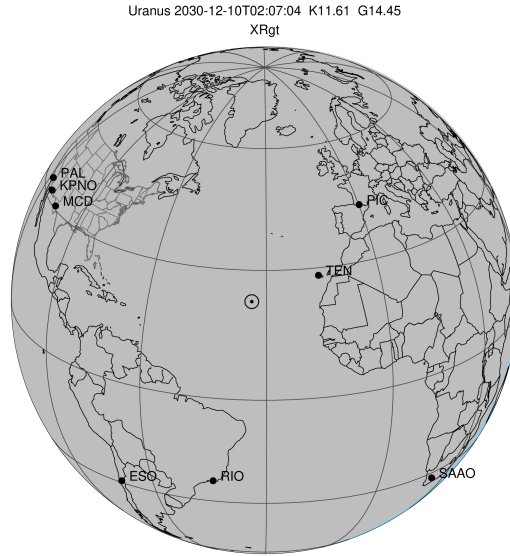


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-10T02:07:04.500
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415599615757108608
 2Mass ID (if available) : 05184680+2311332

ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s

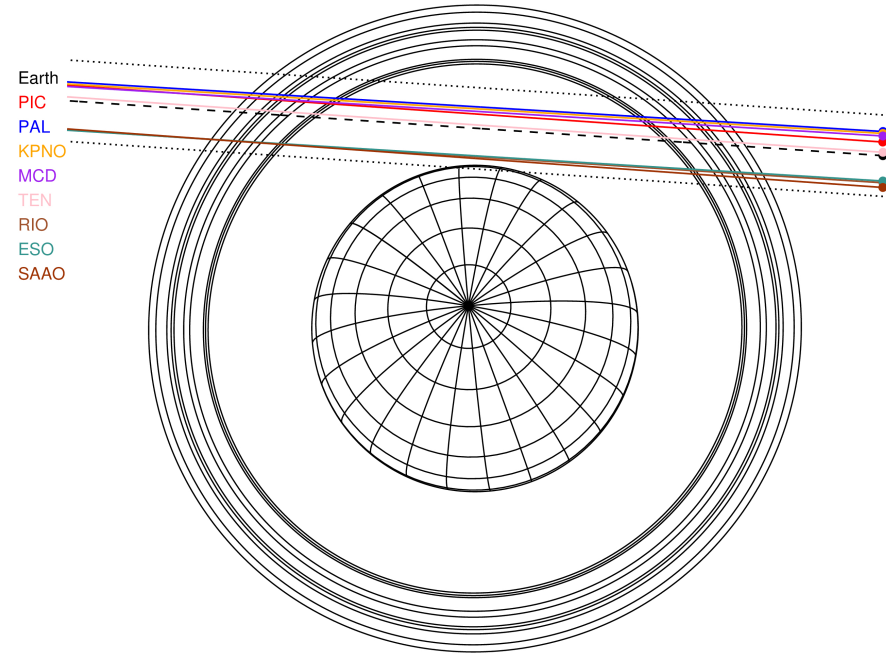
RUWE (>1.4 is poor) : 1.61
 K magnitude : 11.607
 G magnitude : 14.448
 RP magnitude : 13.530
 BP magnitude : 15.178
 DUPflag : 0
 Distance (au) : 18.172
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 177.08
 Sun-Moon sep (deg) : 1.84
 B (ring opening deg) : 81.67
 PA of pole (deg) : 16.09

#	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



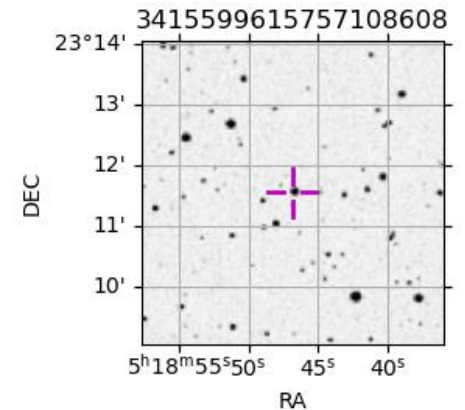
2030-12-10T02:07:04.5000 ra: 05 18 46.8218 s: +23 11 33.131 C/A 2.381" PA 176.14 deg v_sky -23.40 km/s D 18.17 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2030-12-10T02:07:04 K11.61 G14.45 XRgt

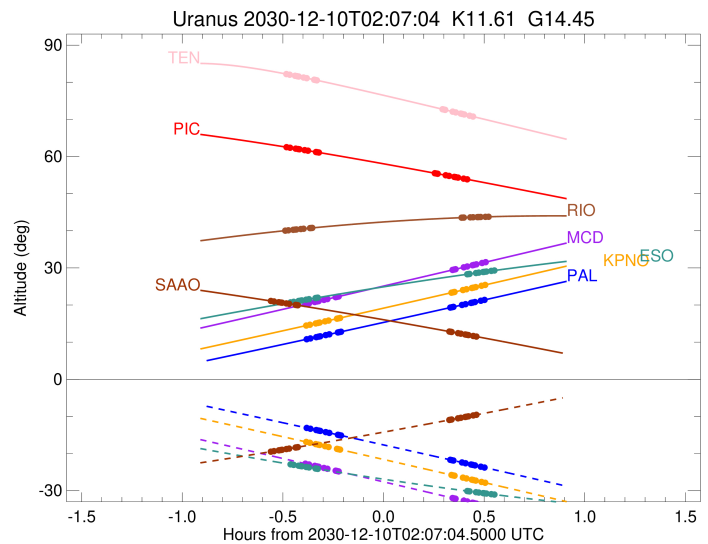
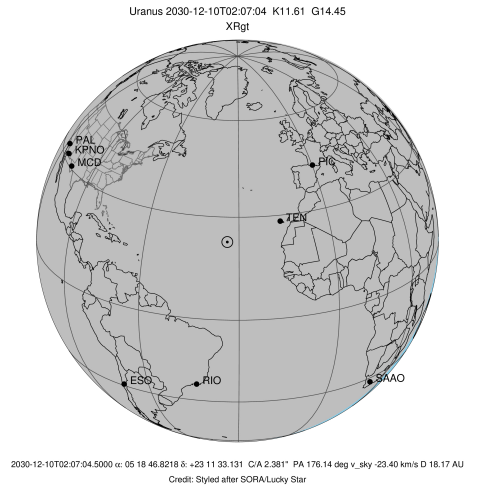


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 10 01:38 - DEC 10 02:32	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	DEC 10 01:44 - DEC 10 02:37	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 10 01:44 - DEC 10 02:37	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 10 01:44 - DEC 10 02:37	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 10 01:38 - DEC 10 02:34	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	DEC 10 01:38 - DEC 10 02:38	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	DEC 10 01:39 - DEC 10 02:40	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++		+++++	DEC 10 01:33 - DEC 10 02:35	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-10T02:05:14.850
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3415599615757108608
 2Mass ID (if available) : 05184680+2311332
 ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
 RUWE (>1.4 is poor) : 1.61
 K magnitude : 11.607
 G magnitude : 14.448
 RP magnitude : 13.530
 BP magnitude : 15.178
 DUPflag : 0
 Distance (au) : 18.172
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 177.08
 Sun-Moon sep (deg) : 2.35
 B (ring opening deg) : 81.67
 PA of pole (deg) : 16.09
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.544
 C/A sky separation (km) : 33523.2
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

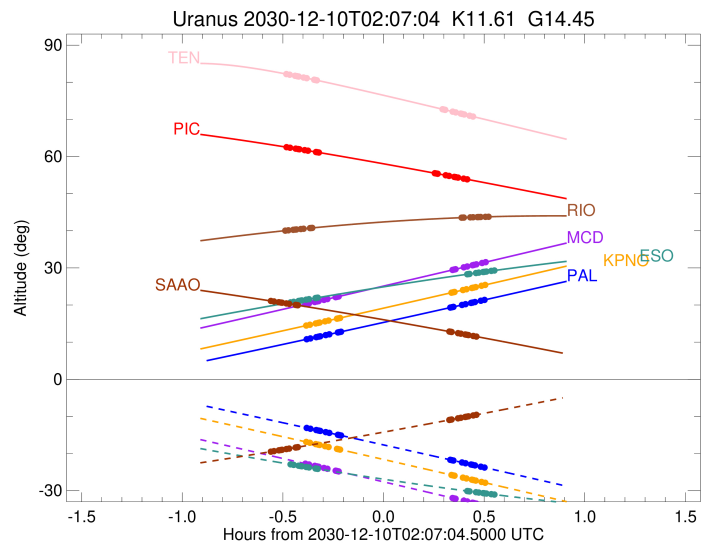
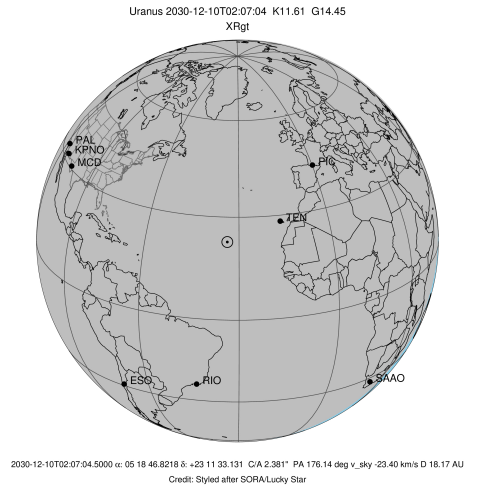


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-10T01:38:23.457		62.49	-60.34	50918.50	-17.84		
lambda	I	2030-12-10T01:39:14.087		62.37	-60.22	50026.71	-17.48		
delta	I	2030-12-10T01:40:54.361		62.12	-59.96	48300.35	-16.94		
gamma	I	2030-12-10T01:41:34.507		62.02	-59.85	47625.06	-16.70		
eta	I	2030-12-10T01:42:01.517		61.96	-59.78	47176.12	-16.54		
beta	I	2030-12-10T01:43:34.793		61.72	-59.54	45661.46	-15.93		
alpha	I	2030-12-10T01:44:36.926		61.57	-59.38	44685.07	-15.50		
4	I	2030-12-10T01:47:00.655		61.21	-59.00	42534.12	-14.39		
5	I	2030-12-10T01:47:27.519		61.14	-58.93	42156.07	-14.14		
6	I	2030-12-10T01:47:51.540		61.08	-58.87	41813.94	-13.92		

No planet occultations

6	E	2030-12-10T02:22:17.469		55.52	-53.16	41796.19	13.90		
5	E	2030-12-10T02:22:46.339		55.44	-53.08	42198.48	14.12		
4	E	2030-12-10T02:23:13.629		55.36	-53.00	42586.38	14.37		
alpha	E	2030-12-10T02:25:36.319		54.96	-52.59	44718.99	15.48		
beta	E	2030-12-10T02:26:34.981		54.79	-52.42	45641.19	15.91		
eta	E	2030-12-10T02:28:09.627		54.52	-52.15	47176.12	16.52		
gamma	E	2030-12-10T02:28:37.057		54.44	-52.07	47631.42	16.68		
delta	E	2030-12-10T02:29:16.877		54.33	-51.95	48300.35	16.91		
lambda	E	2030-12-10T02:30:57.300		54.04	-51.66	50026.71	17.46		
epsilon	E	2030-12-10T02:32:21.253		53.80	-51.42	51509.98	17.81		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-10T02:10:52.750
 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 : 3415599615757108608
 2Mass ID (if available) : 05184680+2311332
 ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
 RUWE (>1.4 is poor) : 1.61
 K magnitude : 11.607
 G magnitude : 14.448
 RP magnitude : 13.530
 BP magnitude : 15.178
 DUPflag : 0
 Distance (au) : 18.172
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 177.08
 Sun-Moon sep (deg) : 1.83
 B (ring opening deg) : 81.67
 PA of pole (deg) : 16.09
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.631
 C/A sky separation (km) : 34672.7
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

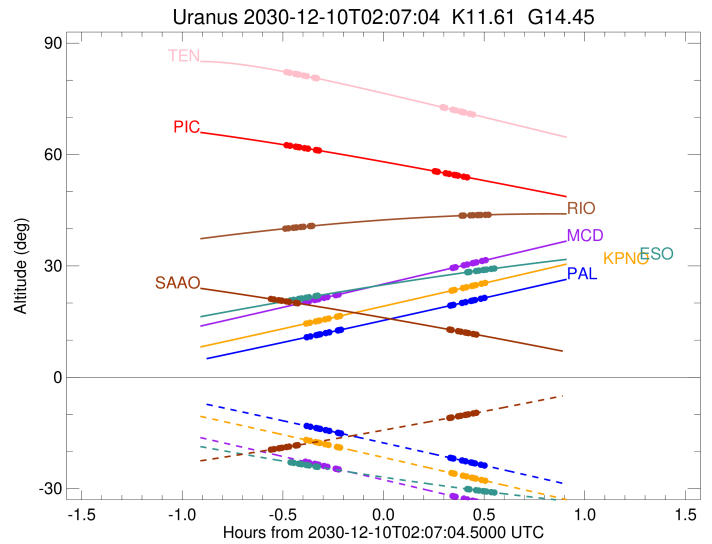
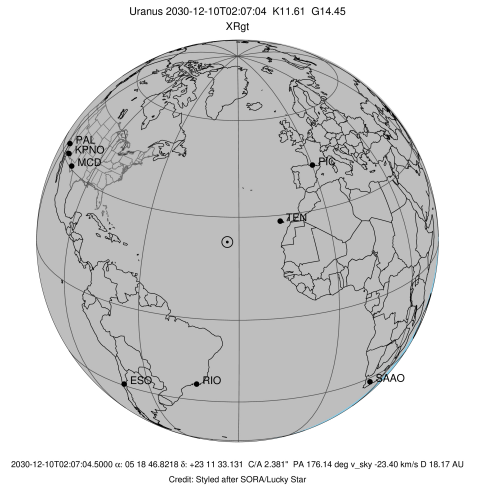


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-10T01:44:24.128		10.82	-13.16	50931.64	-17.10		
lambda	I	2030-12-10T01:45:17.818		11.00	-13.34	50026.71	-16.71		
delta	I	2030-12-10T01:47:02.940		11.34	-13.68	48300.35	-16.12		
gamma	I	2030-12-10T01:47:45.148		11.48	-13.82	47625.29	-15.87		
eta	I	2030-12-10T01:48:13.621		11.58	-13.92	47176.12	-15.69		
beta	I	2030-12-10T01:49:52.311		11.90	-14.24	45660.51	-15.02		
alpha	I	2030-12-10T01:50:58.276		12.12	-14.46	44685.38	-14.55		
4	I	2030-12-10T01:53:32.392		12.62	-14.97	42535.60	-13.31		
5	I	2030-12-10T01:54:01.685		12.72	-15.07	42155.41	-13.03		
6	I	2030-12-10T01:54:27.885		12.81	-15.16	41811.94	-12.78		

No planet occultations

6	E	2030-12-10T02:26:54.711		19.30	-21.69	41795.78	12.81		
5	E	2030-12-10T02:27:25.774		19.40	-21.79	42195.73	13.06		
4	E	2030-12-10T02:27:55.334		19.50	-21.89	42584.76	13.34		
alpha	E	2030-12-10T02:30:27.831		20.01	-22.41	44717.91	14.59		
beta	E	2030-12-10T02:31:30.005		20.22	-22.62	45641.27	15.06		
eta	E	2030-12-10T02:33:09.629		20.56	-22.96	47176.12	15.74		
gamma	E	2030-12-10T02:33:38.389		20.66	-23.05	47631.39	15.92		
delta	E	2030-12-10T02:34:20.069		20.80	-23.20	48300.35	16.18		
lambda	E	2030-12-10T02:36:04.810		21.15	-23.55	50026.71	16.78		
epsilon	E	2030-12-10T02:37:31.789		21.45	-23.85	51505.87	17.17		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-10T02:10:54.590
 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 : 3415599615757108608
 2Mass ID (if available) : 05184680+2311332
 ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
 RUWE (>1.4 is poor) : 1.61
 K magnitude : 11.607
 G magnitude : 14.448
 RP magnitude : 13.530
 BP magnitude : 15.178
 DUPflag : 0
 Distance (au) : 18.172
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 177.08
 Sun-Moon sep (deg) : 1.79
 B (ring opening deg) : 81.67
 PA of pole (deg) : 16.09
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.607
 C/A sky separation (km) : 34357.8
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

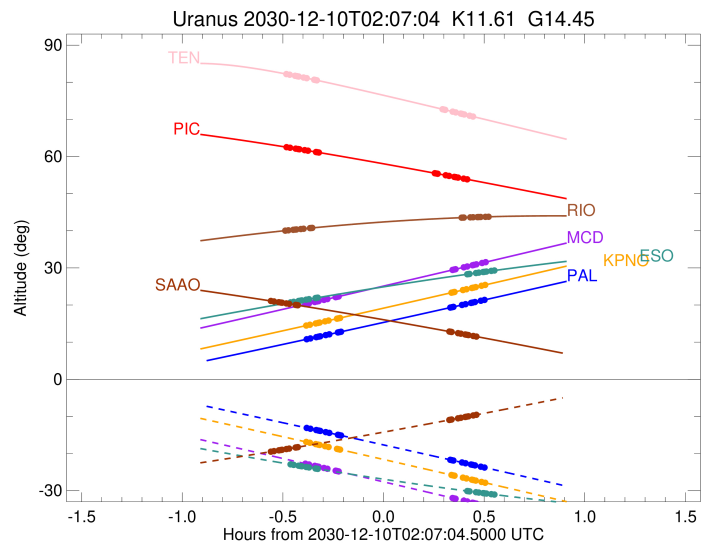
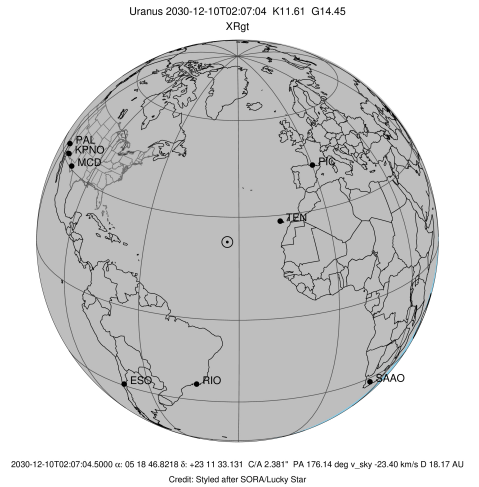


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-10T01:44:16.020		14.51	-16.93	50928.80	-17.26		
lambda	I	2030-12-10T01:45:09.017		14.69	-17.11	50026.71	-16.88		
delta	I	2030-12-10T01:46:53.011		15.04	-17.46	48300.35	-16.31		
gamma	I	2030-12-10T01:47:34.729		15.18	-17.60	47625.24	-16.06		
eta	I	2030-12-10T01:48:02.851		15.28	-17.70	47176.12	-15.88		
beta	I	2030-12-10T01:49:40.216		15.61	-18.03	45660.73	-15.23		
alpha	I	2030-12-10T01:50:45.219		15.83	-18.25	44685.30	-14.78		
4	I	2030-12-10T01:53:16.637		16.34	-18.77	42535.25	-13.58		
5	I	2030-12-10T01:53:45.286		16.43	-18.86	42155.54	-13.31		
6	I	2030-12-10T01:54:10.899		16.52	-18.95	41812.41	-13.07		

No planet occultations

6	E	2030-12-10T02:27:15.566	23.31	-25.77	41795.91	13.10
5	E	2030-12-10T02:27:46.029	23.41	-25.88	42196.67	13.34
4	E	2030-12-10T02:28:14.945	23.51	-25.98	42585.33	13.61
alpha	E	2030-12-10T02:30:44.744	24.03	-26.50	44718.30	14.82
beta	E	2030-12-10T02:31:45.962	24.24	-26.71	45641.24	15.28
eta	E	2030-12-10T02:33:24.258	24.58	-27.05	47176.12	15.94
gamma	E	2030-12-10T02:33:52.667	24.68	-27.15	47631.40	16.11
delta	E	2030-12-10T02:34:33.856	24.82	-27.29	48300.35	16.36
lambda	E	2030-12-10T02:36:17.469	25.18	-27.65	50026.71	16.95
epsilon	E	2030-12-10T02:37:43.699	25.48	-27.95	51507.51	17.33

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-10T02:10:51.430
 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 : 3415599615757108608
 2Mass ID (if available) : 05184680+2311332
 ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
 RUWE (>1.4 is poor) : 1.61
 K magnitude : 11.607
 G magnitude : 14.448
 RP magnitude : 13.530
 BP magnitude : 15.178
 DUPflag : 0
 Distance (au) : 18.172
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 177.08
 Sun-Moon sep (deg) : 1.75
 B (ring opening deg) : 81.67
 PA of pole (deg) : 16.09
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.576
 C/A sky separation (km) : 33957.2
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



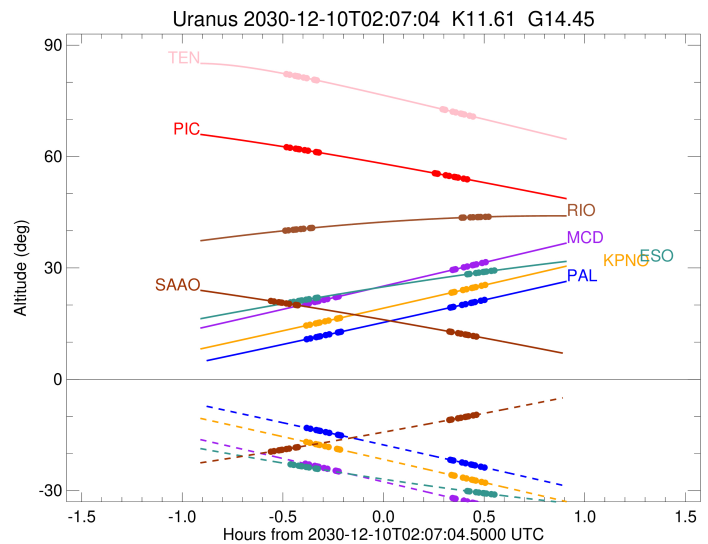
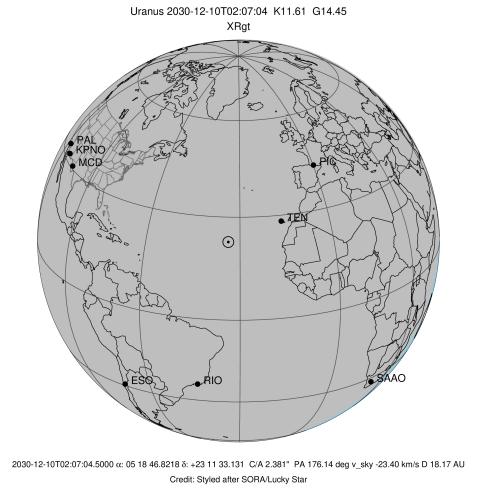
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-10T01:44:00.993		20.28	-22.79	50925.19	-17.47		
lambda	I	2030-12-10T01:44:53.121		20.46	-22.97	50026.71	-17.10		
delta	I	2030-12-10T01:46:35.703		20.82	-23.33	48300.35	-16.54		
gamma	I	2030-12-10T01:47:16.810		20.96	-23.47	47625.17	-16.30		
eta	I	2030-12-10T01:47:44.496		21.06	-23.57	47176.12	-16.13		
beta	I	2030-12-10T01:49:20.225		21.39	-23.90	45661.00	-15.51		
alpha	I	2030-12-10T01:50:24.048		21.61	-24.12	44685.21	-15.07		
4	I	2030-12-10T01:52:52.199		22.13	-24.64	42534.81	-13.92		
5	I	2030-12-10T01:53:20.075		22.22	-24.74	42155.73	-13.66		
6	I	2030-12-10T01:53:44.987		22.31	-24.83	41813.00	-13.43		

No planet occultations

6	E	2030-12-10T02:27:35.396		29.44	-31.97	41796.09	13.46		
5	E	2030-12-10T02:28:05.143		29.54	-32.08	42197.85	13.69		
4	E	2030-12-10T02:28:33.291		29.64	-32.18	42586.03	13.95		
alpha	E	2030-12-10T02:30:59.830		30.16	-32.70	44718.78	15.11		
beta	E	2030-12-10T02:31:59.881		30.37	-32.91	45641.21	15.56		
eta	E	2030-12-10T02:33:36.546		30.71	-33.25	47176.12	16.19		
gamma	E	2030-12-10T02:34:04.520		30.81	-33.35	47631.42	16.36		
delta	E	2030-12-10T02:34:45.102		30.95	-33.50	48300.35	16.60		
lambda	E	2030-12-10T02:36:27.312		31.32	-33.86	50026.71	17.17		
epsilon	E	2030-12-10T02:37:52.601		31.62	-34.16	51509.52	17.54		


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-10T02:06:05.240
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : TEN
Location            : Teide Obs./Tenerife
Latitude (deg)      : 28.30050
E. Longitude (deg)  : 343.48909
Altitude (km)       : 2.395
Gaia source ID      : 3415599615757108608
2Mass ID (if available) : 05184680+2311332
ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
RUWE (>1.4 is poor) : 1.61
K magnitude          : 11.607
G magnitude          : 14.448
RP magnitude         : 13.530
BP magnitude         : 15.178
DUPflag             : 0
Distance (au)       : 18.172
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.40
Sun-Target sep (deg) : 177.08
Sun-Moon sep (deg)  : 2.07
B (ring opening deg) : 81.67
PA of pole (deg)    : 16.09
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.414
C/A sky separation (km) : 31822.0
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

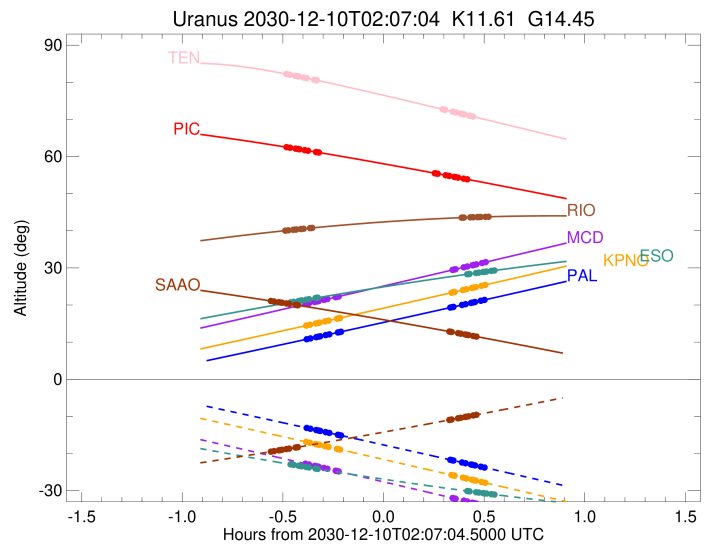
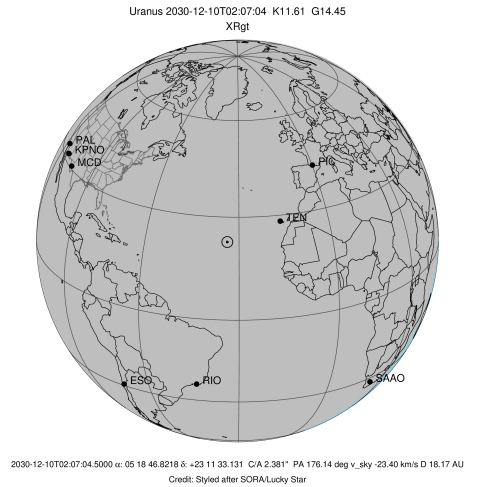


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-10T01:38:20.550		82.18	-79.62	50904.62	-18.58		
lambda	I	2030-12-10T01:39:08.311		82.03	-79.46	50026.71	-18.27		
delta	I	2030-12-10T01:40:44.015		81.75	-79.15	48300.35	-17.80		
gamma	I	2030-12-10T01:41:22.188		81.63	-79.02	47624.81	-17.60		
eta	I	2030-12-10T01:41:47.793		81.55	-78.94	47176.12	-17.45		
beta	I	2030-12-10T01:43:15.814		81.28	-78.65	45662.52	-16.93		
alpha	I	2030-12-10T01:44:14.195		81.10	-78.45	44684.81	-16.56		
4	I	2030-12-10T01:46:27.739		80.68	-78.00	42532.58	-15.63		
5	I	2030-12-10T01:46:52.223		80.60	-77.92	42157.13	-15.42		
6	I	2030-12-10T01:47:14.145		80.53	-77.85	41816.31	-15.23		

No planet occultations

6	E	2030-12-10T02:24:36.725		72.76	-69.93	41797.03	15.23		
5	E	2030-12-10T02:25:03.440		72.66	-69.83	42203.33	15.41		
4	E	2030-12-10T02:25:28.336		72.57	-69.74	42589.14	15.62		
alpha	E	2030-12-10T02:27:40.756		72.09	-69.26	44720.97	16.55		
beta	E	2030-12-10T02:28:35.646		71.90	-69.06	45641.09	16.92		
eta	E	2030-12-10T02:30:04.972		71.57	-68.74	47176.12	17.44		
gamma	E	2030-12-10T02:30:30.975		71.48	-68.65	47631.48	17.58		
delta	E	2030-12-10T02:31:08.797		71.34	-68.51	48300.35	17.78		
lambda	E	2030-12-10T02:32:44.577		70.99	-68.16	50026.71	18.26		
epsilon	E	2030-12-10T02:34:05.450		70.70	-67.87	51518.04	18.57		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-10T02:08:14.060
 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 : 3415599615757108608
 2Mass ID (if available) : 05184680+2311332
 ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
 RUWE (>1.4 is poor) : 1.61
 K magnitude : 11.607
 G magnitude : 14.448
 RP magnitude : 13.530
 BP magnitude : 15.178
 DUPflag : 0
 Distance (au) : 18.172
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 177.08
 Sun-Moon sep (deg) : 1.32
 B (ring opening deg) : 81.67
 PA of pole (deg) : 16.09
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.038
 C/A sky separation (km) : 26860.7
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

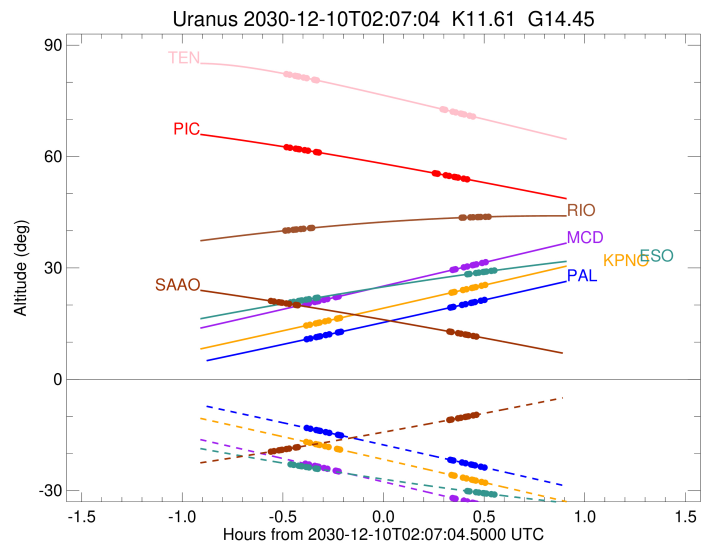
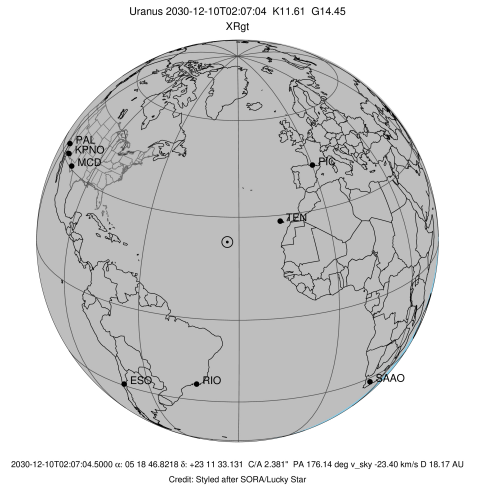


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-10T01:38:01.925		40.06	-41.49	50868.52	-20.23		
lambda	I	2030-12-10T01:38:43.826		40.13	-41.55	50026.71	-20.02		
delta	I	2030-12-10T01:40:10.700		40.26	-41.67	48300.35	-19.72		
gamma	I	2030-12-10T01:40:45.108		40.32	-41.71	47624.15	-19.59		
eta	I	2030-12-10T01:41:08.036		40.35	-41.74	47176.12	-19.50		
beta	I	2030-12-10T01:42:26.177		40.47	-41.84	45665.33	-19.16		
alpha	I	2030-12-10T01:43:17.656		40.55	-41.91	44684.64	-18.94		
4	I	2030-12-10T01:45:13.126		40.72	-42.05	42529.29	-18.36		
5	I	2030-12-10T01:45:33.408		40.75	-42.08	42161.31	-18.23		
6	I	2030-12-10T01:45:51.830		40.78	-42.10	41822.77	-18.12		

No planet occultations

6	E	2030-12-10T02:30:18.711	43.53	-44.20	41800.01	18.14
5	E	2030-12-10T02:30:41.823	43.54	-44.20	42216.30	18.25
4	E	2030-12-10T02:31:02.501	43.56	-44.21	42595.84	18.38
alpha	E	2030-12-10T02:32:56.621	43.62	-44.24	44726.10	18.96
beta	E	2030-12-10T02:33:44.533	43.64	-44.26	45641.13	19.18
eta	E	2030-12-10T02:35:03.832	43.68	-44.28	47176.12	19.52
gamma	E	2030-12-10T02:35:27.113	43.70	-44.28	47631.57	19.61
delta	E	2030-12-10T02:36:01.105	43.71	-44.29	48300.35	19.74
lambda	E	2030-12-10T02:37:27.880	43.75	-44.30	50026.71	20.05
epsilon	E	2030-12-10T02:38:42.725	43.78	-44.32	51536.13	20.26

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-10T02:09:54.160
 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 : 3415599615757108608
 2Mass ID (if available) : 05184680+2311332
 ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
 RUWE (>1.4 is poor) : 1.61
 K magnitude : 11.607
 G magnitude : 14.448
 RP magnitude : 13.530
 BP magnitude : 15.178
 DUPflag : 0
 Distance (au) : 18.172
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 177.08
 Sun-Moon sep (deg) : 1.04
 B (ring opening deg) : 81.67
 PA of pole (deg) : 16.09
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.048
 C/A sky separation (km) : 26993.6
 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



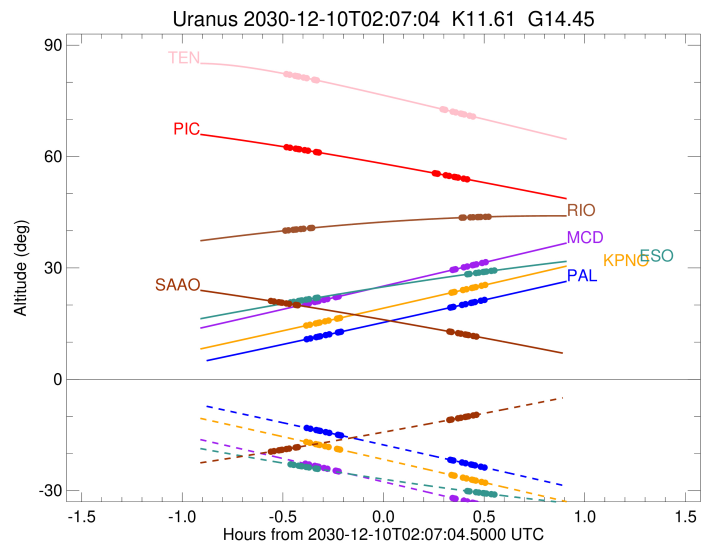
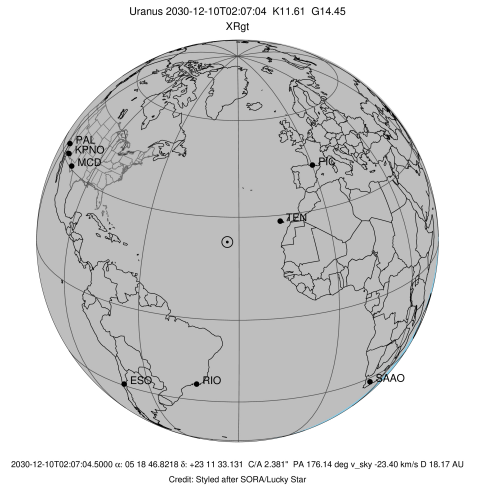
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-10T01:39:36.196		20.75	-22.96	50870.11	-20.08		
lambda	I	2030-12-10T01:40:18.496		20.86	-23.07	50026.71	-19.87		
delta	I	2030-12-10T01:41:46.043		21.09	-23.29	48300.35	-19.56		
gamma	I	2030-12-10T01:42:20.722		21.18	-23.38	47624.18	-19.43		
eta	I	2030-12-10T01:42:43.833		21.24	-23.43	47176.12	-19.34		
beta	I	2030-12-10T01:44:02.613		21.45	-23.63	45665.21	-19.01		
alpha	I	2030-12-10T01:44:54.512		21.58	-23.76	44684.63	-18.78		
4	I	2030-12-10T01:46:50.967		21.88	-24.05	42529.40	-18.20		
5	I	2030-12-10T01:47:11.450		21.94	-24.10	42161.11	-18.07		
6	I	2030-12-10T01:47:30.038		21.98	-24.14	41822.50	-17.96		

No planet occultations

6	E	2030-12-10T02:31:59.737		28.28	-30.11	41799.98	18.00		
5	E	2030-12-10T02:32:23.019		28.33	-30.15	42216.18	18.11		
4	E	2030-12-10T02:32:43.855		28.38	-30.20	42595.78	18.24		
alpha	E	2030-12-10T02:34:38.789		28.62	-30.42	44726.06	18.83		
beta	E	2030-12-10T02:35:27.026		28.72	-30.52	45641.13	19.06		
eta	E	2030-12-10T02:36:46.839		28.89	-30.67	47176.12	19.39		
gamma	E	2030-12-10T02:37:10.266		28.94	-30.72	47631.57	19.49		
delta	E	2030-12-10T02:37:44.469		29.01	-30.78	48300.35	19.62		
lambda	E	2030-12-10T02:39:11.764		29.19	-30.95	50026.71	19.93		
epsilon	E	2030-12-10T02:40:27.037		29.34	-31.09	51536.07	20.14		


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-10T02:04:14.120
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
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      : 3415599615757108608
2Mass ID (if available) : 05184680+2311332
ICRS Star Coord at Epoch: 05h 18m 46.82177s +23:11:33.13075s
RUWE (>1.4 is poor) : 1.61
K magnitude          : 11.607
G magnitude          : 14.448
RP magnitude         : 13.530
BP magnitude         : 15.178
DUPflag             : 0
Distance (au)       : 18.172
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.40
Sun-Target sep (deg) : 177.08
Sun-Moon sep (deg)  : 2.02
B (ring opening deg) : 81.67
PA of pole (deg)    : 16.09
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.016
C/A sky separation (km) : 26570.0
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.bsp
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrfr93_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	2030-12-10T01:33:44.298		21.06	-19.46	50864.50	-20.23		
lambda	I	2030-12-10T01:34:26.001		20.96	-19.36	50026.71	-20.02		
delta	I	2030-12-10T01:35:52.856		20.75	-19.14	48300.35	-19.72		
gamma	I	2030-12-10T01:36:27.251		20.67	-19.06	47624.08	-19.60		
eta	I	2030-12-10T01:36:50.160		20.62	-19.00	47176.12	-19.51		
beta	I	2030-12-10T01:38:08.215		20.43	-18.80	45665.63	-19.19		
alpha	I	2030-12-10T01:38:59.640		20.30	-18.67	44684.66	-18.96		
4	I	2030-12-10T01:40:54.907		20.02	-18.38	42529.02	-18.40		
5	I	2030-12-10T01:41:15.086		19.98	-18.33	42161.83	-18.28		
6	I	2030-12-10T01:41:33.458		19.93	-18.28	41823.42	-18.17		

No planet occultations

6	E	2030-12-10T02:26:39.243		12.86	-10.97	41800.06	18.13		
5	E	2030-12-10T02:27:02.377		12.80	-10.91	42216.47	18.23		
4	E	2030-12-10T02:27:23.068		12.74	-10.85	42595.91	18.36		
alpha	E	2030-12-10T02:29:17.379		12.42	-10.52	44726.15	18.91		
beta	E	2030-12-10T02:30:05.407		12.29	-10.38	45641.13	19.13		
eta	E	2030-12-10T02:31:24.948		12.07	-10.15	47176.12	19.45		
gamma	E	2030-12-10T02:31:48.309		12.00	-10.09	47631.57	19.54		
delta	E	2030-12-10T02:32:22.426		11.91	-9.99	48300.35	19.66		
lambda	E	2030-12-10T02:33:49.554		11.66	-9.74	50026.71	19.96		
epsilon	E	2030-12-10T02:35:04.742		11.45	-9.52	51536.10	20.16		