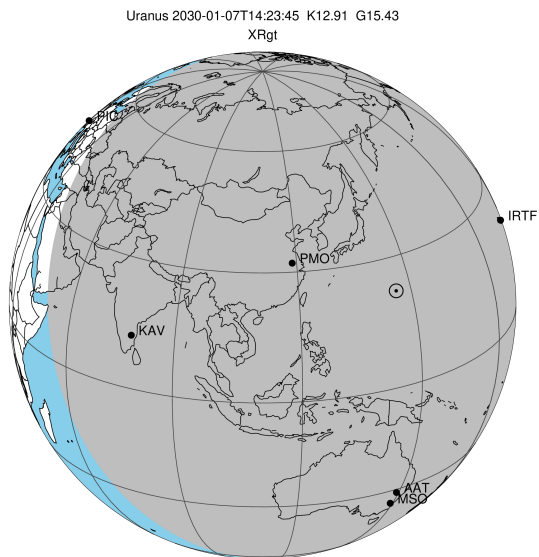


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-01-07T14:23:45.230
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3413211167262512896
 2Mass ID (if available) : 04542391+2237014

ICRS Star Coord at Epoch: 04h 54m 23.93100s +22:37:01.36453s

RUWE (>1.4 is poor) : 1.03
 K magnitude : 12.911
 G magnitude : 15.435
 RP magnitude : 14.636
 BP magnitude : 16.098
 DUPflag : 0
 Distance (au) : 18.378
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.93
 Sun-Target sep (deg) : 147.98
 Sun-Moon sep (deg) : 103.54
 B (ring opening deg) : 81.77
 PA of pole (deg) : -25.89

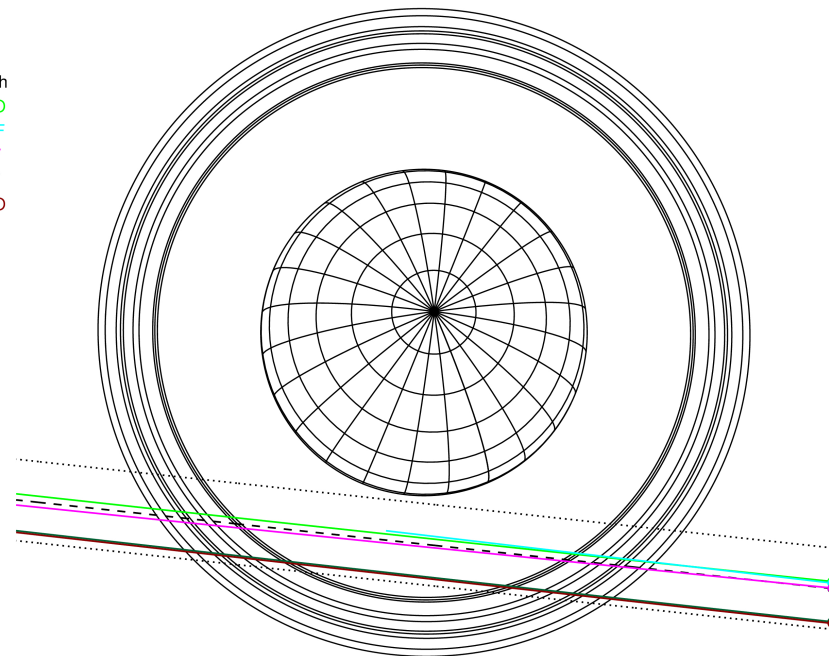
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2030-01-07T14:23:45.2300 α: 04 54 23.9310 α: +22 37 01.365 C/A 2.468° PA 353.80 deg v_sky -18.93 km/s D 18.38 AU
 Credit: Styled after SORA/Lucky Star

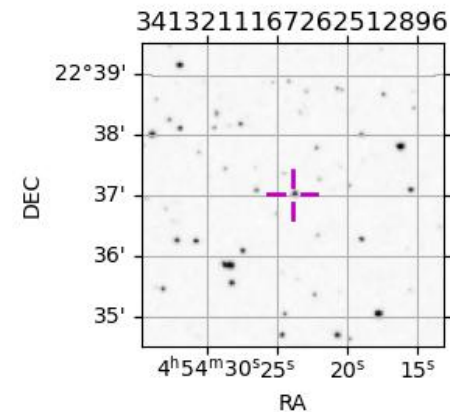
Uranus 2030-01-07T14:23:45 K12.91 G15.43 XRgt

Earth
 PMO
 IRTF
 KAV
 AAT
 MSO

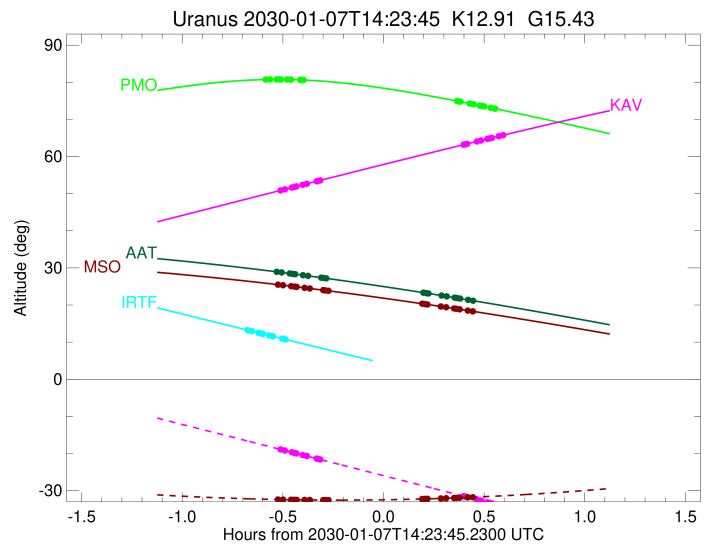
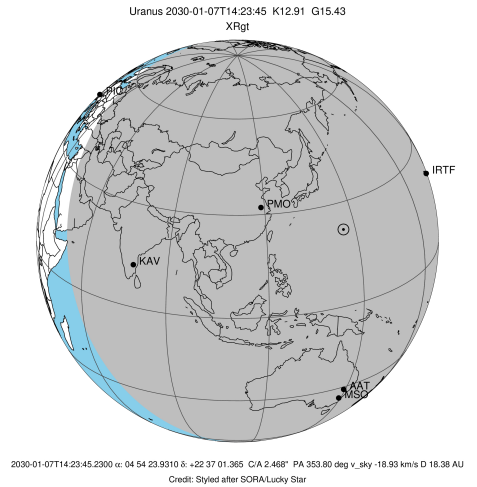


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	JAN 07 13:48 - JAN 07 14:56	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	+++++			JAN 07 13:43 - JAN 07 13:54	PnnRin
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	JAN 07 13:53 - JAN 07 14:59	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	+++++		+++++	JAN 07 13:52 - JAN 07 14:49	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	JAN 07 13:52 - JAN 07 14:49	PnnRie



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-01-07T14:22:59.500
 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 : 3413211167262512896
 2Mass ID (if available) : 04542391+2237014
 ICRS Star Coord at Epoch: 04h 54m 23.93100s +22:37:01.36453s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 12.911
 G magnitude : 15.435
 RP magnitude : 14.636
 BP magnitude : 16.098
 DUPflag : 0
 Distance (au) : 18.378
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.93
 Sun-Target sep (deg) : 147.98
 Sun-Moon sep (deg) : 104.41
 B (ring opening deg) : 81.77
 PA of pole (deg) : -25.89
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.401
 C/A sky separation (km) : 32008.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

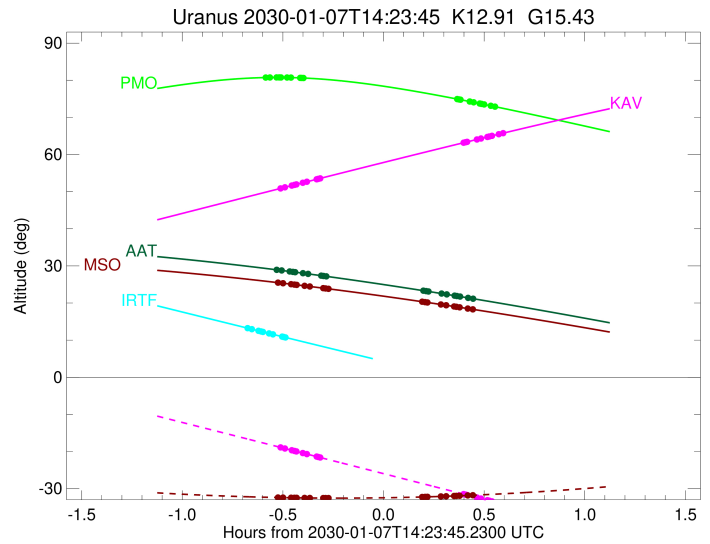
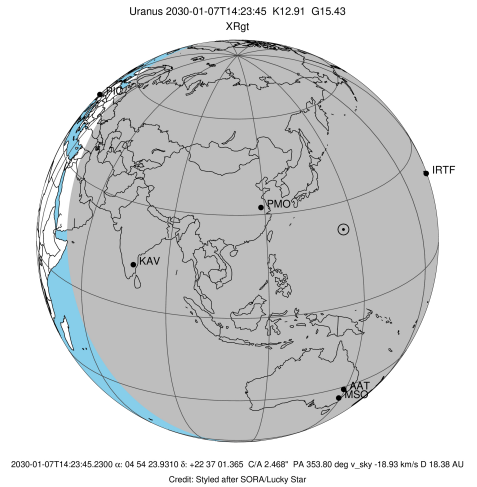


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-01-07T13:48:46.944		80.74	-57.09	51032.98	-14.88		
lambda	I	2030-01-07T13:49:54.620		80.76	-57.33	50026.71	-14.77		
delta	I	2030-01-07T13:51:53.078		80.77	-57.74	48300.35	-14.37		
gamma	I	2030-01-07T13:52:39.950		80.77	-57.91	47630.43	-14.21		
eta	I	2030-01-07T13:53:12.057		80.77	-58.02	47176.12	-14.09		
beta	I	2030-01-07T13:55:00.062		80.75	-58.40	45676.48	-13.66		
alpha	I	2030-01-07T13:56:11.744		80.73	-58.65	44707.24	-13.37		
4	I	2030-01-07T13:58:56.363		80.65	-59.22	42569.13	-12.57		
5	I	2030-01-07T13:59:25.744		80.63	-59.32	42201.82	-12.41		
6	I	2030-01-07T13:59:57.500		80.61	-59.43	41808.87	-12.26		

No planet occultations

6	E	2030-01-07T14:45:38.911		74.96	-68.77	41800.70	12.25		
5	E	2030-01-07T14:46:08.697		74.87	-68.87	42157.37	12.40		
4	E	2030-01-07T14:46:37.609		74.79	-68.96	42526.19	12.56		
alpha	E	2030-01-07T14:49:29.139		74.28	-69.52	44750.01	13.36		
beta	E	2030-01-07T14:50:35.711		74.08	-69.74	45648.15	13.65		
eta	E	2030-01-07T14:52:25.945		73.74	-70.10	47176.12	14.08		
gamma	E	2030-01-07T14:52:58.002		73.64	-70.20	47629.21	14.19		
delta	E	2030-01-07T14:53:45.015		73.50	-70.35	48300.35	14.36		
lambda	E	2030-01-07T14:55:43.617		73.13	-70.73	50026.71	14.75		
epsilon	E	2030-01-07T14:56:35.030		72.98	-70.90	50788.93	14.86		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-01-07T14:18:33.420
 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 : 3413211167262512896
 2Mass ID (if available) : 04542391+2237014
 ICRS Star Coord at Epoch: 04h 54m 23.93100s +22:37:01.36453s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 12.911
 G magnitude : 15.435
 RP magnitude : 14.636
 BP magnitude : 16.098
 DUPflag : 0
 Distance (au) : 18.378
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.93
 Sun-Target sep (deg) : 147.98
 Sun-Moon sep (deg) : 103.40
 B (ring opening deg) : 81.77
 PA of pole (deg) : -25.89
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.366
 C/A sky separation (km) : 31531.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

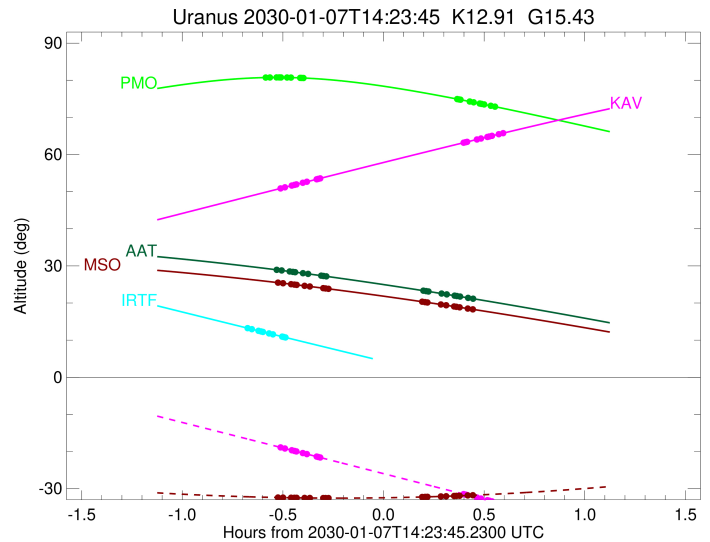
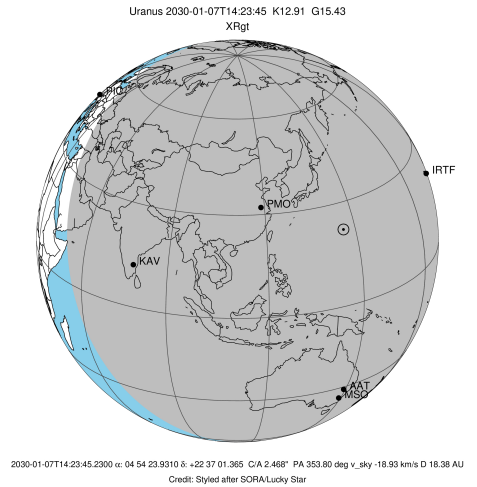


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-01-07T13:43:22.790		13.20	-44.57	51033.63	-14.78		
lambda	I	2030-01-07T13:44:30.959		12.95	-44.31	50026.71	-14.67		
delta	I	2030-01-07T13:46:30.104		12.51	-43.86	48300.35	-14.30		
gamma	I	2030-01-07T13:47:17.209		12.33	-43.68	47630.42	-14.14		
eta	I	2030-01-07T13:47:49.458		12.21	-43.55	47176.12	-14.03		
beta	I	2030-01-07T13:49:37.842		11.81	-43.14	45676.53	-13.63		
alpha	I	2030-01-07T13:50:49.696		11.55	-42.86	44707.08	-13.35		
4	I	2030-01-07T13:53:34.263		10.94	-42.23	42569.44	-12.60		
5	I	2030-01-07T13:54:03.561		10.83	-42.12	42202.35	-12.45		
6	I	2030-01-07T13:54:35.236		10.72	-42.00	41809.11	-12.30		

No planet occultations

6	E	2030-01-07T14:42:12.605		0.31x	-31.11	41801.31	12.24		
5	E	2030-01-07T14:42:42.421		0.20x	-31.00	42157.94	12.38		
4	E	2030-01-07T14:43:11.340		0.10x	-30.89	42526.07	12.53		
alpha	E	2030-01-07T14:46:03.707		-0.52x	-30.24	44750.31	13.27		
beta	E	2030-01-07T14:47:10.717		-0.76x	-29.98	45647.78	13.54		
eta	E	2030-01-07T14:49:01.966		-1.16x	-29.56	47176.12	13.94		
gamma	E	2030-01-07T14:49:34.341		-1.28x	-29.44	47629.11	14.05		
delta	E	2030-01-07T14:50:21.864		-1.45x	-29.26	48300.35	14.20		
lambda	E	2030-01-07T14:52:21.871		-1.87x	-28.81	50026.71	14.56		
epsilon	E	2030-01-07T14:53:14.226		-2.06x	-28.61	50793.06	14.67		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-01-07T14:26:27.950
 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 : 3413211167262512896
 2Mass ID (if available) : 04542391+2237014
 ICRS Star Coord at Epoch: 04h 54m 23.93100s +22:37:01.36453s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 12.911
 G magnitude : 15.435
 RP magnitude : 14.636
 BP magnitude : 16.098
 DUPflag : 0
 Distance (au) : 18.378
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.93
 Sun-Target sep (deg) : 147.98
 Sun-Moon sep (deg) : 104.44
 B (ring opening deg) : 81.77
 PA of pole (deg) : -25.89
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.506
 C/A sky separation (km) : 33397.9
 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

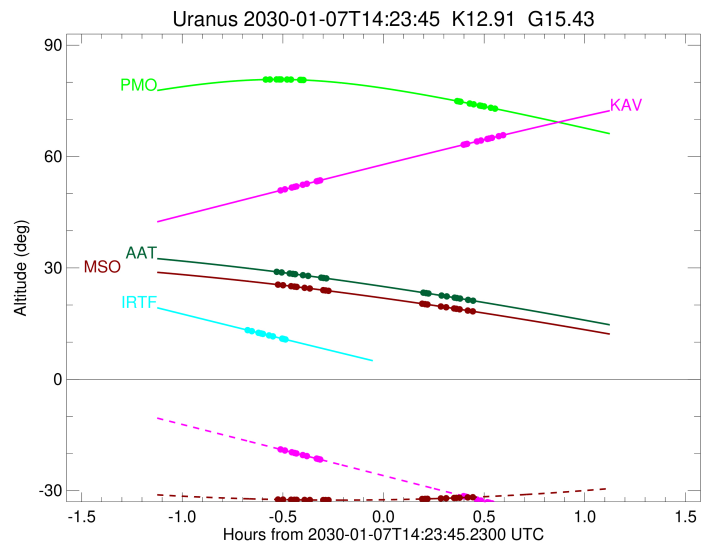
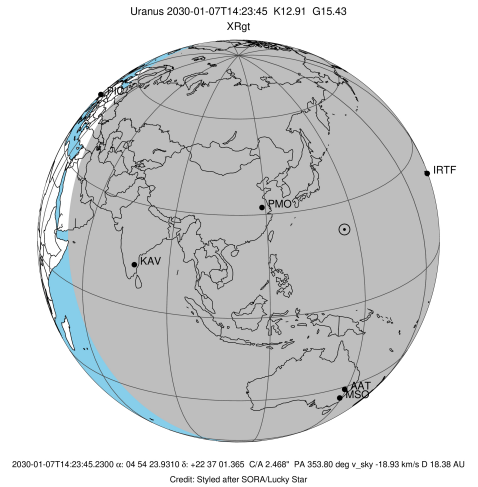


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-01-07T13:53:13.562		50.91	-18.93	51021.14	-14.38		
lambda	I	2030-01-07T13:54:22.789		51.18	-19.19	50026.71	-14.25		
delta	I	2030-01-07T13:56:25.787		51.65	-19.67	48300.35	-13.81		
gamma	I	2030-01-07T13:57:14.604		51.83	-19.85	47630.54	-13.63		
eta	I	2030-01-07T13:57:48.115		51.96	-19.98	47176.12	-13.49		
beta	I	2030-01-07T13:59:41.244		52.39	-20.41	45675.96	-13.01		
alpha	I	2030-01-07T14:00:56.537		52.68	-20.70	44708.56	-12.68		
4	I	2030-01-07T14:03:51.523		53.34	-21.37	42567.01	-11.76		
5	I	2030-01-07T14:04:23.067		53.46	-21.50	42198.36	-11.58		
6	I	2030-01-07T14:04:57.013		53.59	-21.63	41807.35	-11.40		

No planet occultations

6	E	2030-01-07T14:47:33.143		63.17	-31.46	41799.46	11.42		
5	E	2030-01-07T14:48:05.052		63.28	-31.58	42156.32	11.60		
4	E	2030-01-07T14:48:36.031		63.40	-31.70	42526.54	11.79		
alpha	E	2030-01-07T14:51:37.421		64.06	-32.40	44749.31	12.71		
beta	E	2030-01-07T14:52:47.356		64.32	-32.67	45648.94	13.04		
eta	E	2030-01-07T14:54:42.314		64.73	-33.11	47176.12	13.53		
gamma	E	2030-01-07T14:55:15.656		64.85	-33.24	47629.42	13.66		
delta	E	2030-01-07T14:56:04.428		65.03	-33.43	48300.35	13.85		
lambda	E	2030-01-07T14:58:07.086		65.47	-33.90	50026.71	14.29		
epsilon	E	2030-01-07T14:58:59.571		65.66	-34.10	50781.42	14.42		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-01-07T14:21:22.840
 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 : 3413211167262512896
 2Mass ID (if available) : 04542391+2237014
 ICRS Star Coord at Epoch: 04h 54m 23.93100s +22:37:01.36453s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 12.911
 G magnitude : 15.435
 RP magnitude : 14.636
 BP magnitude : 16.098
 DUPflag : 0
 Distance (au) : 18.378
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.93
 Sun-Target sep (deg) : 147.98
 Sun-Moon sep (deg) : 103.82
 B (ring opening deg) : 81.77
 PA of pole (deg) : -25.89
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.851
 C/A sky separation (km) : 37996.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

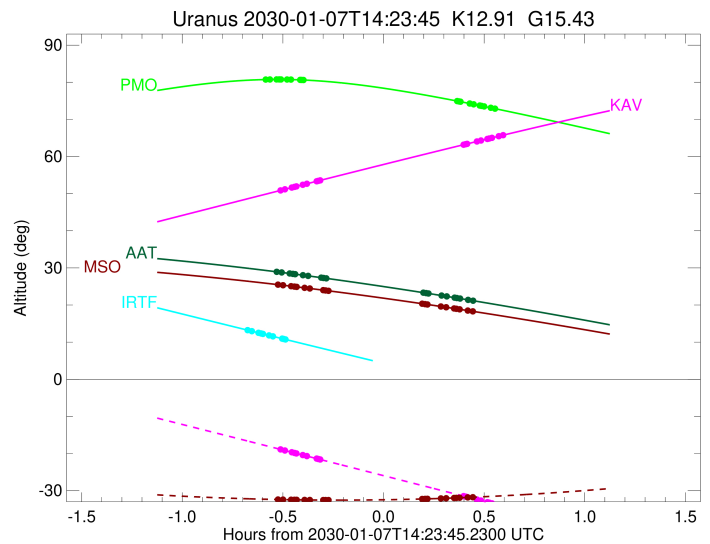
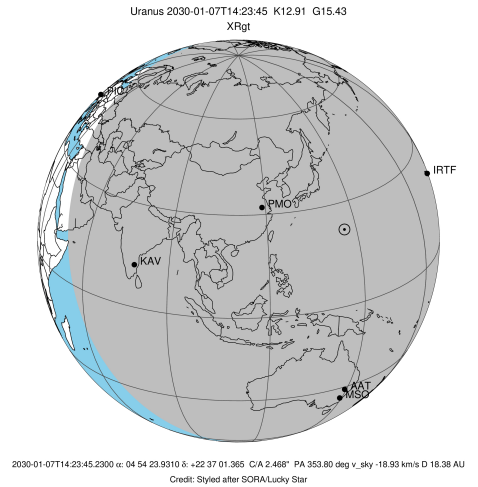


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-01-07T13:52:10.021		28.92	-36.41	50968.80	-12.60		
lambda	I	2030-01-07T13:53:25.099		28.77	-36.43	50026.71	-12.39		
delta	I	2030-01-07T13:55:48.237		28.50	-36.47	48300.35	-11.72		
gamma	I	2030-01-07T13:56:46.036		28.38	-36.49	47630.99	-11.44		
eta	I	2030-01-07T13:57:26.173		28.31	-36.50	47176.12	-11.23		
beta	I	2030-01-07T13:59:44.589		28.03	-36.52	45673.34	-10.46		
alpha	I	2030-01-07T14:01:18.623		27.84	-36.54	44714.75	-9.92		
4	I	2030-01-07T14:05:14.428		27.37	-36.57	42557.32	-8.33		
5	I	2030-01-07T14:05:59.980		27.27	-36.57	42183.31	-8.00		
6	I	2030-01-07T14:06:48.909		27.17	-36.58	41801.16	-7.65		

No planet occultations

6	E	2030-01-07T14:35:30.329		23.35	-36.24	41796.18	7.63		
5	E	2030-01-07T14:36:17.525		23.24	-36.22	42154.83	7.98		
4	E	2030-01-07T14:37:02.527		23.13	-36.20	42528.89	8.31		
alpha	E	2030-01-07T14:41:05.640		22.55	-36.07	44746.51	9.90		
beta	E	2030-01-07T14:42:34.729		22.33	-36.02	45651.59	10.44		
eta	E	2030-01-07T14:44:55.659		21.99	-35.94	47176.12	11.20		
gamma	E	2030-01-07T14:45:35.827		21.89	-35.91	47629.98	11.40		
delta	E	2030-01-07T14:46:33.892		21.75	-35.87	48300.35	11.69		
lambda	E	2030-01-07T14:48:57.500		21.39	-35.78	50026.71	12.34		
epsilon	E	2030-01-07T14:49:56.590		21.24	-35.74	50763.58	12.56		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-01-07T14:21:32.070
 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 : 3413211167262512896
 2Mass ID (if available) : 04542391+2237014
 ICRS Star Coord at Epoch: 04h 54m 23.93100s +22:37:01.36453s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 12.911
 G magnitude : 15.435
 RP magnitude : 14.636
 BP magnitude : 16.098
 DUPflag : 0
 Distance (au) : 18.378
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.93
 Sun-Target sep (deg) : 147.98
 Sun-Moon sep (deg) : 103.77
 B (ring opening deg) : 81.77
 PA of pole (deg) : -25.89
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.870
 C/A sky separation (km) : 38249.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.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	2030-01-07T13:52:33.292		25.46	-32.40	50966.05	-12.48		
lambda	I	2030-01-07T13:53:48.908		25.33	-32.42	50026.71	-12.26		
delta	I	2030-01-07T13:56:13.681		25.07	-32.45	48300.35	-11.58		
gamma	I	2030-01-07T13:57:12.223		24.96	-32.47	47631.01	-11.29		
eta	I	2030-01-07T13:57:52.914		24.89	-32.47	47176.12	-11.07		
beta	I	2030-01-07T14:00:13.504		24.63	-32.50	45673.18	-10.29		
alpha	I	2030-01-07T14:01:49.228		24.45	-32.51	44715.12	-9.73		
4	I	2030-01-07T14:05:51.024		24.00	-32.54	42556.72	-8.08		
5	I	2030-01-07T14:06:38.096		23.91	-32.54	42182.41	-7.73		
6	I	2030-01-07T14:07:28.757		23.81	-32.55	41800.81	-7.36		

No planet occultations

6	E	2030-01-07T14:35:08.641		20.37	-32.25	41796.01	7.35		
5	E	2030-01-07T14:35:57.572		20.27	-32.23	42154.86	7.72		
4	E	2030-01-07T14:36:44.084		20.16	-32.21	42529.13	8.06		
alpha	E	2030-01-07T14:40:53.177		19.61	-32.10	44746.29	9.71		
beta	E	2030-01-07T14:42:23.944		19.40	-32.05	45651.77	10.26		
eta	E	2030-01-07T14:44:47.036		19.07	-31.98	47176.12	11.04		
gamma	E	2030-01-07T14:45:27.753		18.98	-31.95	47630.02	11.25		
delta	E	2030-01-07T14:46:26.556		18.85	-31.92	48300.35	11.55		
lambda	E	2030-01-07T14:48:51.781		18.51	-31.83	50026.71	12.22		
epsilon	E	2030-01-07T14:49:51.384		18.37	-31.79	50762.60	12.44		