

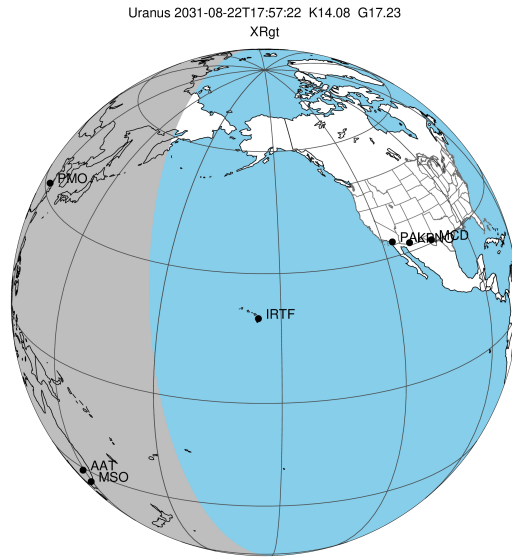
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-22T17:57:22.120  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3428370615113789824  
 2Mass ID (if available) : 05425829+2330190

ICRS Star Coord at Epoch: 05h 42m 58.28543s +23:30:19.06195s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.083  
 G magnitude : 17.229  
 RP magnitude : 16.267  
 BP magnitude : 18.163  
 DUPflag : 0  
 Distance (au) : 19.547  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.90  
 Sun-Target sep (deg) : 62.92  
 Sun-Moon sep (deg) : 115.52  
 B (ring opening deg) : 78.49  
 PA of pole (deg) : 45.16

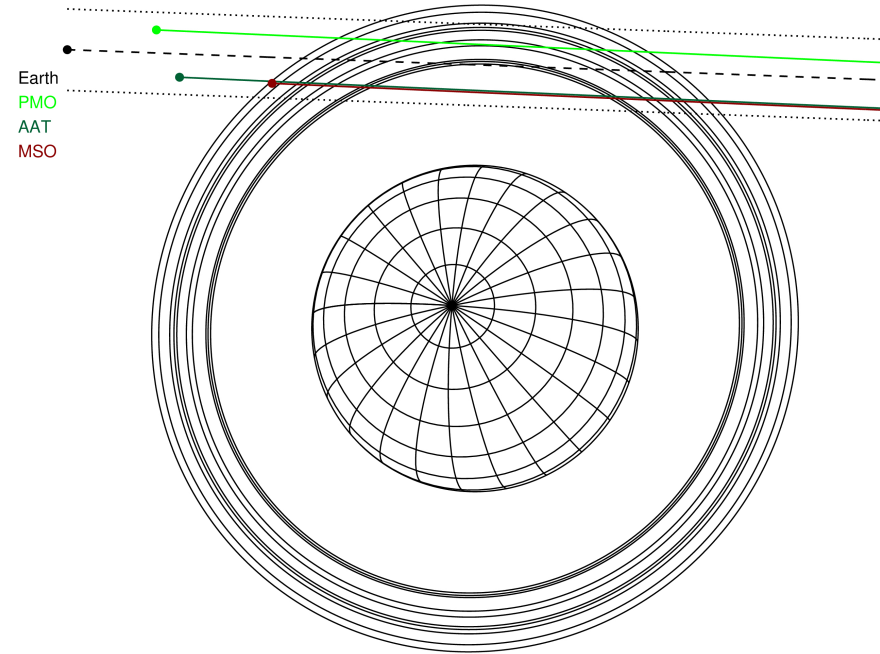
# a(km) ring

- 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



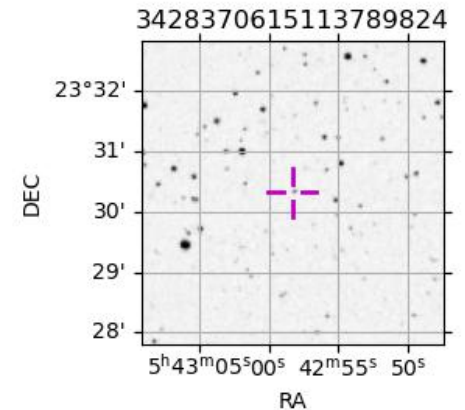
2031-08-22T17:57:22.1200 ex: 05 42 58.2854 s: +23 30 19.062 C/A 2.915" PA 177.88 deg v\_sky +19.90 km/s D 19.55 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2031-08-22T17:57:22 K14.08 G17.23 XRgt

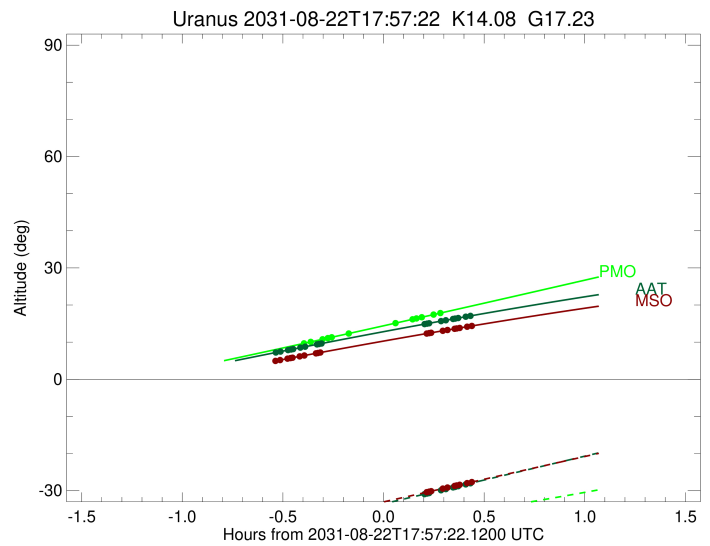
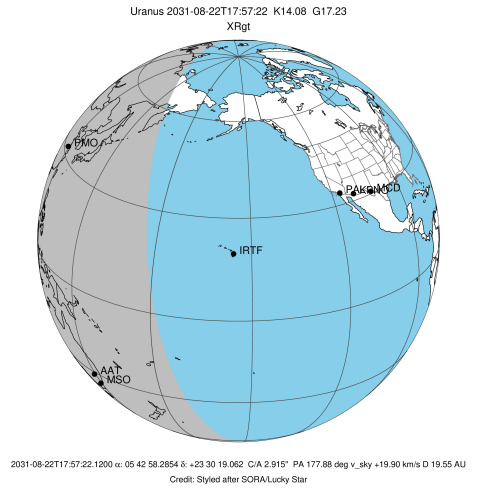


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	AUG 22 17:33 - AUG 22 18:14	PnnRie
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					PnnRnn
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	+++++		+++++	AUG 22 17:24 - AUG 22 18:23	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	AUG 22 17:26 - AUG 22 18:23	PnnRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-22T17:53:13.350  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3428370615113789824  
 2Mass ID (if available) : 05425829+2330190  
 ICRS Star Coord at Epoch: 05h 42m 58.28543s +23:30:19.06195s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.083  
 G magnitude : 17.229  
 RP magnitude : 16.267  
 BP magnitude : 18.163  
 DUPflag : 0  
 Distance (au) : 19.547  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.90  
 Sun-Target sep (deg) : 62.92  
 Sun-Moon sep (deg) : 115.38  
 B (ring opening deg) : 78.49  
 PA of pole (deg) : 45.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.137  
 C/A sky separation (km) : 44471.9  
 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

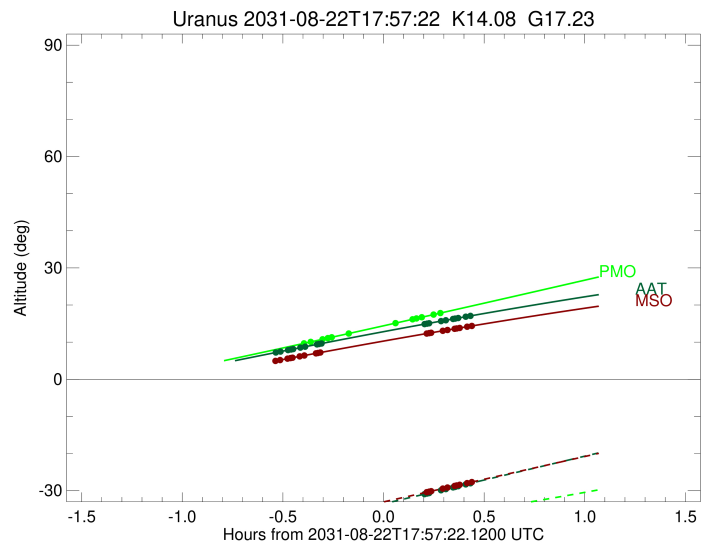
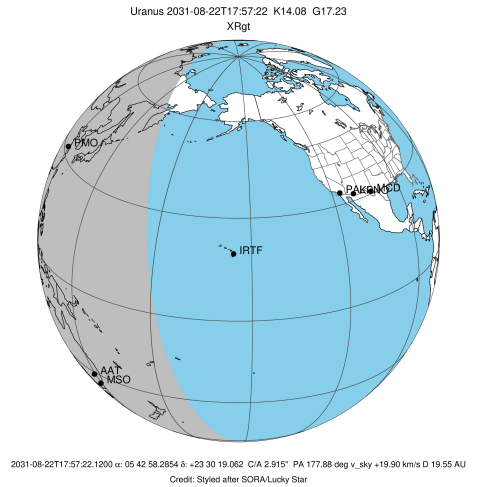


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-22T17:33:08.070		9.57	-41.87	51475.60	-9.78		
lambda	I	2031-08-22T17:35:42.468		10.08	-41.61	50026.71	-8.89		
delta	I	2031-08-22T17:39:13.667		10.77	-41.24	48300.35	-7.43		
gamma	I	2031-08-22T17:40:49.362		11.09	-41.07	47623.02	-6.72		
eta	I	2031-08-22T17:41:58.594		11.32	-40.94	47176.12	-6.19		
beta	I	2031-08-22T17:46:59.378		12.32	-40.38	45680.21	-3.71		

No planet occultations

beta	E	2031-08-22T18:00:56.976		15.12	-38.69	45676.61	3.71		
eta	E	2031-08-22T18:05:59.307		16.14	-38.05	47176.12	6.17		
gamma	E	2031-08-22T18:07:08.428		16.37	-37.90	47621.10	6.70		
delta	E	2031-08-22T18:08:44.675		16.70	-37.69	48300.35	7.41		
lambda	E	2031-08-22T18:12:16.571		17.42	-37.22	50026.71	8.86		
epsilon	E	2031-08-22T18:14:14.620		17.82	-36.95	51116.73	9.74		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-22T17:53:36.320  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3428370615113789824  
 2Mass ID (if available) : 05425829+2330190  
 ICRS Star Coord at Epoch: 05h 42m 58.28543s +23:30:19.06195s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.083  
 G magnitude : 17.229  
 RP magnitude : 16.267  
 BP magnitude : 18.163  
 DUPflag : 0  
 Distance (au) : 19.547  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.90  
 Sun-Target sep (deg) : 62.92  
 Sun-Moon sep (deg) : 115.42  
 B (ring opening deg) : 78.49  
 PA of pole (deg) : 45.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.628  
 C/A sky separation (km) : 37251.7  
 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

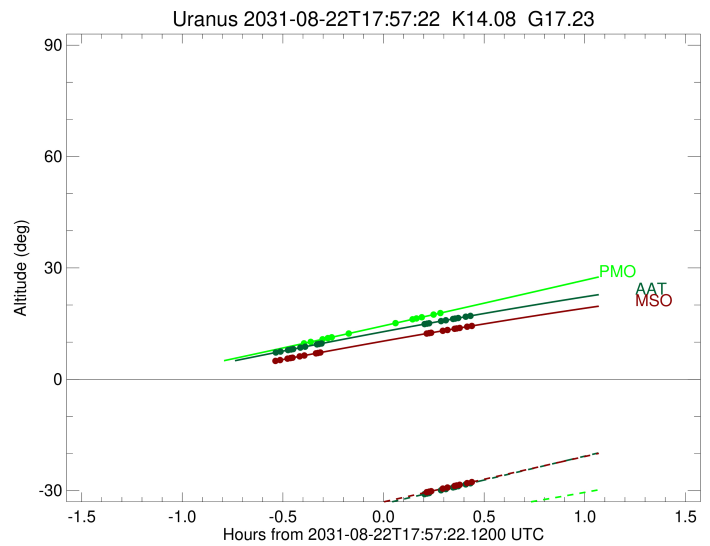
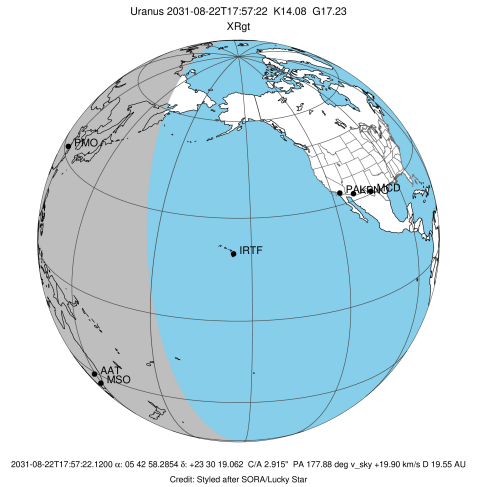


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-22T17:24:49.272		7.13	-40.43	51524.24	-13.61		
lambda	I	2031-08-22T17:26:40.913		7.46	-40.04	50026.71	-13.17		
delta	I	2031-08-22T17:28:55.227		7.87	-39.57	48300.35	-12.53		
gamma	I	2031-08-22T17:29:49.782		8.03	-39.38	47624.51	-12.25		
eta	I	2031-08-22T17:30:26.688		8.14	-39.25	47176.12	-12.05		
beta	I	2031-08-22T17:32:34.504		8.52	-38.80	45681.13	-11.33		
alpha	I	2031-08-22T17:34:00.293		8.77	-38.50	44733.76	-10.81		
4	I	2031-08-22T17:37:29.554		9.39	-37.76	42612.37	-9.37		
5	I	2031-08-22T17:38:11.767		9.51	-37.62	42234.17	-9.04		
6	I	2031-08-22T17:39:00.515		9.65	-37.44	41796.81	-8.70		

No planet occultations

6	E	2031-08-22T18:09:30.880		14.85	-30.96	41801.95	8.67		
5	E	2031-08-22T18:10:12.130		14.96	-30.82	42169.69	9.01		
4	E	2031-08-22T18:10:57.056		15.08	-30.66	42578.37	9.34		
alpha	E	2031-08-22T18:14:32.904		15.67	-29.89	44752.40	10.78		
beta	E	2031-08-22T18:15:56.110		15.89	-29.59	45670.08	11.29		
eta	E	2031-08-22T18:18:05.431		16.24	-29.13	47176.12	12.00		
gamma	E	2031-08-22T18:18:42.207		16.34	-29.00	47620.98	12.19		
delta	E	2031-08-22T18:19:37.296		16.49	-28.80	48300.35	12.47		
lambda	E	2031-08-22T18:21:52.247		16.85	-28.32	50026.71	13.10		
epsilon	E	2031-08-22T18:23:07.167		17.05	-28.06	51020.65	13.54		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-22T17:53:45.560  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : MSO  
 Location : Mt. Stromlo Observatory  
 Latitude (deg) : -35.32000  
 E. Longitude (deg) : 149.00833  
 Altitude (km) : 0.770  
 Gaia source ID : 3428370615113789824  
 2Mass ID (if available) : 05425829+2330190  
 ICRS Star Coord at Epoch: 05h 42m 58.28543s +23:30:19.06195s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.083  
 G magnitude : 17.229  
 RP magnitude : 16.267  
 BP magnitude : 18.163  
 DUPflag : 0  
 Distance (au) : 19.547  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.90  
 Sun-Target sep (deg) : 62.92  
 Sun-Moon sep (deg) : 115.40  
 B (ring opening deg) : 78.49  
 PA of pole (deg) : 45.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.607  
 C/A sky separation (km) : 36954.2  
 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\_itrff93\_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	2031-08-22T17:24:42.915	4.86x	-39.56	51525.62	-13.74			
lambda	I	2031-08-22T17:26:33.549	5.18	-39.20	50026.71	-13.31			
delta	I	2031-08-22T17:28:46.326	5.56	-38.76	48300.35	-12.68			
gamma	I	2031-08-22T17:29:40.177	5.71	-38.58	47624.56	-12.41			
eta	I	2031-08-22T17:30:16.584	5.81	-38.46	47176.12	-12.22			
beta	I	2031-08-22T17:32:22.449	6.17	-38.04	45681.11	-11.52			
alpha	I	2031-08-22T17:33:46.742	6.40	-37.76	44733.38	-11.02			
4	I	2031-08-22T17:37:11.168	6.98	-37.09	42612.65	-9.64			
5	I	2031-08-22T17:37:52.073	7.09	-36.95	42235.44	-9.31			
6	I	2031-08-22T17:38:39.434	7.22	-36.79	41797.03	-8.99			

No planet occultations

6	E	2031-08-22T18:10:09.820	12.30	-30.44	41802.33	8.97			
5	E	2031-08-22T18:10:49.681	12.40	-30.31	42169.00	9.29			
4	E	2031-08-22T18:11:33.304	12.52	-30.16	42577.72	9.61			
alpha	E	2031-08-22T18:15:04.282	13.06	-29.45	44752.38	10.99			
beta	E	2031-08-22T18:16:25.981	13.27	-29.17	45669.88	11.48			
eta	E	2031-08-22T18:18:33.331	13.59	-28.74	47176.12	12.17			
gamma	E	2031-08-22T18:19:09.602	13.68	-28.61	47620.98	12.36			
delta	E	2031-08-22T18:20:03.976	13.82	-28.43	48300.35	12.63			
lambda	E	2031-08-22T18:22:17.367	14.15	-27.98	50026.71	13.25			
epsilon	E	2031-08-22T18:23:31.284	14.34	-27.73	51017.47	13.67			