47176.12	73.46		
gamma	E	2047-11-19T11:40:06.085		40.83	-33.70	47622.10	74.22		
delta	E	2047-11-19T11:40:15.158		40.86	-33.67	48300.35	75.31		
lambda	E	2047-11-19T11:40:37.698		40.94	-33.59	50026.71	77.84		
epsilon	E	2047-11-19T11:40:53.057		40.99	-33.53	51234.50	78.87		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2047-11-19T11:30:40.820
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      : 3866154088970921216
2Mass ID (if available) : 10475319+0827415
ICRS Star Coord at Epoch: 10h 47m 53.21222s +08:27:41.13988s
RUWE (>1.4 is poor) : 1.03
K magnitude         : 14.918
G magnitude         : 16.498
RP magnitude        : 16.012
BP magnitude        : 16.826
DUPflag            : 0
Distance (au)       : 18.512
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : 13.94
Sun-Target sep (deg) : 76.23
Sun-Moon sep (deg)  : 104.20
B (ring opening deg) : 7.32
PA of pole (deg)    : 104.34
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.527
C/A sky separation (km) : 33925.0
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



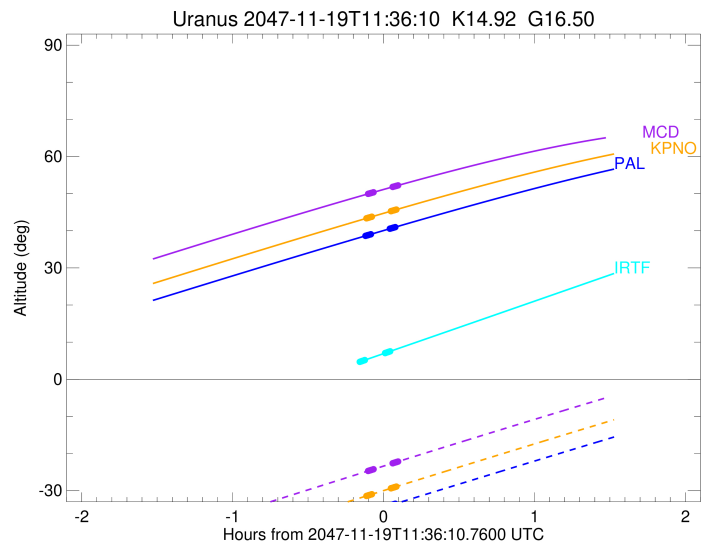
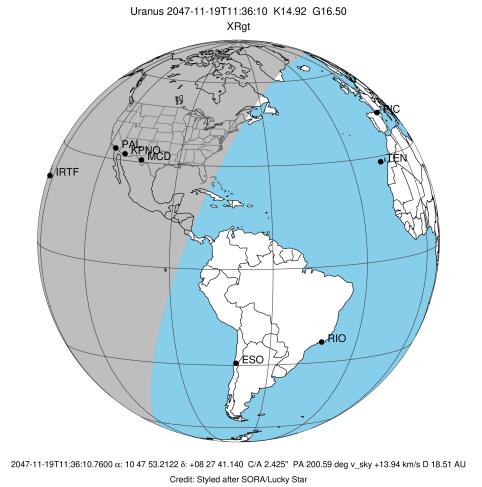
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2047-11-19T11:29:28.442	43.37	-31.42	50746.31	-78.93		
lambda	I	2047-11-19T11:29:37.621	43.40	-31.38	50026.71	-77.91		
delta	I	2047-11-19T11:30:00.136	43.48	-31.30	48300.35	-75.39		
gamma	I	2047-11-19T11:30:09.099	43.51	-31.27	47629.42	-74.30		
eta	I	2047-11-19T11:30:15.230	43.53	-31.25	47176.12	-73.54		
beta	I	2047-11-19T11:30:36.656	43.60	-31.17	45642.83	-70.69		
alpha	I	2047-11-19T11:30:50.175	43.64	-31.13	44732.39	-69.03		
4	I	2047-11-19T11:31:20.846	43.74	-31.02	42600.41	-63.49		
5	I	2047-11-19T11:31:30.470	43.78	-30.99	42232.85	-62.70		
6	I	2047-11-19T11:31:33.030	43.79	-30.98	41876.89	-61.25		

No planet occultations

6	E	2047-11-19T11:39:10.370	45.29	-29.36	41864.79	61.22		
5	E	2047-11-19T11:39:13.582	45.30	-29.35	42158.19	62.67		
4	E	2047-11-19T11:39:20.550	45.32	-29.33	42612.80	63.45		
alpha	E	2047-11-19T11:39:51.112	45.42	-29.22	44751.33	68.98		
beta	E	2047-11-19T11:40:04.744	45.47	-29.17	45650.73	70.63		
eta	E	2047-11-19T11:40:25.655	45.54	-29.10	47176.12	73.47		
gamma	E	2047-11-19T11:40:31.695	45.56	-29.08	47622.09	74.23		
delta	E	2047-11-19T11:40:40.767	45.59	-29.05	48300.35	75.31		
lambda	E	2047-11-19T11:41:03.310	45.66	-28.97	50026.71	77.82		
epsilon	E	2047-11-19T11:41:18.684	45.71	-28.91	51235.18	78.84		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2047-11-19T11:31:17.540
 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 : 3866154088970921216
 2Mass ID (if available) : 10475319+0827415
 ICRS Star Coord at Epoch: 10h 47m 53.21222s +08:27:41.13988s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.918
 G magnitude : 16.498
 RP magnitude : 16.012
 BP magnitude : 16.826
 DUPflag : 0
 Distance (au) : 18.512
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.94
 Sun-Target sep (deg) : 76.23
 Sun-Moon sep (deg) : 104.30
 B (ring opening deg) : 7.32
 PA of pole (deg) : 104.34
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.527
 C/A sky separation (km) : 33926.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



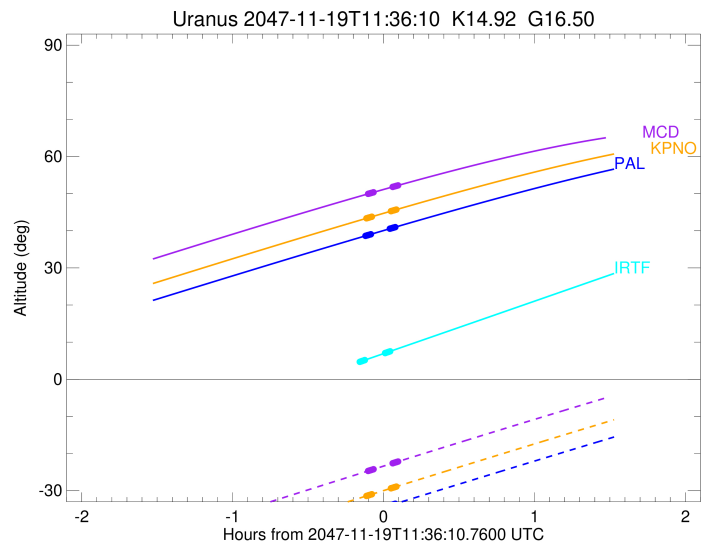
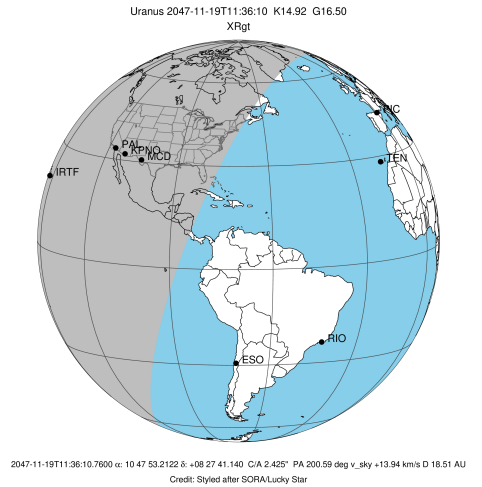
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2047-11-19T11:30:08.408		49.96	-24.68	50746.31	-78.71		
lambda	I	2047-11-19T11:30:17.613		49.99	-24.65	50026.71	-77.69		
delta	I	2047-11-19T11:30:40.193		50.06	-24.57	48300.35	-75.17		
gamma	I	2047-11-19T11:30:49.181		50.09	-24.54	47629.42	-74.09		
eta	I	2047-11-19T11:30:55.330		50.11	-24.52	47176.12	-73.33		
beta	I	2047-11-19T11:31:16.818		50.18	-24.44	45642.83	-70.48		
alpha	I	2047-11-19T11:31:30.377		50.23	-24.39	44732.39	-68.83		
4	I	2047-11-19T11:32:01.139		50.33	-24.28	42600.43	-63.30		
5	I	2047-11-19T11:32:10.792		50.36	-24.25	42232.84	-62.51		
6	I	2047-11-19T11:32:13.360		50.36	-24.24	41876.89	-61.07		

No planet occultations

6	E	2047-11-19T11:39:51.694		51.82	-22.62	41864.81	61.04		
5	E	2047-11-19T11:39:54.919		51.83	-22.61	42158.19	62.48		
4	E	2047-11-19T11:40:01.905		51.86	-22.58	42612.80	63.27		
alpha	E	2047-11-19T11:40:32.556		51.95	-22.47	44751.33	68.79		
beta	E	2047-11-19T11:40:46.226		52.00	-22.43	45650.72	70.43		
eta	E	2047-11-19T11:41:07.196		52.06	-22.35	47176.12	73.27		
gamma	E	2047-11-19T11:41:13.252		52.08	-22.33	47622.09	74.02		
delta	E	2047-11-19T11:41:22.349		52.11	-22.30	48300.35	75.10		
lambda	E	2047-11-19T11:41:44.953		52.18	-22.22	50026.71	77.61		
epsilon	E	2047-11-19T11:42:00.366		52.23	-22.16	51235.05	78.62		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2047-11-19T11:28:43.720
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      : 3866154088970921216
2Mass ID (if available) : 10475319+0827415
ICRS Star Coord at Epoch: 10h 47m 53.21222s +08:27:41.13988s
RUWE (>1.4 is poor) : 1.03
K magnitude          : 14.918
G magnitude          : 16.498
RP magnitude         : 16.012
BP magnitude         : 16.826
DUPflag             : 0
Distance (au)       : 18.512
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 13.94
Sun-Target sep (deg) : 76.23
Sun-Moon sep (deg)  : 103.57
B (ring opening deg) : 7.32
PA of pole (deg)    : 104.34
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.420
C/A sky separation (km) : 32487.4
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.bsp
ural161.bsp
vgr2.ural161.bsp
peph.ural160.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	2047-11-19T11:26:49.634		4.71x	-71.23	50744.81	-83.17		
lambda	I	2047-11-19T11:26:58.316		4.75x	-71.20	50026.71	-82.27		
delta	I	2047-11-19T11:27:19.587		4.83x	-71.12	48300.35	-80.00		
gamma	I	2047-11-19T11:27:28.020		4.86x	-71.08	47629.60	-79.03		
eta	I	2047-11-19T11:27:33.782		4.89x	-71.06	47176.12	-78.35		
beta	I	2047-11-19T11:27:53.820		4.96x	-70.98	45643.23	-75.81		
alpha	I	2047-11-19T11:28:06.485		5.01	-70.93	44730.87	-74.38		
4	I	2047-11-19T11:28:34.562		5.12	-70.82	42598.47	-69.44		
5	I	2047-11-19T11:28:43.544		5.16	-70.79	42237.37	-68.85		
6	I	2047-11-19T11:28:45.588		5.17	-70.78	41875.94	-67.46		

No planet occultations

6	E	2047-11-19T11:36:50.837		7.06	-68.88	41862.82	67.39		
5	E	2047-11-19T11:36:53.439		7.07	-68.87	42156.97	68.77		
4	E	2047-11-19T11:36:59.998		7.10	-68.84	42611.70	69.36		
alpha	E	2047-11-19T11:37:27.981		7.21	-68.73	44750.86	74.28		
beta	E	2047-11-19T11:37:40.757		7.26	-68.68	45651.58	75.70		
eta	E	2047-11-19T11:38:00.317		7.33	-68.61	47176.11	78.23		
gamma	E	2047-11-19T11:38:05.992		7.36	-68.59	47621.95	78.90		
delta	E	2047-11-19T11:38:14.538		7.39	-68.55	48300.35	79.87		
lambda	E	2047-11-19T11:38:35.848		7.47	-68.47	50026.71	82.12		
epsilon	E	2047-11-19T11:38:50.624		7.53	-68.41	51250.75	83.02		