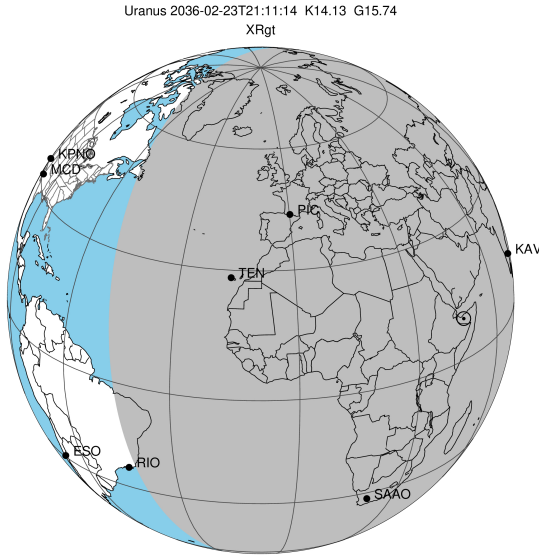


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-02-23T21:11:14.700  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3379616512894974208  
 2Mass ID (if available) : 06464842+2323378

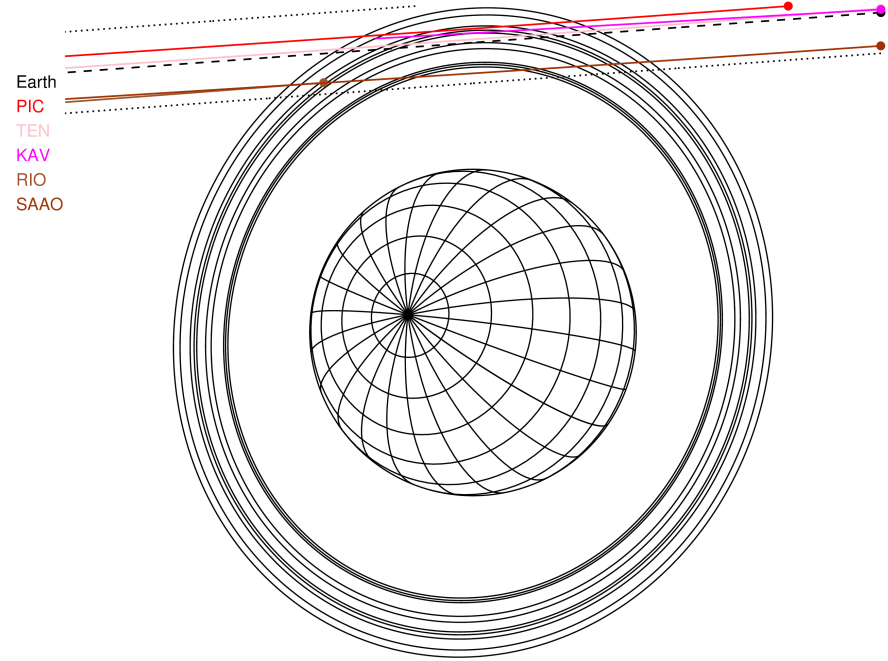
ICRS Star Coord at Epoch: 06h 46m 48.42715s +23:23:37.51188s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.128  
 G magnitude : 15.737  
 RP magnitude : 15.194  
 BP magnitude : 16.108  
 DUPflag : 0  
 Distance (au) : 18.213  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.26  
 Sun-Target sep (deg) : 126.40  
 Sun-Moon sep (deg) : 162.65  
 B (ring opening deg) : 65.60  
 PA of pole (deg) : 74.74

#	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



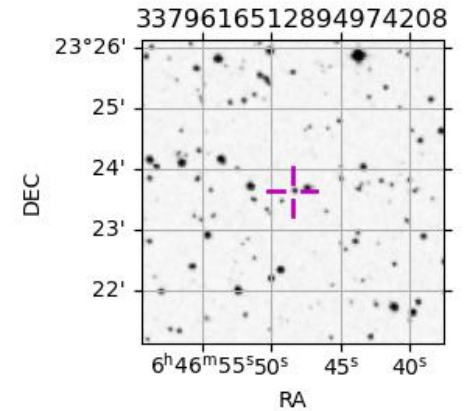
2036-02-23T21:11:14.7000 ra: 06 46 48.4272 s: +23 23 37.512 C/A 3.434° PA 184.21 deg v\_sky -11.26 km/s D 18.21 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2036-02-23T21:11:14 K14.13 G15.74 XRgt

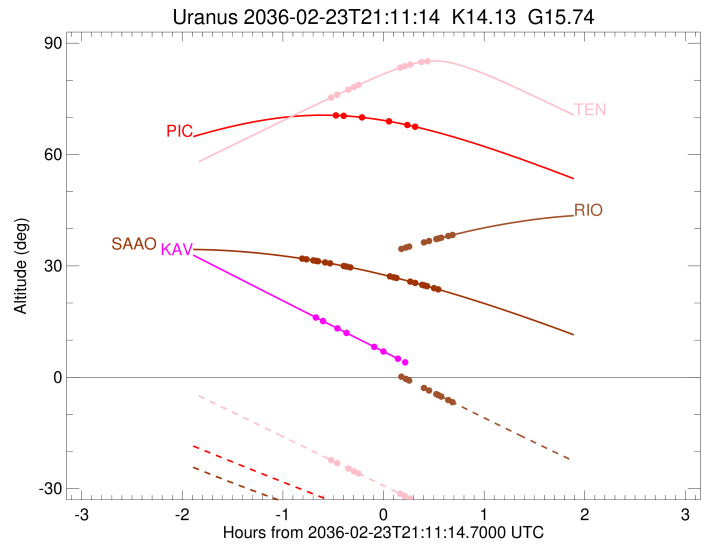
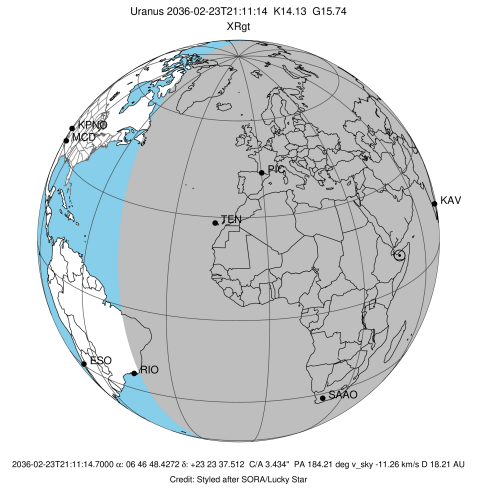


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++		+++	FEB 23 20:44 - FEB 23 21:29	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	FEB 23 20:41 - FEB 23 21:36	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	++++		+++	FEB 23 20:32 - FEB 23 21:19	PnnRie
RIO	Rio de Janeiro	-22.9	316.8			+++	FEB 23 21:45 - FEB 23 21:52	PnnRne
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	+++++		+++++	FEB 23 20:23 - FEB 23 21:43	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-02-23T21:10:09.050  
 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 : 3379616512894974208  
 2Mass ID (if available) : 06464842+2323378  
 ICRS Star Coord at Epoch: 06h 46m 48.42715s +23:23:37.51188s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.128  
 G magnitude : 15.737  
 RP magnitude : 15.194  
 BP magnitude : 16.108  
 DUPflag : 0  
 Distance (au) : 18.213  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.26  
 Sun-Target sep (deg) : 126.40  
 Sun-Moon sep (deg) : 162.87  
 B (ring opening deg) : 65.60  
 PA of pole (deg) : 74.74  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.593  
 C/A sky separation (km) : 47467.8  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



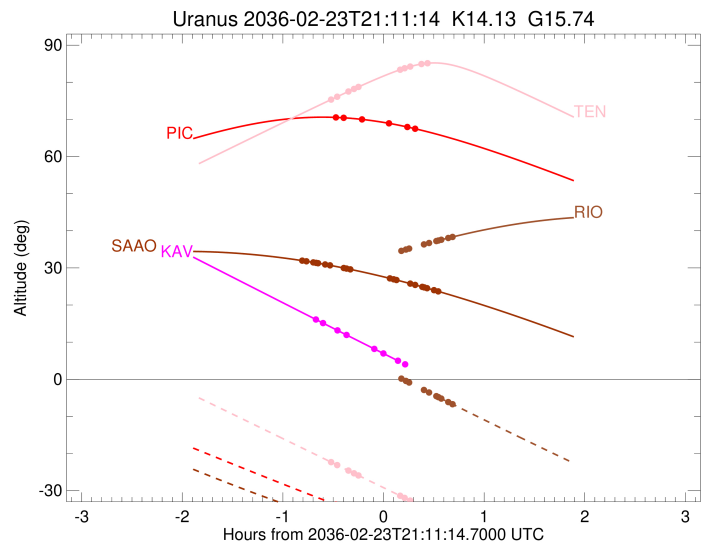
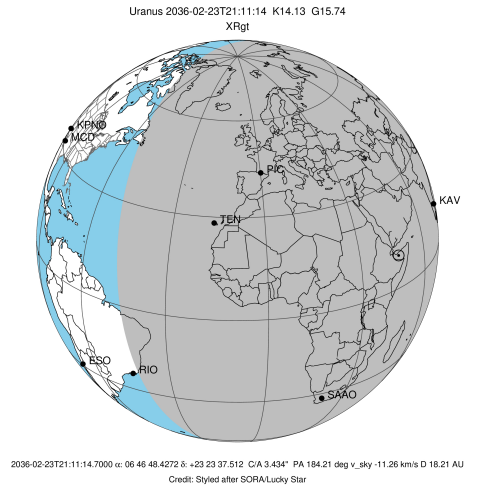
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-02-23T20:44:27.953		70.51	-34.05	50750.92	-4.18		
lambda	I	2036-02-23T20:47:34.008		70.43	-34.58	50026.71	-3.62		
delta	I	2036-02-23T20:58:35.085		70.00	-36.46	48300.35	-1.56		

No planet occultations

delta	E	2036-02-23T21:14:21.256		68.96	-39.07	48300.35	1.56		
lambda	E	2036-02-23T21:25:23.143		67.97	-40.85	50026.71	3.62		
epsilon	E	2036-02-23T21:29:01.611		67.60	-41.43	50885.39	4.17		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-02-23T21:12:18.030  
 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 : 3379616512894974208  
 2Mass ID (if available) : 06464842+2323378  
 ICRS Star Coord at Epoch: 06h 46m 48.42715s +23:23:37.51188s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.128  
 G magnitude : 15.737  
 RP magnitude : 15.194  
 BP magnitude : 16.108  
 DUPflag : 0  
 Distance (au) : 18.213  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.26  
 Sun-Target sep (deg) : 126.40  
 Sun-Moon sep (deg) : 163.02  
 B (ring opening deg) : 65.60  
 PA of pole (deg) : 74.74  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.465  
 C/A sky separation (km) : 45774.0  
 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

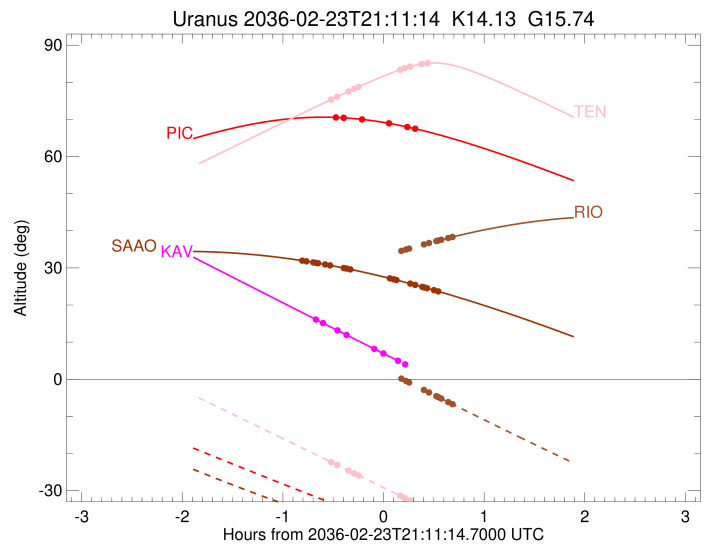
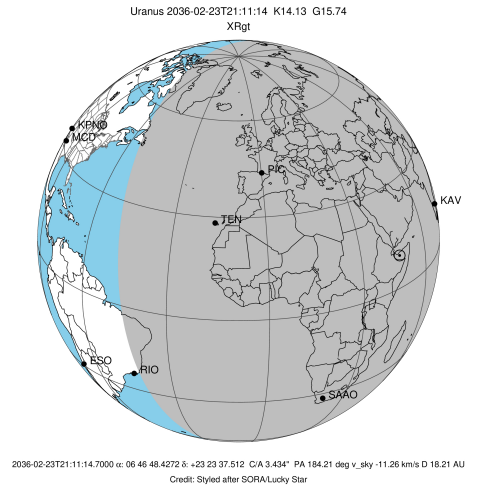


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-02-23T20:41:18.383		75.62	-22.61	50745.75	-5.25		
lambda	I	2036-02-23T20:43:40.714		76.12	-23.13	50026.71	-4.86		
delta	I	2036-02-23T20:50:23.963		77.53	-24.61	48300.35	-3.68		
gamma	I	2036-02-23T20:53:45.514		78.23	-25.35	47621.17	-3.05		
eta	I	2036-02-23T20:56:24.762		78.77	-25.93	47176.12	-2.53		

No planet occultations

eta	E	2036-02-23T21:21:04.821		83.37	-31.36	47176.12	2.53		
gamma	E	2036-02-23T21:23:44.510		83.77	-31.94	47622.44	3.05		
delta	E	2036-02-23T21:27:05.680		84.23	-32.67	48300.35	3.68		
lambda	E	2036-02-23T21:33:49.022		84.92	-34.14	50026.71	4.86		
epsilon	E	2036-02-23T21:36:43.394		85.10	-34.78	50914.81	5.25		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-02-23T21:01:05.680  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 3379616512894974208  
 2Mass ID (if available) : 06464842+2323378  
 ICRS Star Coord at Epoch: 06h 46m 48.42715s +23:23:37.51188s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.128  
 G magnitude : 15.737  
 RP magnitude : 15.194  
 BP magnitude : 16.108  
 DUPflag : 0  
 Distance (au) : 18.213  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.26  
 Sun-Target sep (deg) : 126.40  
 Sun-Moon sep (deg) : 161.91  
 B (ring opening deg) : 65.60  
 PA of pole (deg) : 74.74  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.545  
 C/A sky separation (km) : 46823.4  
 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

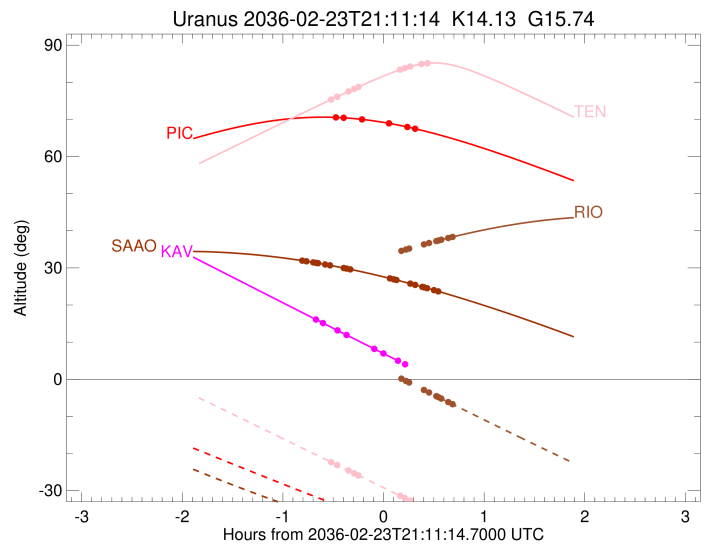
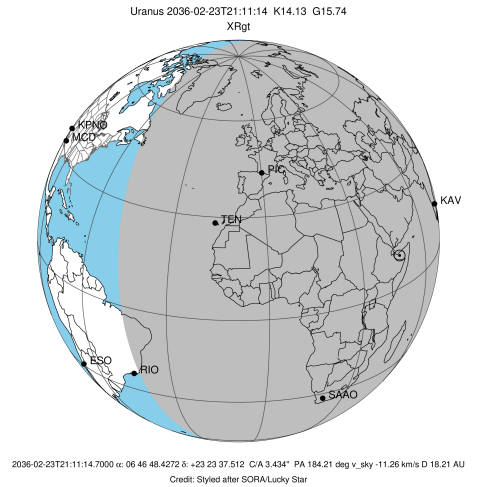


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-02-23T20:32:26.214		15.76	-66.67	50747.57	-4.52		
lambda	I	2036-02-23T20:35:14.383		15.12	-65.98	50026.71	-4.06		
delta	I	2036-02-23T20:43:54.028		13.15	-63.87	48300.35	-2.56		
gamma	I	2036-02-23T20:49:24.793		11.89	-62.53	47621.35	-1.54		

No planet occultations

gamma	E	2036-02-23T21:05:33.074		8.23	-58.59	47622.00	1.53		
delta	E	2036-02-23T21:11:04.909		6.97	-57.24	48300.35	2.55		
lambda	E	2036-02-23T21:19:48.442		5.00	-55.11	50026.71	4.02		
epsilon	E	2036-02-23T21:23:10.768		4.24x	-54.29	50893.95	4.48		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-02-23T21:15:50.700  
 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 : 3379616512894974208  
 2Mass ID (if available) : 06464842+2323378  
 ICRS Star Coord at Epoch: 06h 46m 48.42715s +23:23:37.51188s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.128  
 G magnitude : 15.737  
 RP magnitude : 15.194  
 BP magnitude : 16.108  
 DUPflag : 0  
 Distance (au) : 18.213  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.26  
 Sun-Target sep (deg) : 126.40  
 Sun-Moon sep (deg) : 163.07  
 B (ring opening deg) : 65.60  
 PA of pole (deg) : 74.74  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.091  
 C/A sky separation (km) : 40831.6  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



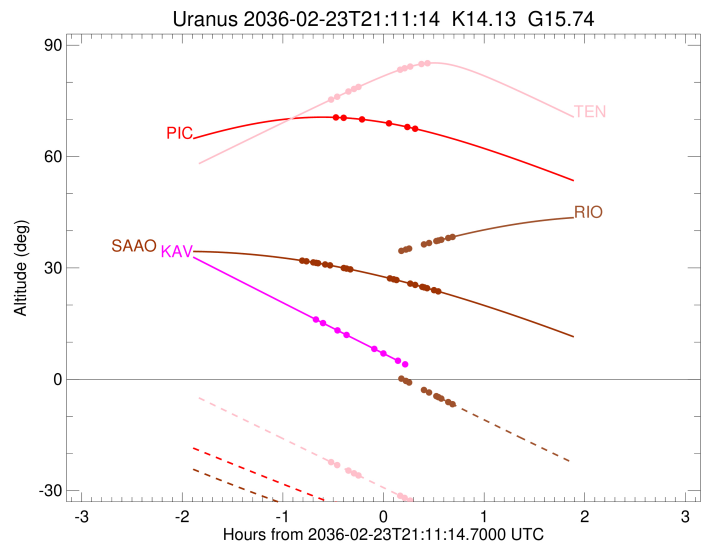
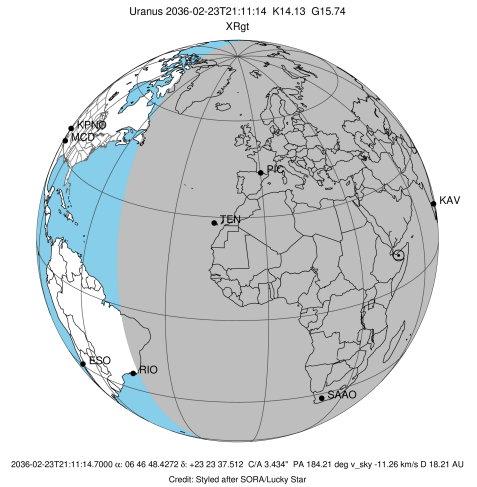
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-02-23T20:33:38.253		27.29	11.18x	50744.93	-7.34		
lambda	I	2036-02-23T20:35:17.405		27.57	10.80x	50026.71	-7.14		
delta	I	2036-02-23T20:39:29.169		28.25	9.84x	48300.35	-6.57		
gamma	I	2036-02-23T20:41:14.711		28.53	9.44x	47620.96	-6.31		
eta	I	2036-02-23T20:42:26.268		28.73	9.17x	47176.12	-6.13		
beta	I	2036-02-23T20:46:51.965		29.43	8.15x	45642.71	-5.41		
alpha	I	2036-02-23T20:49:44.881		29.88	7.49x	44751.80	-4.90		
4	I	2036-02-23T20:58:32.523		31.24	5.48x	42612.77	-3.17		
5	I	2036-02-23T21:01:08.546		31.63	4.89x	42163.30	-2.60		
6	I	2036-02-23T21:03:16.942		31.94	4.40x	41856.04	-2.15		

No planet occultations

6	E	2036-02-23T21:22:03.197		34.60	0.13x	41867.71	2.16		
5	E	2036-02-23T21:24:00.090		34.87	-0.31x	42154.93	2.60		
4	E	2036-02-23T21:26:41.800		35.22	-0.92x	42616.37	3.18		
alpha	E	2036-02-23T21:35:22.328		36.33	-2.88x	44737.24	4.91		
beta	E	2036-02-23T21:38:20.249		36.70	-3.55x	45655.59	5.42		
eta	E	2036-02-23T21:42:42.863		37.23	-4.54x	47176.12	6.15		
gamma	E	2036-02-23T21:43:54.562		37.37	-4.80x	47623.64	6.33		
delta	E	2036-02-23T21:45:39.245		37.57	-5.20	48300.35	6.59		
lambda	E	2036-02-23T21:49:49.874		38.05	-6.14	50026.71	7.17		
epsilon	E	2036-02-23T21:52:00.965		38.29	-6.63	50985.45	7.38		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2036-02-23T21:06:21.300
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      : 3379616512894974208
2Mass ID (if available) : 06464842+2323378
ICRS Star Coord at Epoch: 06h 46m 48.42715s +23:23:37.51188s
RUWE (>1.4 is poor) : 0.92
K magnitude          : 14.128
G magnitude          : 15.737
RP magnitude         : 15.194
BP magnitude         : 16.108
DUPflag             : 0
Distance (au)       : 18.213
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -11.26
Sun-Target sep (deg) : 126.40
Sun-Moon sep (deg)  : 162.25
B (ring opening deg) : 65.60
PA of pole (deg)    : 74.74
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.066
C/A sky separation (km) : 40499.0
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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	2036-02-23T20:23:41.861		31.89	-35.41	50745.92	-7.50		
lambda	I	2036-02-23T20:25:18.898		31.78	-35.66	50026.71	-7.31		
delta	I	2036-02-23T20:29:24.320		31.48	-36.27	48300.35	-6.75		
gamma	I	2036-02-23T20:31:06.856		31.35	-36.53	47620.96	-6.50		
eta	I	2036-02-23T20:32:16.230		31.26	-36.70	47176.12	-6.32		
beta	I	2036-02-23T20:36:32.509		30.92	-37.32	45642.47	-5.63		
alpha	I	2036-02-23T20:39:17.635		30.69	-37.72	44752.00	-5.15		
4	I	2036-02-23T20:47:26.479		29.98	-38.85	42611.90	-3.57		
5	I	2036-02-23T20:49:40.803		29.78	-39.16	42165.26	-3.08		
6	I	2036-02-23T20:51:27.785		29.61	-39.40	41853.78	-2.72		

No planet occultations

6	E	2036-02-23T21:15:11.003		27.17	-42.34	41868.66	2.71		
5	E	2036-02-23T21:16:46.677		26.99	-42.52	42154.85	3.07		
4	E	2036-02-23T21:19:07.640		26.72	-42.78	42616.28	3.56		
alpha	E	2036-02-23T21:27:12.533		25.77	-43.63	44737.02	5.13		
beta	E	2036-02-23T21:30:03.954		25.42	-43.92	45655.69	5.60		
eta	E	2036-02-23T21:34:19.570		24.90	-44.33	47176.12	6.29		
gamma	E	2036-02-23T21:35:29.791		24.75	-44.44	47623.65	6.46		
delta	E	2036-02-23T21:37:12.577		24.54	-44.60	48300.35	6.71		
lambda	E	2036-02-23T21:41:19.734		24.01	-44.97	50026.71	7.25		
epsilon	E	2036-02-23T21:43:29.467		23.73	-45.16	50985.19	7.45		