

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-24T14:18:54.240
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 55705176073818496
 2Mass ID (if available) : 03164872+1750105

ICRS Star Coord at Epoch: 03h 16m 48.71940s +17:50:10.75650s

RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.744
 G magnitude : 16.365
 RP magnitude : 15.830
 BP magnitude : 16.730
 DUPflag : 0
 Distance (au) : 18.692
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.46
 Sun-Target sep (deg) : 159.05
 Sun-Moon sep (deg) : 78.40
 B (ring opening deg) : 62.94
 PA of pole (deg) : -88.54

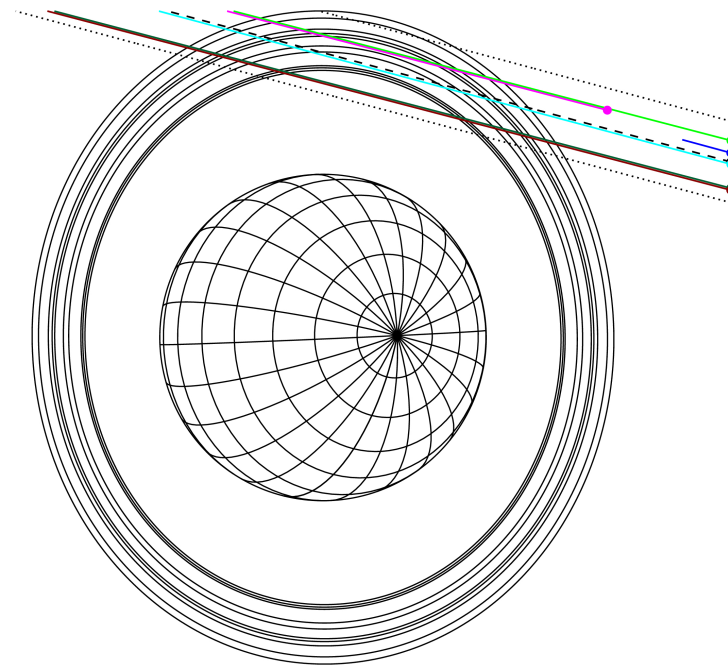
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2023-10-24T14:18:54.2400 ex: 03 16 48.7194 s: +17 50 10.757 C/A 3.180° PA 165.01 deg v_sky -21.46 km/s D 18.69 AU
 Credit: Styled after SORA/Lucky Star

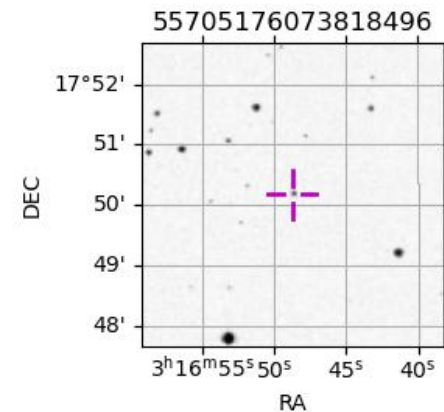
Uranus 2023-10-24T14:18:54 K14.74 G16.36 XRgt

Earth
 PAL
 PMO
 IRTF
 KAV
 AAT
 MSO

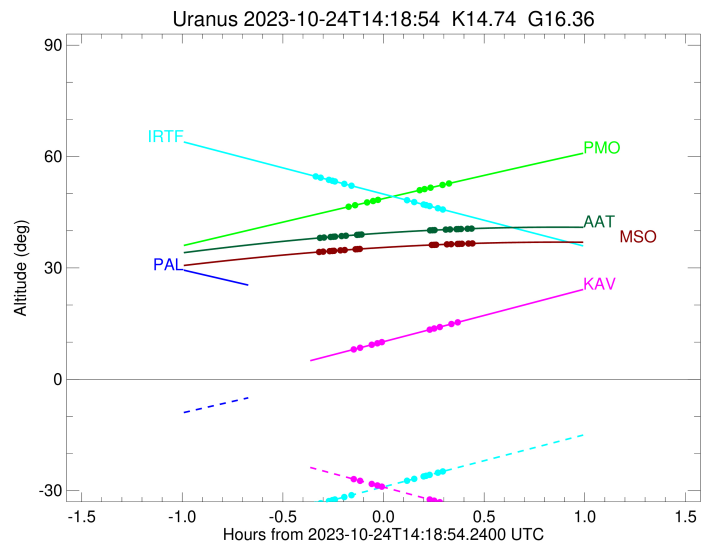
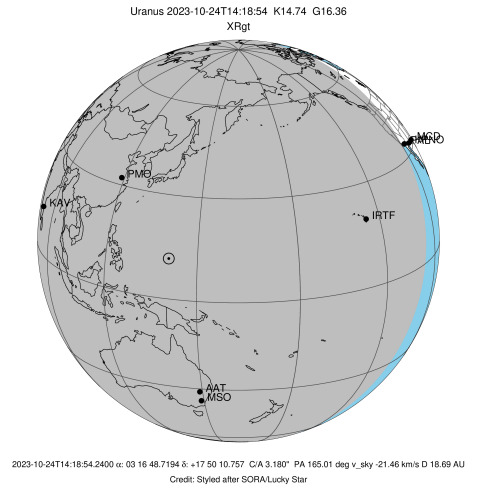


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	OCT 24 14:09 - OCT 24 14:38	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	+++++++		+++++++	OCT 24 13:59 - OCT 24 14:36	PnnRie
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	OCT 24 14:10 - OCT 24 14:40	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	+++++++		+++++++	OCT 24 14:00 - OCT 24 14:45	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++++		+++++++	OCT 24 14:00 - OCT 24 14:45	PnnRie



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-24T14:21:30.680
 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 : 55705176073818496
 2Mass ID (if available) : 03164872+1750105
 ICRS Star Coord at Epoch: 03h 16m 48.71940s +17:50:10.75650s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.744
 G magnitude : 16.365
 RP magnitude : 15.830
 BP magnitude : 16.730
 DUPflag : 0
 Distance (au) : 18.692
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.46
 Sun-Target sep (deg) : 159.05
 Sun-Moon sep (deg) : 79.05
 B (ring opening deg) : 62.94
 PA of pole (deg) : -88.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.389
 C/A sky separation (km) : 45937.7
 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

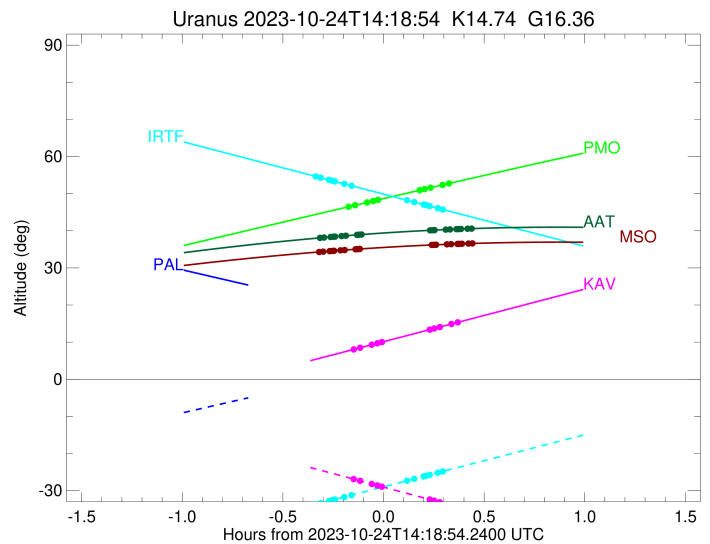
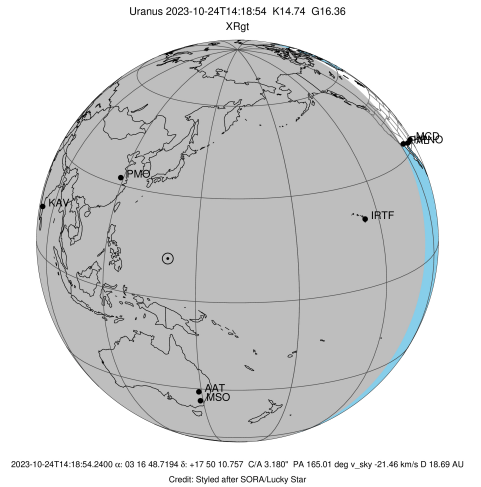


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-24T14:09:07.047		46.60	-59.48	50795.81	-10.01		
lambda	I	2023-10-24T14:10:27.733		46.89	-59.71	50026.71	-9.13		
delta	I	2023-10-24T14:14:03.148		47.64	-60.33	48300.35	-6.85		
gamma	I	2023-10-24T14:15:52.029		48.03	-60.63	47621.07	-5.61		
eta	I	2023-10-24T14:17:19.227		48.33	-60.87	47176.12	-4.59		

No planet occultations

eta	E	2023-10-24T14:29:38.217		50.91	-62.85	47176.12	4.59		
gamma	E	2023-10-24T14:31:05.348		51.22	-63.08	47621.13	5.62		
delta	E	2023-10-24T14:32:54.100		51.60	-63.35	48300.35	6.86		
lambda	E	2023-10-24T14:36:29.205		52.34	-63.89	50026.71	9.15		
epsilon	E	2023-10-24T14:38:16.684		52.72	-64.15	51067.05	10.03		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-24T14:15:46.260
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 55705176073818496
 2Mass ID (if available) : 03164872+1750105
 ICRS Star Coord at Epoch: 03h 16m 48.71940s +17:50:10.75650s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.744
 G magnitude : 16.365
 RP magnitude : 15.830
 BP magnitude : 16.730
 DUPflag : 0
 Distance (au) : 18.692
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.46
 Sun-Target sep (deg) : 159.05
 Sun-Moon sep (deg) : 79.27
 B (ring opening deg) : 62.94
 PA of pole (deg) : -88.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.150
 C/A sky separation (km) : 42701.2
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

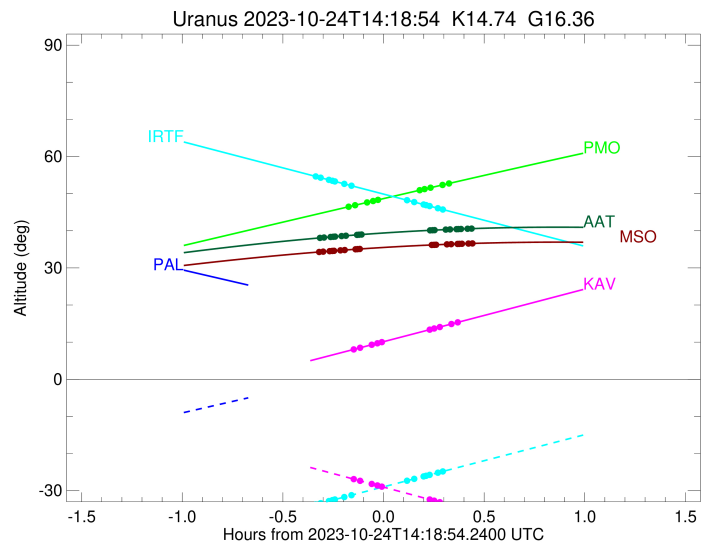
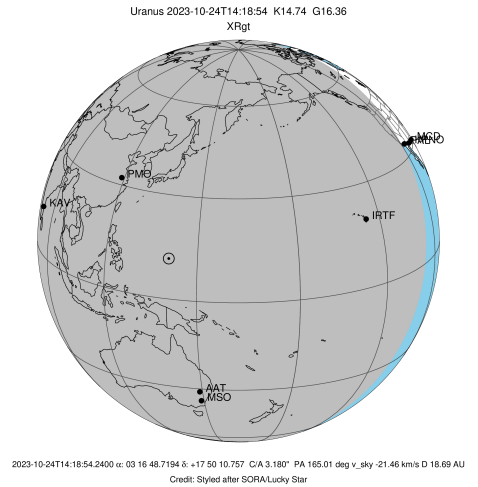


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-24T13:59:12.136		54.52	-33.61	50771.45	-12.92		
lambda	I	2023-10-24T14:00:11.184		54.29	-33.38	50026.71	-12.36		
delta	I	2023-10-24T14:02:38.909		53.71	-32.80	48300.35	-10.99		
gamma	I	2023-10-24T14:03:42.492		53.46	-32.55	47621.42	-10.36		
eta	I	2023-10-24T14:04:26.434		53.29	-32.38	47176.12	-9.91		
beta	I	2023-10-24T14:07:12.191		52.64	-31.73	45681.23	-8.09		
alpha	I	2023-10-24T14:09:27.750		52.11	-31.20	44691.14	-6.46		

No planet occultations

alpha	E	2023-10-24T14:25:47.351		48.27	-27.36	44684.76	6.46		
beta	E	2023-10-24T14:28:03.809		47.73	-26.83	45677.06	8.08		
eta	E	2023-10-24T14:30:50.422		47.08	-26.18	47176.12	9.90		
gamma	E	2023-10-24T14:31:34.426		46.91	-26.01	47621.50	10.35		
delta	E	2023-10-24T14:32:38.088		46.66	-25.76	48300.35	10.98		
lambda	E	2023-10-24T14:35:06.037		46.08	-25.18	50026.71	12.34		
epsilon	E	2023-10-24T14:36:31.947		45.74	-24.84	51118.08	12.90		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-24T14:23:34.250
 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 : 55705176073818496
 2Mass ID (if available) : 03164872+1750105
 ICRS Star Coord at Epoch: 03h 16m 48.71940s +17:50:10.75650s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.744
 G magnitude : 16.365
 RP magnitude : 15.830
 BP magnitude : 16.730
 DUPflag : 0
 Distance (au) : 18.692
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.46
 Sun-Target sep (deg) : 159.05
 Sun-Moon sep (deg) : 78.40
 B (ring opening deg) : 62.94
 PA of pole (deg) : -88.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.370
 C/A sky separation (km) : 45683.2
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

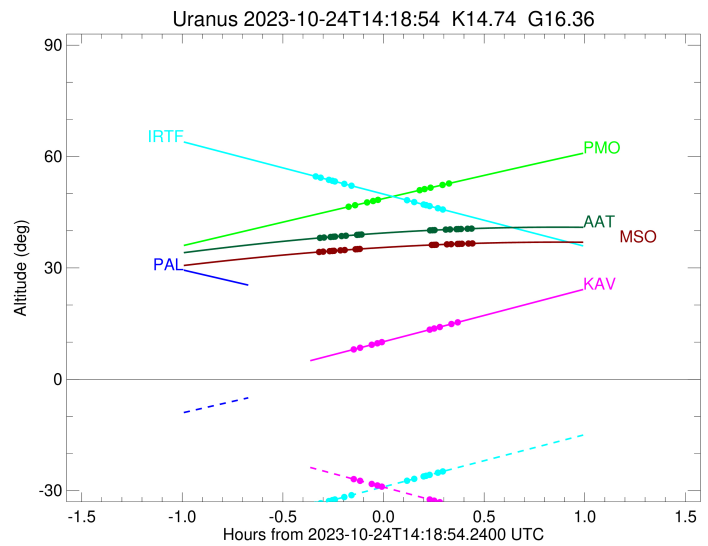
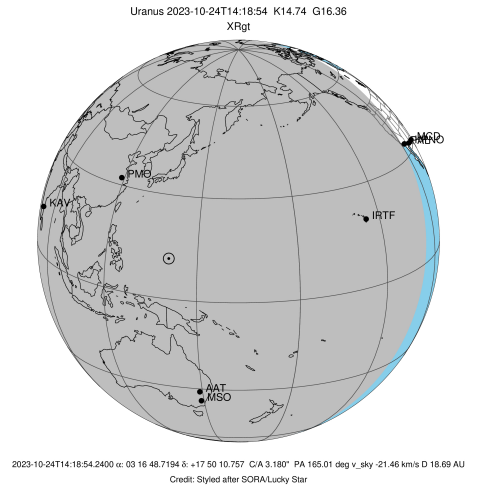


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-24T14:10:38.311		8.18	-27.04	50793.40	-10.15		
lambda	I	2023-10-24T14:11:57.356		8.49	-27.36	50026.71	-9.32		
delta	I	2023-10-24T14:15:25.960		9.31	-28.21	48300.35	-7.19		
gamma	I	2023-10-24T14:17:08.384		9.71	-28.62	47621.10	-6.06		
eta	I	2023-10-24T14:18:27.630		10.02	-28.94	47176.12	-5.16		

No planet occultations

eta	E	2023-10-24T14:32:38.295		13.35	-32.38	47176.12	5.17		
gamma	E	2023-10-24T14:33:57.429		13.66	-32.70	47621.16	6.07		
delta	E	2023-10-24T14:35:39.655		14.06	-33.11	48300.35	7.21		
lambda	E	2023-10-24T14:39:07.770		14.88	-33.95	50026.71	9.35		
epsilon	E	2023-10-24T14:40:53.821		15.30	-34.38	51071.83	10.18		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-24T14:20:55.000
 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 : 55705176073818496
 2Mass ID (if available) : 03164872+1750105
 ICRS Star Coord at Epoch: 03h 16m 48.71940s +17:50:10.75650s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.744
 G magnitude : 16.365
 RP magnitude : 15.830
 BP magnitude : 16.730
 DUPflag : 0
 Distance (au) : 18.692
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.46
 Sun-Target sep (deg) : 159.05
 Sun-Moon sep (deg) : 78.94
 B (ring opening deg) : 62.94
 PA of pole (deg) : -88.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.860
 C/A sky separation (km) : 38775.9
 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

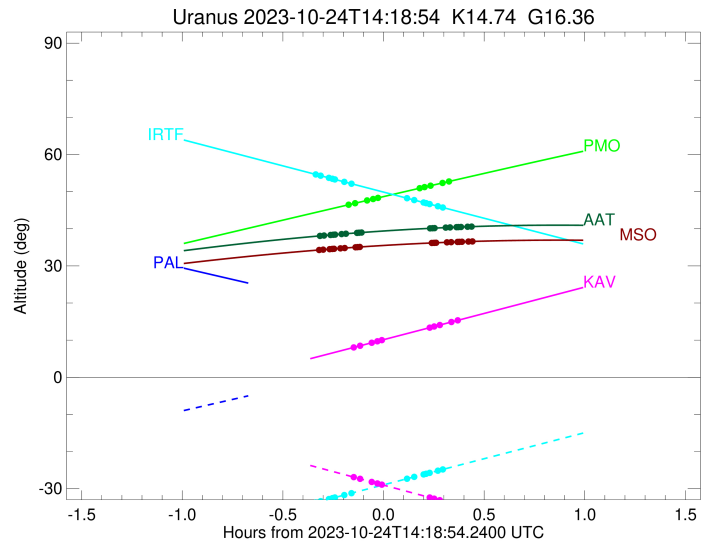
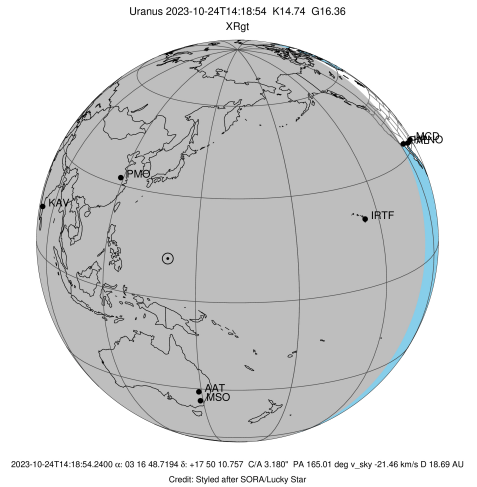


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-24T14:00:24.115		38.12	-47.00	50755.72	-15.53		
lambda	I	2023-10-24T14:01:11.678		38.18	-46.99	50026.71	-15.16		
delta	I	2023-10-24T14:03:08.958		38.33	-46.95	48300.35	-14.27		
gamma	I	2023-10-24T14:03:57.181		38.39	-46.93	47621.84	-13.87		
eta	I	2023-10-24T14:04:29.633		38.43	-46.92	47176.12	-13.60		
beta	I	2023-10-24T14:06:23.776		38.57	-46.88	45680.75	-12.57		
alpha	I	2023-10-24T14:07:44.438		38.67	-46.84	44696.43	-11.76		
4	I	2023-10-24T14:11:07.680		38.90	-46.75	42530.73	-9.54		
5	I	2023-10-24T14:11:34.587		38.94	-46.73	42274.57	-9.26		
6	I	2023-10-24T14:12:26.949		38.99	-46.70	41810.26	-8.57		

No planet occultations

6	E	2023-10-24T14:32:40.978		40.12	-45.78	41795.31	8.58		
5	E	2023-10-24T14:33:38.803		40.16	-45.72	42312.26	9.27		
4	E	2023-10-24T14:34:01.708		40.18	-45.70	42528.55	9.55		
alpha	E	2023-10-24T14:37:23.050		40.31	-45.49	44684.99	11.77		
beta	E	2023-10-24T14:38:44.370		40.36	-45.40	45674.17	12.58		
eta	E	2023-10-24T14:40:39.064		40.43	-45.27	47176.12	13.61		
gamma	E	2023-10-24T14:41:11.492		40.45	-45.24	47621.98	13.89		
delta	E	2023-10-24T14:41:59.651		40.48	-45.18	48300.35	14.28		
lambda	E	2023-10-24T14:43:56.792		40.54	-45.04	50026.71	15.18		
epsilon	E	2023-10-24T14:45:11.097		40.58	-44.95	51173.96	15.55		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-24T14:20:55.670
 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 : 55705176073818496
 2Mass ID (if available) : 03164872+1750105
 ICRS Star Coord at Epoch: 03h 16m 48.71940s +17:50:10.75650s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.744
 G magnitude : 16.365
 RP magnitude : 15.830
 BP magnitude : 16.730
 DUPflag : 0
 Distance (au) : 18.692
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.46
 Sun-Target sep (deg) : 159.05
 Sun-Moon sep (deg) : 78.89
 B (ring opening deg) : 62.94
 PA of pole (deg) : -88.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.839
 C/A sky separation (km) : 38490.9
 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	2023-10-24T14:00:09.077		34.32	-42.99	50754.85	-15.68		
lambda	I	2023-10-24T14:00:56.104		34.38	-42.98	50026.71	-15.32		
delta	I	2023-10-24T14:02:52.021		34.51	-42.95	48300.35	-14.45		
gamma	I	2023-10-24T14:03:39.595		34.57	-42.93	47621.87	-14.07		
eta	I	2023-10-24T14:04:11.581		34.60	-42.92	47176.12	-13.80		
beta	I	2023-10-24T14:06:03.823		34.73	-42.88	45680.69	-12.81		
alpha	I	2023-10-24T14:07:22.808		34.82	-42.85	44696.77	-12.03		
4	I	2023-10-24T14:10:40.205		35.03	-42.77	42531.08	-9.91		
5	I	2023-10-24T14:11:06.222		35.05	-42.76	42273.33	-9.65		
6	I	2023-10-24T14:11:56.125		35.10	-42.74	41810.90	-9.00		

No planet occultations

6	E	2023-10-24T14:33:11.966		36.18	-41.87	41795.18	9.00		
5	E	2023-10-24T14:34:07.343		36.21	-41.82	42312.62	9.65		
4	E	2023-10-24T14:34:29.351		36.23	-41.80	42528.81	9.92		
alpha	E	2023-10-24T14:37:44.859		36.35	-41.62	44685.05	12.04		
beta	E	2023-10-24T14:39:04.504		36.39	-41.54	45673.99	12.82		
eta	E	2023-10-24T14:40:57.299		36.46	-41.43	47176.12	13.82		
gamma	E	2023-10-24T14:41:29.261		36.47	-41.40	47622.01	14.08		
delta	E	2023-10-24T14:42:16.773		36.50	-41.35	48300.35	14.47		
lambda	E	2023-10-24T14:44:12.556		36.55	-41.23	50026.71	15.34		
epsilon	E	2023-10-24T14:45:26.344		36.59	-41.15	51177.41	15.70		