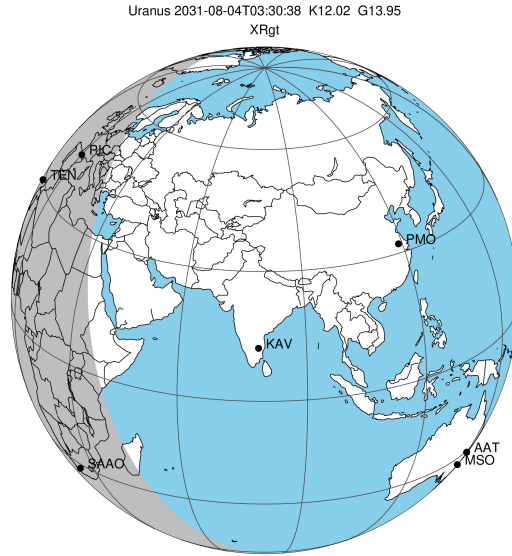


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-04T03:30:38.410  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3404410470036502656  
 2Mass ID (if available) : 05394488+2328316

ICRS Star Coord at Epoch: 05h 39m 44.89635s +23:28:31.48007s

RUWE (>1.4 is poor) : 1.47  
 K magnitude : 12.020  
 G magnitude : 13.953  
 RP magnitude : 13.313  
 BP magnitude : 14.412  
 DUPflag : 0  
 Distance (au) : 19.805  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 27.11  
 Sun-Target sep (deg) : 45.80  
 Sun-Moon sep (deg) : 118.89  
 B (ring opening deg) : 79.02  
 PA of pole (deg) : 42.26

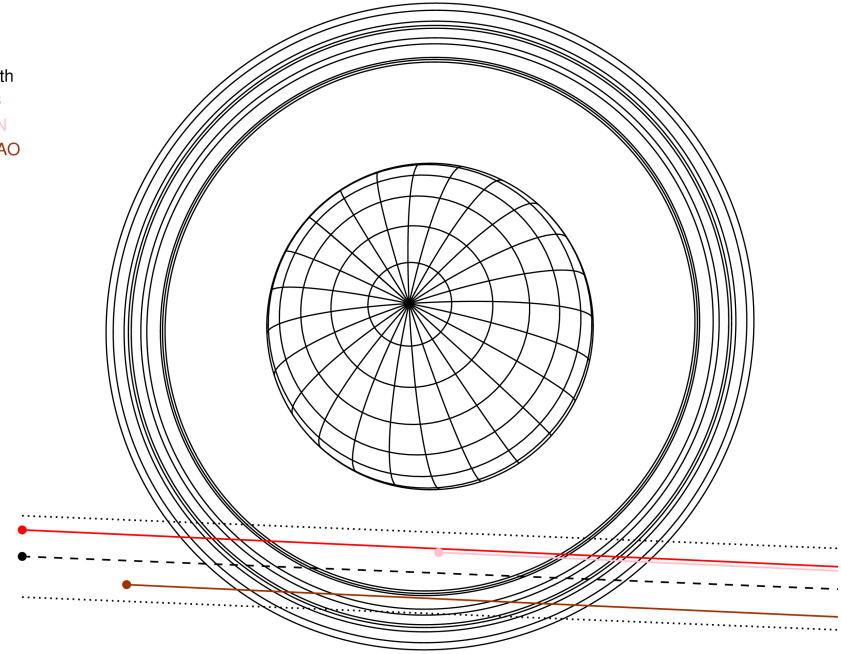
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-08-04T03:30:38.4100 cc: 05 39 44.8963 8: +23 28 31.480 C/A 2.678" PA 357.70 deg v\_sky +27.11 km/s D 19.81 AU  
 Credit: Styled after SORA/Lucky Star

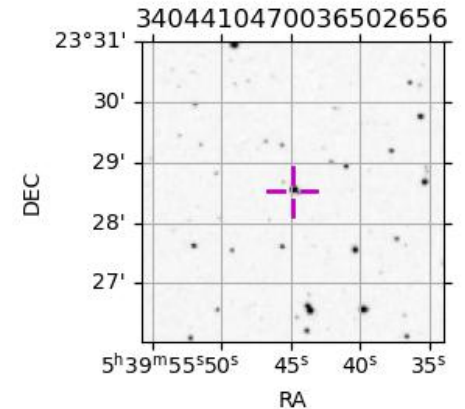
Uranus 2031-08-04T03:30:38 K12.02 G13.95 XRgt

Earth  
 PIC  
 TEN  
 SAAO

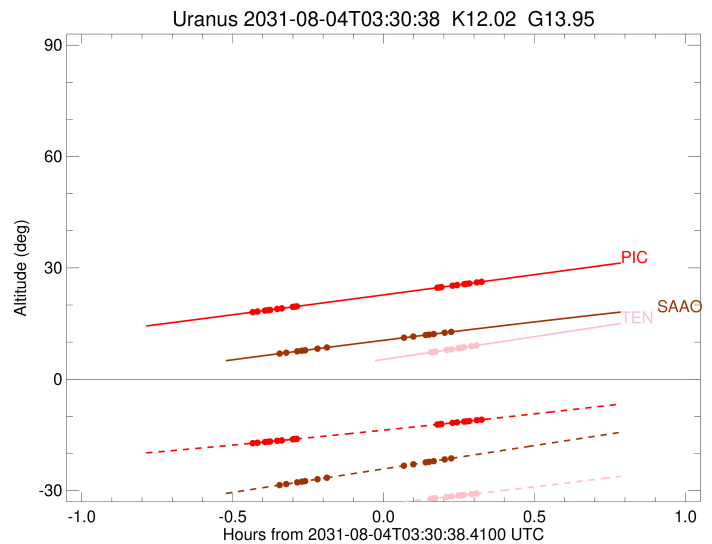
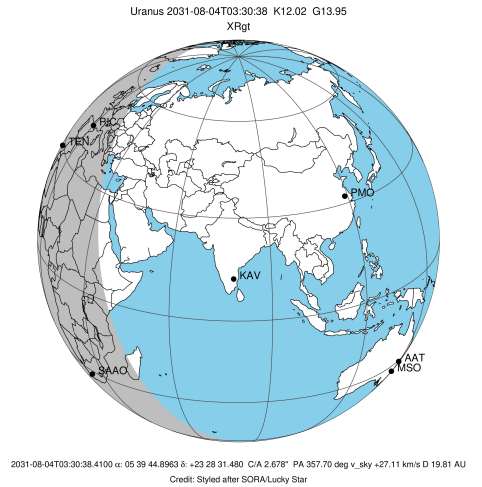


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	AUG 04 03:04 - AUG 04 03:49	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			+++++	AUG 04 03:40 - AUG 04 03:48	PnnRne
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					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	+++++		+++++	AUG 04 03:10 - AUG 04 03:43	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-04T03:27:46.640  
 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 : 3404410470036502656  
 2Mass ID (if available) : 05394488+2328316  
 ICRS Star Coord at Epoch: 05h 39m 44.89635s +23:28:31.48007s  
 RUWE (>1.4 is poor) : 1.47  
 K magnitude : 12.020  
 G magnitude : 13.953  
 RP magnitude : 13.313  
 BP magnitude : 14.412  
 DUPflag : 0  
 Distance (au) : 19.805  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 27.11  
 Sun-Target sep (deg) : 45.80  
 Sun-Moon sep (deg) : 119.61  
 B (ring opening deg) : 79.02  
 PA of pole (deg) : 42.26  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.416  
 C/A sky separation (km) : 34703.7  
 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



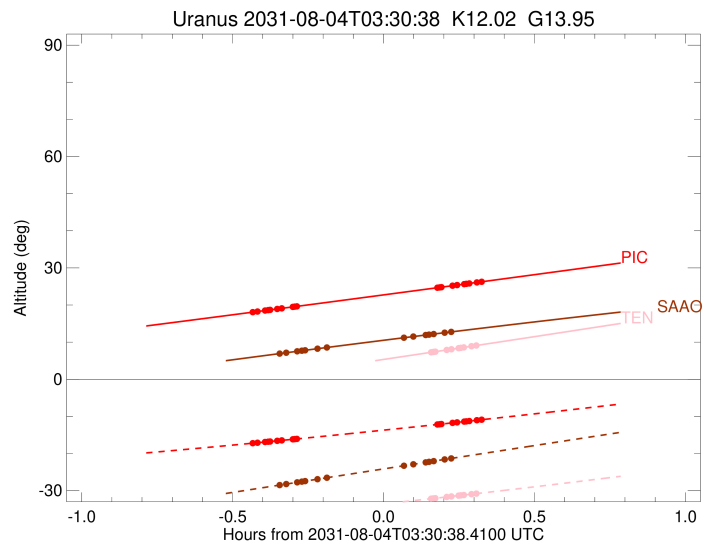
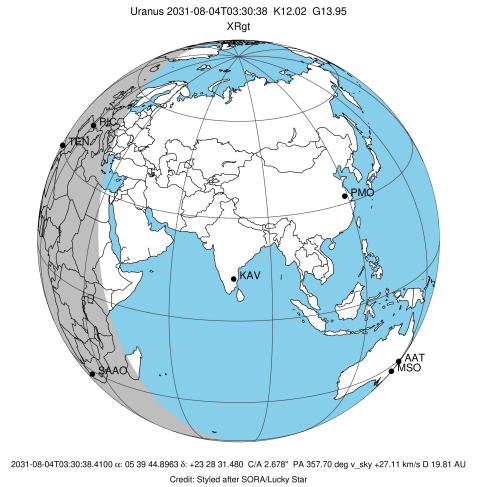
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-04T03:04:41.108		18.08	-17.21	51122.21	-19.76		
lambda	I	2031-08-04T03:05:36.673		18.25	-17.09	50026.71	-19.52		
delta	I	2031-08-04T03:07:06.716		18.52	-16.90	48300.35	-18.82		
gamma	I	2031-08-04T03:07:42.562		18.62	-16.82	47631.15	-18.52		
eta	I	2031-08-04T03:08:07.276		18.69	-16.77	47176.12	-18.30		
beta	I	2031-08-04T03:09:32.792		18.95	-16.58	45643.88	-17.51		
alpha	I	2031-08-04T03:10:28.097		19.11	-16.46	44690.08	-16.97		
4	I	2031-08-04T03:12:40.704		19.51	-16.17	42535.92	-15.48		
5	I	2031-08-04T03:12:59.242		19.56	-16.13	42250.96	-15.22		
6	I	2031-08-04T03:13:23.728		19.63	-16.07	41879.03	-14.96		

No planet occultations

6	E	2031-08-04T03:41:20.843		24.66	-12.18	41846.90	14.94		
5	E	2031-08-04T03:41:41.500		24.73	-12.13	42168.37	15.20		
4	E	2031-08-04T03:42:06.007		24.80	-12.07	42532.07	15.45		
alpha	E	2031-08-04T03:44:21.156		25.21	-11.74	44729.97	16.94		
beta	E	2031-08-04T03:45:14.555		25.37	-11.61	45647.94	17.47		
eta	E	2031-08-04T03:46:40.017		25.63	-11.41	47176.12	18.26		
gamma	E	2031-08-04T03:47:04.440		25.70	-11.35	47624.60	18.47		
delta	E	2031-08-04T03:47:40.733		25.81	-11.26	48300.35	18.77		
lambda	E	2031-08-04T03:49:11.023		26.09	-11.04	50026.71	19.46		
epsilon	E	2031-08-04T03:49:47.736		26.20	-10.94	50746.02	19.71		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-04T03:27:09.420  
 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 : 3404410470036502656  
 2Mass ID (if available) : 05394488+2328316  
 ICRS Star Coord at Epoch: 05h 39m 44.89635s +23:28:31.48007s  
 RUWE (>1.4 is poor) : 1.47  
 K magnitude : 12.020  
 G magnitude : 13.953  
 RP magnitude : 13.313  
 BP magnitude : 14.412  
 DUPflag : 0  
 Distance (au) : 19.805  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 27.11  
 Sun-Target sep (deg) : 45.80  
 Sun-Moon sep (deg) : 119.42  
 B (ring opening deg) : 79.02  
 PA of pole (deg) : 42.26  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.456  
 C/A sky separation (km) : 35282.9  
 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

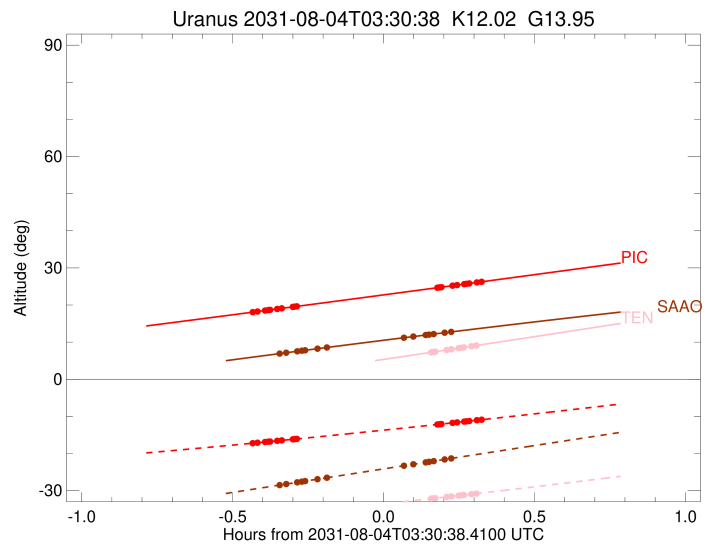
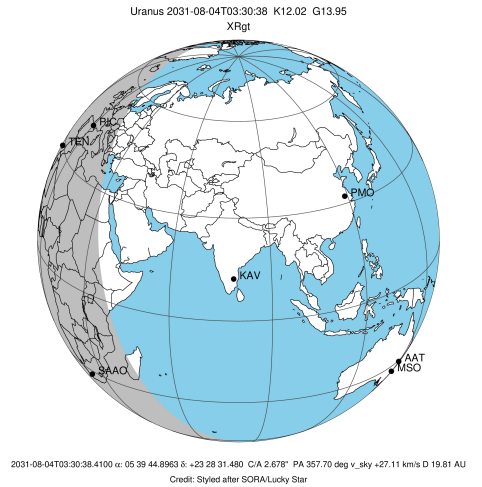


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-04T03:04:30.014		0.11x	-37.06	51116.09	-19.55		
lambda	I	2031-08-04T03:05:25.905		0.30x	-36.94	50026.71	-19.28		
delta	I	2031-08-04T03:06:57.156		0.60x	-36.75	48300.35	-18.54		
gamma	I	2031-08-04T03:07:33.554		0.72x	-36.67	47631.12	-18.23		
eta	I	2031-08-04T03:07:58.673		0.80x	-36.62	47176.12	-18.00		
beta	I	2031-08-04T03:09:25.796		1.09x	-36.44	45643.68	-17.16		
alpha	I	2031-08-04T03:10:22.281		1.28x	-36.31	44690.47	-16.58		
4	I	2031-08-04T03:12:38.654		1.73x	-36.02	42535.26	-14.98		
5	I	2031-08-04T03:12:57.911		1.79x	-35.98	42249.03	-14.71		
6	I	2031-08-04T03:13:23.142		1.88x	-35.92	41878.82	-14.43		

No planet occultations

6	E	2031-08-04T03:40:06.511		7.26	-32.17	41848.01	14.40		
5	E	2031-08-04T03:40:27.921		7.33	-32.11	42169.56	14.68		
4	E	2031-08-04T03:40:53.140		7.42	-32.05	42531.50	14.95		
alpha	E	2031-08-04T03:43:12.084		7.89	-31.70	44729.26	16.54		
beta	E	2031-08-04T03:44:06.692		8.08	-31.56	45647.62	17.11		
eta	E	2031-08-04T03:45:33.794		8.37	-31.34	47176.12	17.95		
gamma	E	2031-08-04T03:45:58.632		8.46	-31.28	47624.70	18.17		
delta	E	2031-08-04T03:46:35.492		8.58	-31.19	48300.35	18.49		
lambda	E	2031-08-04T03:48:07.026		8.90	-30.95	50026.71	19.22		
epsilon	E	2031-08-04T03:48:44.148		9.02	-30.86	50745.32	19.48		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-04T03:27:31.840  
 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 : 3404410470036502656  
 2Mass ID (if available) : 05394488+2328316  
 ICRS Star Coord at Epoch: 05h 39m 44.89635s +23:28:31.48007s  
 RUWE (>1.4 is poor) : 1.47  
 K magnitude : 12.020  
 G magnitude : 13.953  
 RP magnitude : 13.313  
 BP magnitude : 14.412  
 DUPflag : 0  
 Distance (au) : 19.805  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 27.11  
 Sun-Target sep (deg) : 45.80  
 Sun-Moon sep (deg) : 119.39  
 B (ring opening deg) : 79.02  
 PA of pole (deg) : 42.26  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.962  
 C/A sky separation (km) : 42548.1  
 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\_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	2031-08-04T03:10:09.651		6.94	-28.47	51024.87	-14.50		
lambda	I	2031-08-04T03:11:19.411		7.15	-28.23	50026.71	-13.93		
delta	I	2031-08-04T03:13:30.248		7.53	-27.76	48300.35	-12.43		
gamma	I	2031-08-04T03:14:25.679		7.69	-27.57	47630.33	-11.74		
eta	I	2031-08-04T03:15:05.211		7.81	-27.43	47176.12	-11.23		
beta	I	2031-08-04T03:17:35.274		8.25	-26.90	45641.40	-9.18		
alpha	I	2031-08-04T03:19:28.017		8.58	-26.51	44699.21	-7.53		

No planet occultations

alpha	E	2031-08-04T03:34:39.707		11.18	-23.30	44717.00	7.52		
beta	E	2031-08-04T03:36:30.559		11.49	-22.92	45643.54	9.17		
eta	E	2031-08-04T03:39:00.570		11.91	-22.39	47176.12	11.22		
gamma	E	2031-08-04T03:39:39.811		12.02	-22.25	47626.15	11.72		
delta	E	2031-08-04T03:40:35.696		12.18	-22.06	48300.35	12.41		
lambda	E	2031-08-04T03:42:46.790		12.54	-21.60	50026.71	13.91		
epsilon	E	2031-08-04T03:43:37.607		12.68	-21.42	50747.16	14.47		