

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-23T06:23:13.420
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427508421902219776
 2Mass ID (if available) : 05503560+2338128

ICRS Star Coord at Epoch: 05h 50m 35.61280s +23:38:12.92461s

RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.871
 G magnitude : 17.351
 RP magnitude : 16.535
 BP magnitude : 18.037
 DUPflag : 0
 Distance (au) : 18.201
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.97
 Sun-Target sep (deg) : 144.75
 Sun-Moon sep (deg) : 120.00
 B (ring opening deg) : 77.10
 PA of pole (deg) : 50.88

a(km) ring

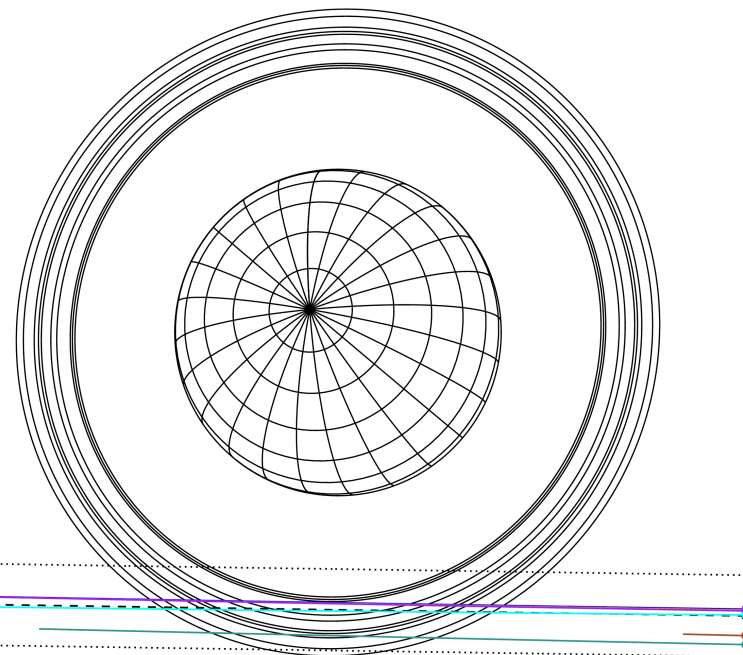
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2033-01-23T06:23:13.4200 ra: 05 50 35.61280 s: +23 38 12.925 C/A 3.283° PA 359.14 deg v_sky -17.97 km/s D 18.20 AU
 Credit: Styled after SORA/Lucky Star

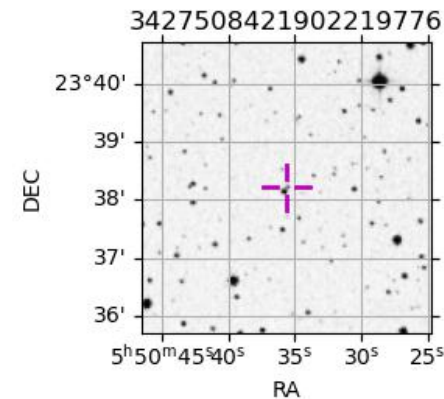
Uranus 2033-01-23T06:23:13 K14.87 G17.35 XRgt

Earth
 PAL
 KPNO
 MCD
 IRTF
 RIO
 ESO

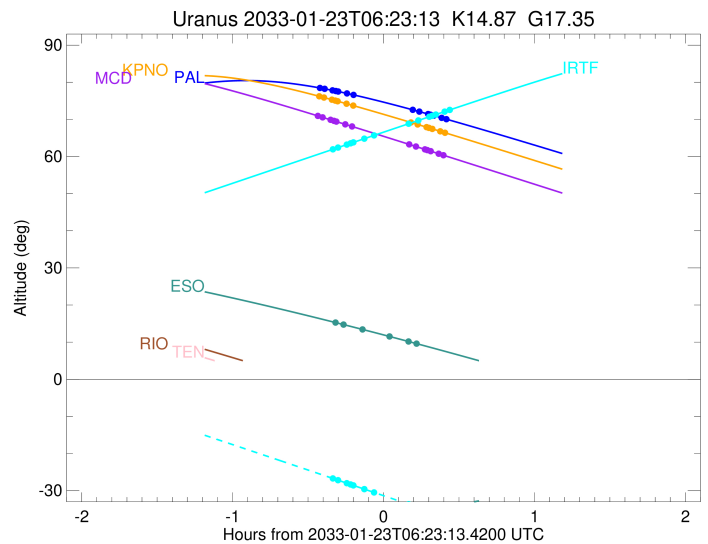
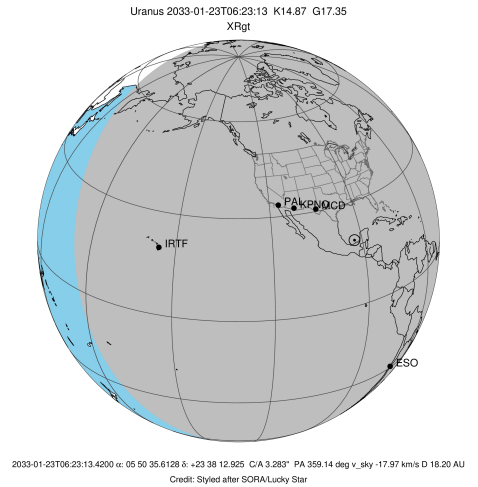


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	JAN 23 05:58 - JAN 23 06:48	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	JAN 23 05:58 - JAN 23 06:47	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	JAN 23 05:57 - JAN 23 06:46	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	JAN 23 06:03 - JAN 23 06:49	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	+++		+++	JAN 23 06:05 - JAN 23 06:36	PnnRie
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 : 2033-01-23T06:22:07.880
 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 : 3427508421902219776
 2Mass ID (if available) : 05503560+2338128
 ICRS Star Coord at Epoch: 05h 50m 35.61280s +23:38:12.92461s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.871
 G magnitude : 17.351
 RP magnitude : 16.535
 BP magnitude : 18.037
 DUPflag : 0
 Distance (au) : 18.201
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.97
 Sun-Target sep (deg) : 144.75
 Sun-Moon sep (deg) : 120.85
 B (ring opening deg) : 77.10
 PA of pole (deg) : 50.88
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.206
 C/A sky separation (km) : 42327.9
 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

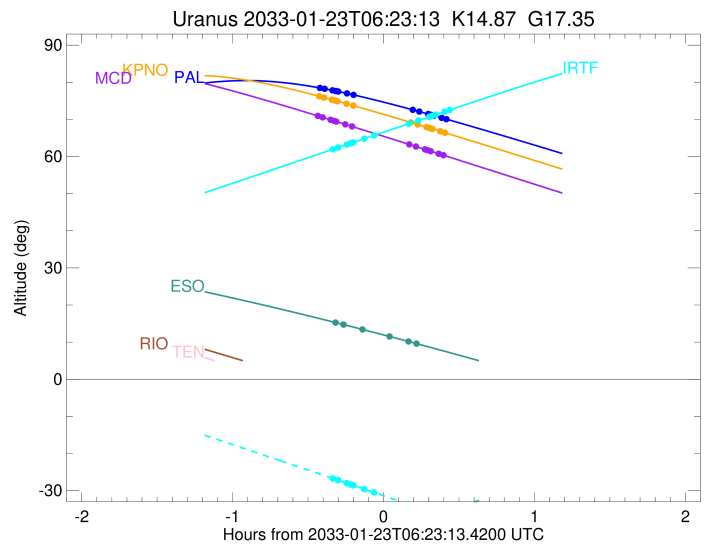
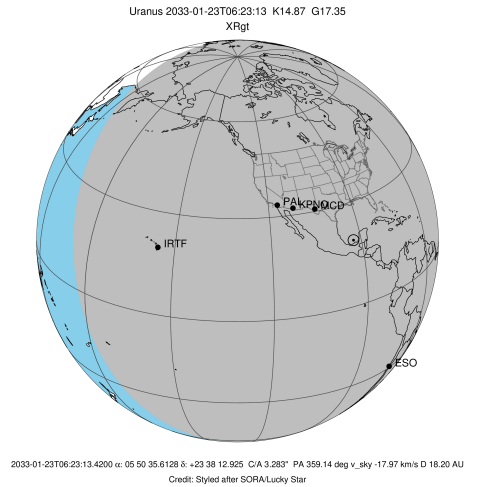


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-23T05:58:36.247		78.40	-59.78	50768.52	-10.10		
lambda	I	2033-01-23T05:59:51.398		78.24	-60.03	50026.71	-9.68		
delta	I	2033-01-23T06:02:59.290		77.82	-60.64	48300.35	-8.68		
gamma	I	2033-01-23T06:04:19.504		77.64	-60.91	47622.85	-8.21		
eta	I	2033-01-23T06:05:15.009		77.51	-61.09	47176.12	-7.88		
beta	I	2033-01-23T06:08:47.531		76.99	-61.77	45641.96	-6.52		
alpha	I	2033-01-23T06:11:28.082		76.58	-62.29	44684.88	-5.42		

No planet occultations

alpha	E	2033-01-23T06:34:43.791		72.60	-66.62	44692.94	5.42		
beta	E	2033-01-23T06:37:22.793		72.12	-67.10	45642.76	6.52		
eta	E	2033-01-23T06:40:55.458		71.45	-67.72	47176.12	7.87		
gamma	E	2033-01-23T06:41:50.796		71.28	-67.88	47620.96	8.20		
delta	E	2033-01-23T06:43:11.337		71.02	-68.11	48300.35	8.67		
lambda	E	2033-01-23T06:46:19.481		70.43	-68.65	50026.71	9.67		
epsilon	E	2033-01-23T06:48:09.513		70.08	-68.96	51120.55	10.08		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-23T06:21:42.640
 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 : 3427508421902219776
 2Mass ID (if available) : 05503560+2338128
 ICRS Star Coord at Epoch: 05h 50m 35.61280s +23:38:12.92461s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.871
 G magnitude : 17.351
 RP magnitude : 16.535
 BP magnitude : 18.037
 DUPflag : 0
 Distance (au) : 18.201
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.97
 Sun-Target sep (deg) : 144.75
 Sun-Moon sep (deg) : 120.87
 B (ring opening deg) : 77.10
 PA of pole (deg) : 50.88
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.214
 C/A sky separation (km) : 42431.2
 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



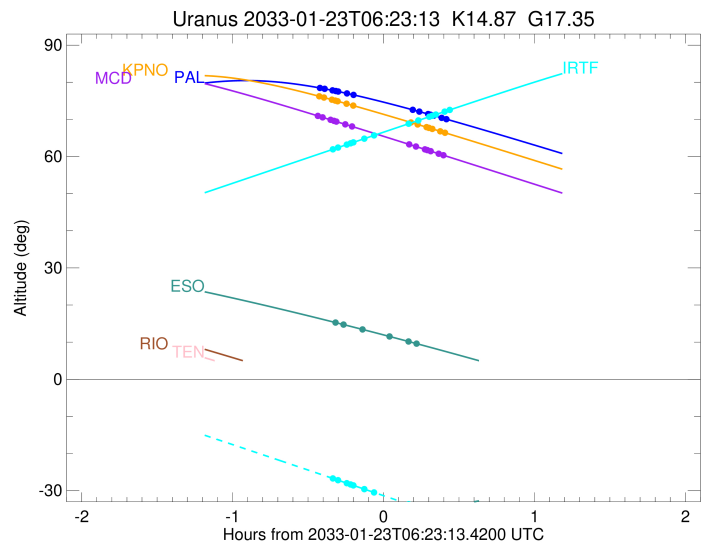
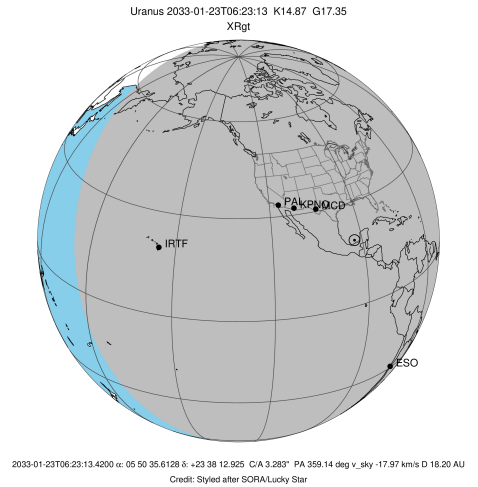
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-23T05:58:19.651		76.11	-64.37	50769.16	-10.04		
lambda	I	2033-01-23T05:59:35.338		75.89	-64.62	50026.71	-9.62		
delta	I	2033-01-23T06:02:44.673		75.31	-65.23	48300.35	-8.60		
gamma	I	2033-01-23T06:04:05.656		75.06	-65.49	47622.82	-8.13		
eta	I	2033-01-23T06:05:01.758		74.89	-65.67	47176.12	-7.79		
beta	I	2033-01-23T06:08:37.316		74.21	-66.36	45641.92	-6.41		
alpha	I	2033-01-23T06:11:21.404		73.69	-66.88	44684.92	-5.28		

No planet occultations

alpha	E	2033-01-23T06:34:00.291		69.21	-70.96	44692.78	5.27		
beta	E	2033-01-23T06:36:42.864		68.66	-71.41	45642.71	6.40		
eta	E	2033-01-23T06:40:18.620		67.92	-72.00	47176.12	7.78		
gamma	E	2033-01-23T06:41:14.572		67.73	-72.15	47620.96	8.12		
delta	E	2033-01-23T06:42:35.907		67.45	-72.37	48300.35	8.59		
lambda	E	2033-01-23T06:45:45.562		66.80	-72.86	50026.71	9.60		
epsilon	E	2033-01-23T06:47:36.193		66.42	-73.15	51119.34	10.02		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-23T06:21:07.300
 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 : 3427508421902219776
 2Mass ID (if available) : 05503560+2338128
 ICRS Star Coord at Epoch: 05h 50m 35.61280s +23:38:12.92461s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.871
 G magnitude : 17.351
 RP magnitude : 16.535
 BP magnitude : 18.037
 DUPflag : 0
 Distance (au) : 18.201
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.97
 Sun-Target sep (deg) : 144.75
 Sun-Moon sep (deg) : 120.89
 B (ring opening deg) : 77.10
 PA of pole (deg) : 50.88
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.217
 C/A sky separation (km) : 42471.3
 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



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

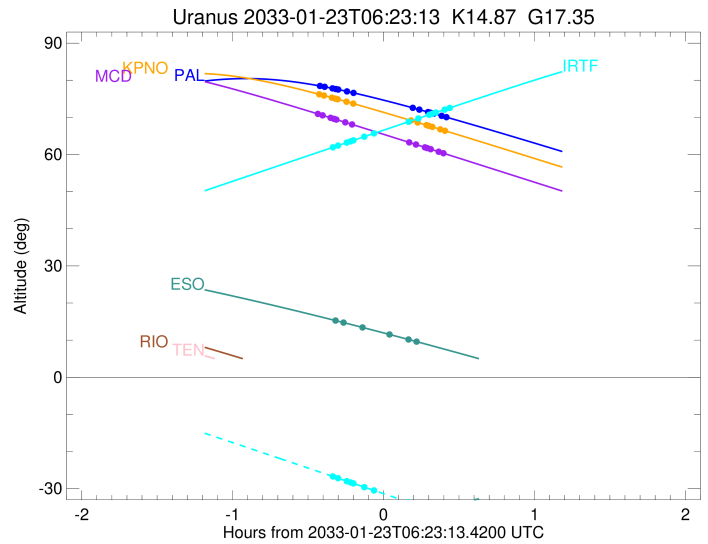
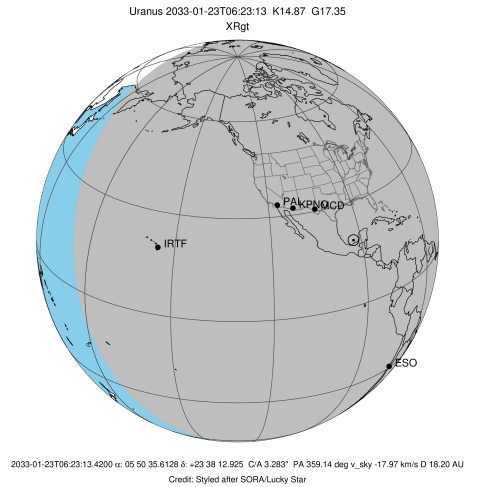
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-23T05:57:46.803		70.81	-70.63	50769.52	-10.01		
lambda	I	2033-01-23T05:59:02.742		70.55	-70.86	50026.71	-9.59		
delta	I	2033-01-23T06:02:12.725		69.89	-71.44	48300.35	-8.57		
gamma	I	2033-01-23T06:03:34.048		69.61	-71.68	47622.81	-8.09		
eta	I	2033-01-23T06:04:30.410		69.41	-71.85	47176.12	-7.76		
beta	I	2033-01-23T06:08:07.272		68.65	-72.49	45641.90	-6.36		
alpha	I	2033-01-23T06:10:52.860		68.07	-72.96	44684.93	-5.22		

No planet occultations

alpha	E	2033-01-23T06:33:18.380		63.30	-76.38	44692.73	5.21		
beta	E	2033-01-23T06:36:02.498		62.72	-76.73	45642.70	6.35		
eta	E	2033-01-23T06:39:39.636		61.94	-77.15	47176.12	7.74		
gamma	E	2033-01-23T06:40:35.872		61.74	-77.25	47620.96	8.08		
delta	E	2033-01-23T06:41:57.583		61.45	-77.40	48300.35	8.55		
lambda	E	2033-01-23T06:45:07.982		60.76	-77.72	50026.71	9.57		
epsilon	E	2033-01-23T06:46:58.970		60.37	-77.89	51119.20	9.99		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-01-23T06:25:21.260
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      : 3427508421902219776
2Mass ID (if available) : 05503560+2338128
ICRS Star Coord at Epoch: 05h 50m 35.61280s +23:38:12.92461s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 14.871
G magnitude          : 17.351
RP magnitude         : 16.535
BP magnitude         : 18.037
DUPflag             : 0
Distance (au)       : 18.201
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -17.97
Sun-Target sep (deg) : 144.75
Sun-Moon sep (deg)  : 120.54
B (ring opening deg) : 77.10
PA of pole (deg)    : 50.88
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.305
C/A sky separation (km) : 43623.7
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
    
```



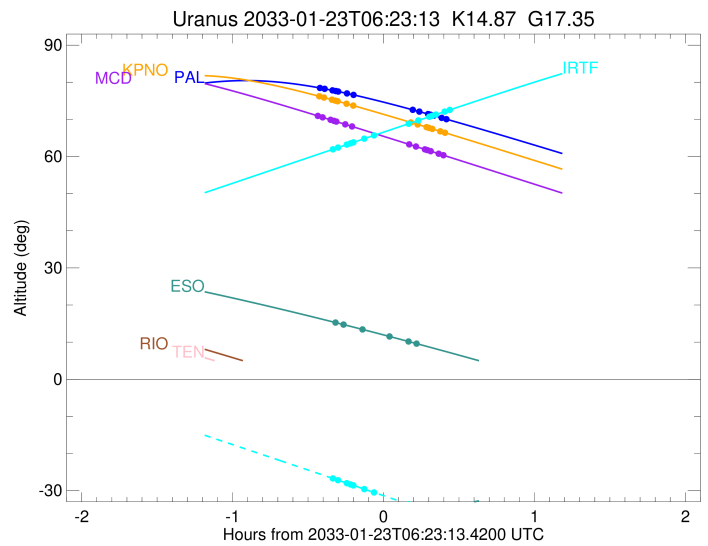
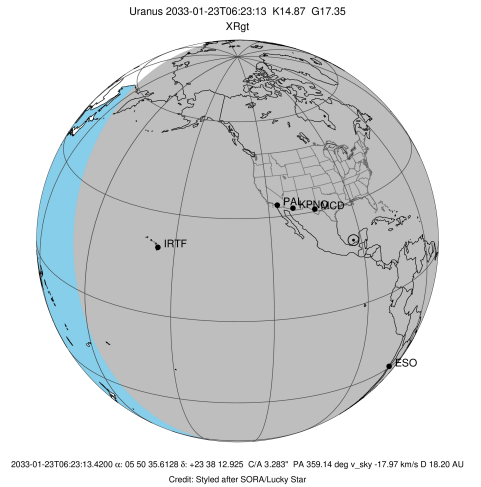
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-23T06:03:47.405		62.10	-26.88	50775.01	-9.31		
lambda	I	2033-01-23T06:05:10.168		62.42	-27.19	50026.71	-8.82		
delta	I	2033-01-23T06:08:39.755		63.22	-28.00	48300.35	-7.63		
gamma	I	2033-01-23T06:10:11.951		63.57	-28.35	47622.60	-7.07		
eta	I	2033-01-23T06:11:17.016		63.82	-28.60	47176.12	-6.65		
beta	I	2033-01-23T06:15:42.866		64.84	-29.62	45641.51	-4.85		
alpha	I	2033-01-23T06:19:43.692		65.76	-30.55	44685.65	-3.09		

No planet occultations

alpha	E	2033-01-23T06:32:58.333		68.78	-33.61	44690.18	3.09		
beta	E	2033-01-23T06:36:57.352		69.69	-34.53	45642.04	4.86		
eta	E	2033-01-23T06:41:22.927		70.70	-35.55	47176.12	6.66		
gamma	E	2033-01-23T06:42:27.694		70.95	-35.80	47620.96	7.07		
delta	E	2033-01-23T06:44:00.023		71.30	-36.16	48300.35	7.64		
lambda	E	2033-01-23T06:47:29.350		72.09	-36.97	50026.71	8.83		
epsilon	E	2033-01-23T06:49:26.529		72.53	-37.42	51098.20	9.32		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-23T06:19:10.720
 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 : 3427508421902219776
 2Mass ID (if available) : 05503560+2338128
 ICRS Star Coord at Epoch: 05h 50m 35.61280s +23:38:12.92461s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.871
 G magnitude : 17.351
 RP magnitude : 16.535
 BP magnitude : 18.037
 DUPflag : 0
 Distance (au) : 18.201
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.97
 Sun-Target sep (deg) : 144.75
 Sun-Moon sep (deg) : 120.50
 B (ring opening deg) : 77.10
 PA of pole (deg) : 50.88
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.597
 C/A sky separation (km) : 47480.5
 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



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	2033-01-23T06:05:05.074		15.12	-38.66	50812.05	-6.20		
lambda	I	2033-01-23T06:07:22.763		14.72	-38.48	50026.71	-5.28		
delta	I	2033-01-23T06:14:59.408		13.41	-37.82	48300.35	-2.23		

No planet occultations

delta	E	2033-01-23T06:25:30.859		11.55	-36.83	48300.35	2.23		
lambda	E	2033-01-23T06:33:08.265		10.18	-36.05	50026.71	5.26		
epsilon	E	2033-01-23T06:36:01.534		9.66	-35.74	51030.82	6.18		