

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-28T23:23:02.750  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3413039334211183232  
 2Mass ID (if available) : 04470421+2220422

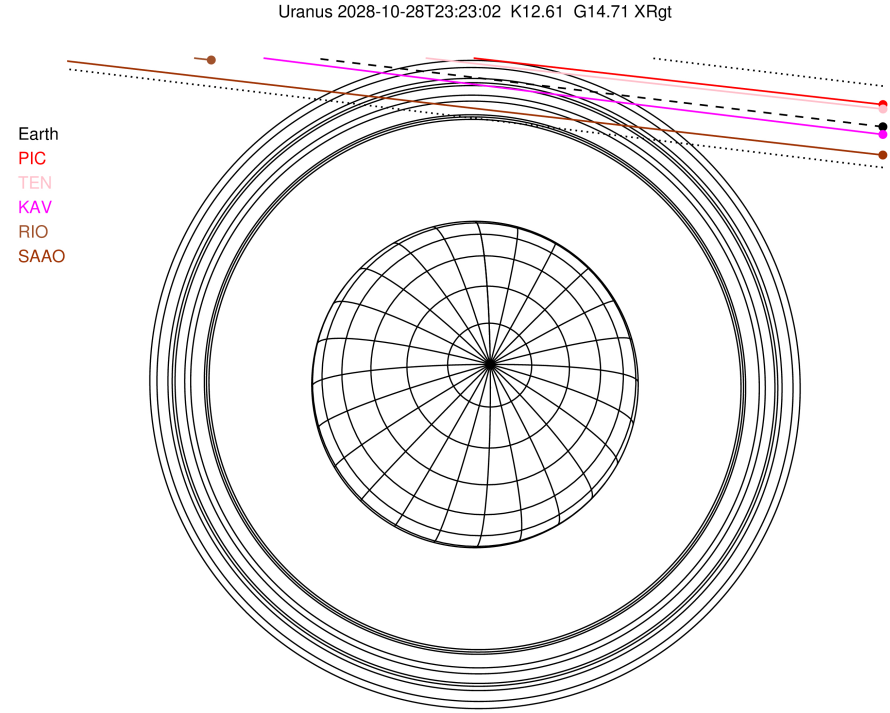
ICRS Star Coord at Epoch: 04h 47m 04.21534s +22:20:42.17886s

RUWE (>1.4 is poor) : 1.04  
 K magnitude : 12.610  
 G magnitude : 14.708  
 RP magnitude : 14.000  
 BP magnitude : 15.254  
 DUPflag : 0  
 Distance (au) : 18.503  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.30  
 Sun-Target sep (deg) : 142.49  
 Sun-Moon sep (deg) : 86.20  
 B (ring opening deg) : 81.12  
 PA of pole (deg) : -37.14

#	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

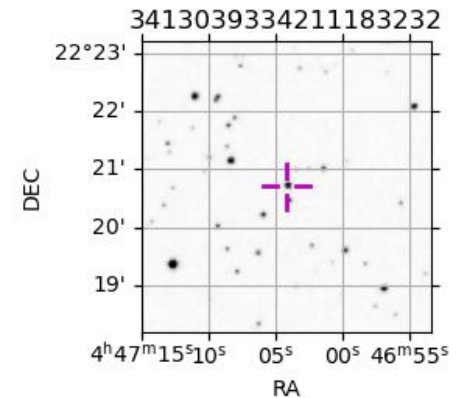


2028-10-28T23:23:02.7500 ra: 04 47 04.2153 s: +22 20 42.179 C/A 3.5611 PA 173.12 deg v\_sky -17.30 km/s D 18.50 AU  
 Credit: Styled after SORA/Lucky Star

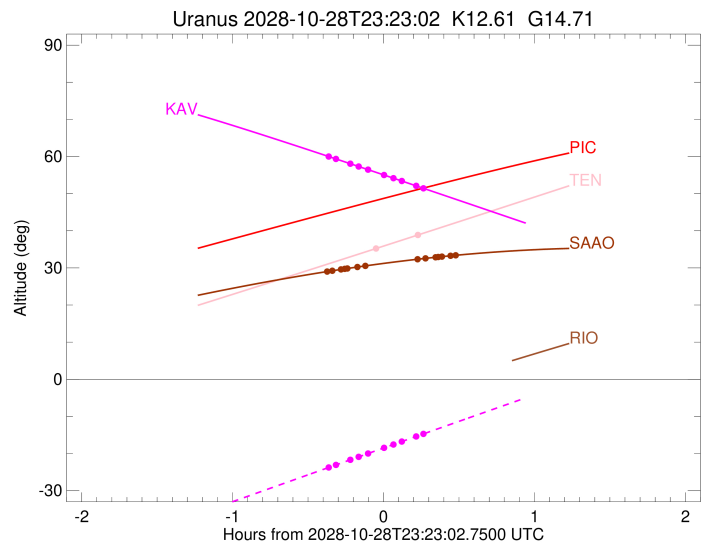
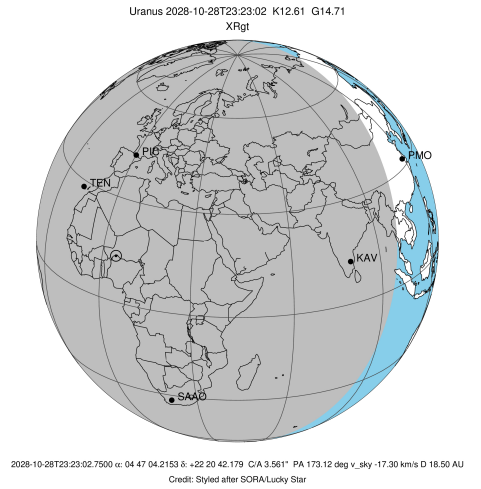


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					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	+		+	OCT 28 23:21 - OCT 28 23:36	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	OCT 28 23:01 - OCT 28 23:39	PnnRie
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	+++++++		+++++++	OCT 28 23:01 - OCT 28 23:51	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-28T23:27:53.810  
 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 : 3413039334211183232  
 2Mass ID (if available) : 04470421+2220422  
 ICRS Star Coord at Epoch: 04h 47m 04.21534s +22:20:42.17886s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 12.610  
 G magnitude : 14.708  
 RP magnitude : 14.000  
 BP magnitude : 15.254  
 DUPflag : 0  
 Distance (au) : 18.503  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.30  
 Sun-Target sep (deg) : 142.49  
 Sun-Moon sep (deg) : 86.68  
 B (ring opening deg) : 81.12  
 PA of pole (deg) : -37.14  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.722  
 C/A sky separation (km) : 49946.9  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



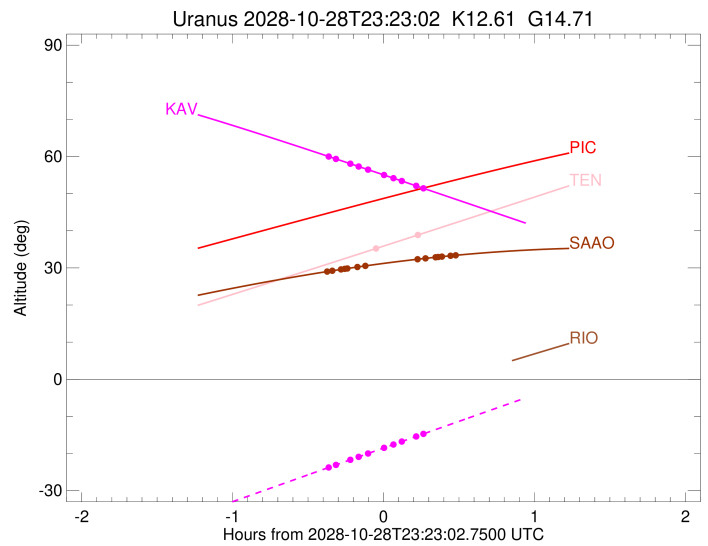
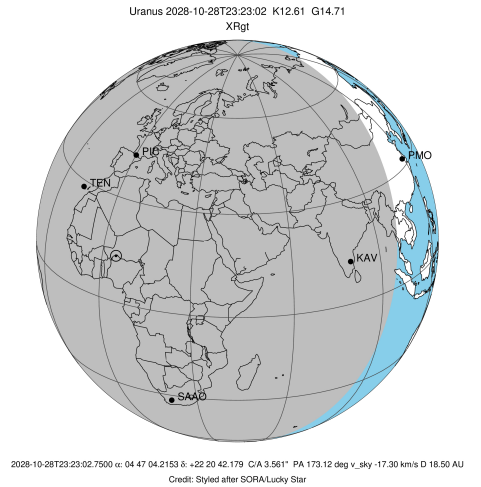
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-28T23:21:03.250	35.44	-64.74	50999.03	-2.79		

No planet occultations

epsilon	E	2028-10-28T23:36:29.918	38.82	-67.58	51124.91	2.80		
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target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-28T23:19:37.520  
 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 : 3413039334211183232  
 2Mass ID (if available) : 04470421+2220422  
 ICRS Star Coord at Epoch: 04h 47m 04.21534s +22:20:42.17886s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 12.610  
 G magnitude : 14.708  
 RP magnitude : 14.000  
 BP magnitude : 15.254  
 DUPflag : 0  
 Distance (au) : 18.503  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.30  
 Sun-Target sep (deg) : 142.49  
 Sun-Moon sep (deg) : 86.96  
 B (ring opening deg) : 81.12  
 PA of pole (deg) : -37.14  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.475  
 C/A sky separation (km) : 46632.4  
 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



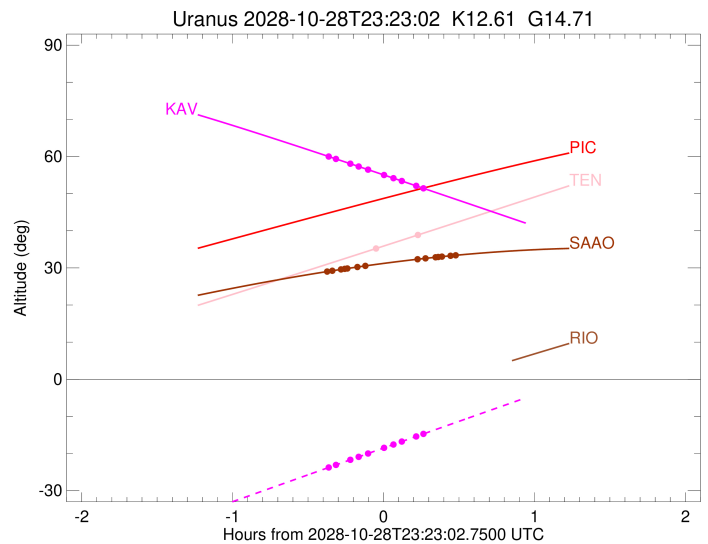
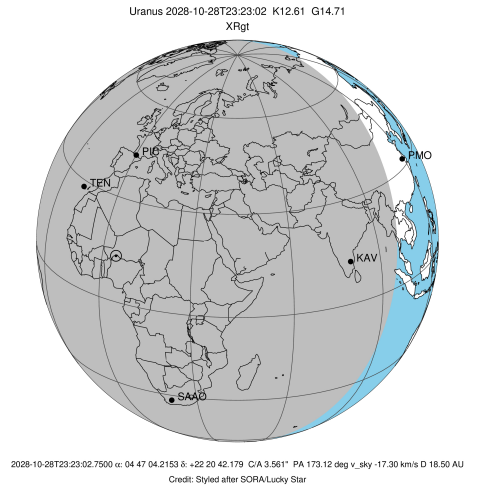
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-28T23:01:53.022		59.87	-23.61	50910.70	-6.88		
lambda	I	2028-10-28T23:04:11.199		59.35	-23.06	50026.71	-6.02		
delta	I	2028-10-28T23:09:55.188		58.05	-21.68	48300.35	-3.98		
gamma	I	2028-10-28T23:13:18.182		57.29	-20.87	47621.46	-2.70		
eta	I	2028-10-28T23:17:06.871		56.42	-19.95	47176.12	-1.19		

No planet occultations

eta	E	2028-10-28T23:23:03.645		55.07	-18.52	47176.12	1.19		
gamma	E	2028-10-28T23:26:52.772		54.20	-17.61	47622.35	2.70		
delta	E	2028-10-28T23:30:15.598		53.42	-16.80	48300.35	3.98		
lambda	E	2028-10-28T23:36:00.014		52.11	-15.42	50026.71	6.01		
epsilon	E	2028-10-28T23:39:02.819		51.41	-14.69	51216.00	6.86		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-28T23:25:47.250  
 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 : 3413039334211183232  
 2Mass ID (if available) : 04470421+2220422  
 ICRS Star Coord at Epoch: 04h 47m 04.21534s +22:20:42.17886s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 12.610  
 G magnitude : 14.708  
 RP magnitude : 14.000  
 BP magnitude : 15.254  
 DUPflag : 0  
 Distance (au) : 18.503  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.30  
 Sun-Target sep (deg) : 142.49  
 Sun-Moon sep (deg) : 86.64  
 B (ring opening deg) : 81.12  
 PA of pole (deg) : -37.14  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.200  
 C/A sky separation (km) : 42949.1  
 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	2028-10-28T23:01:10.852		29.07	-43.23	50864.27	-9.34		
lambda	I	2028-10-28T23:02:43.425		29.23	-43.15	50026.71	-8.83		
delta	I	2028-10-28T23:06:10.688		29.59	-42.97	48300.35	-7.81		
gamma	I	2028-10-28T23:07:40.436		29.74	-42.88	47621.04	-7.33		
eta	I	2028-10-28T23:08:42.600		29.85	-42.82	47176.12	-6.98		
beta	I	2028-10-28T23:12:45.393		30.25	-42.57	45651.53	-5.56		
alpha	I	2028-10-28T23:15:55.083		30.55	-42.37	44710.47	-4.32		

No planet occultations

alpha	E	2028-10-28T23:36:27.193		32.32	-40.77	44695.85	4.33		
beta	E	2028-10-28T23:39:42.398		32.57	-40.47	45663.92	5.57		
eta	E	2028-10-28T23:43:42.592		32.86	-40.10	47176.12	7.00		
gamma	E	2028-10-28T23:44:44.973		32.93	-40.00	47623.51	7.34		
delta	E	2028-10-28T23:46:14.198		33.03	-39.85	48300.35	7.82		
lambda	E	2028-10-28T23:49:40.977		33.26	-39.51	50026.71	8.86		
epsilon	E	2028-10-28T23:51:57.807		33.41	-39.28	51281.72	9.37		