

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-08T18:34:01.330
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377546613535203200
 2Mass ID (if available) : 06184407+2338225

ICRS Star Coord at Epoch: 06h 18m 44.10328s +23:38:22.42571s

RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.077
 G magnitude : 17.044
 RP magnitude : 16.090
 BP magnitude : 18.006
 DUPflag : 0
 Distance (au) : 18.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.96
 Sun-Target sep (deg) : 162.22
 Sun-Moon sep (deg) : 15.79
 B (ring opening deg) : 71.58
 PA of pole (deg) : 65.80

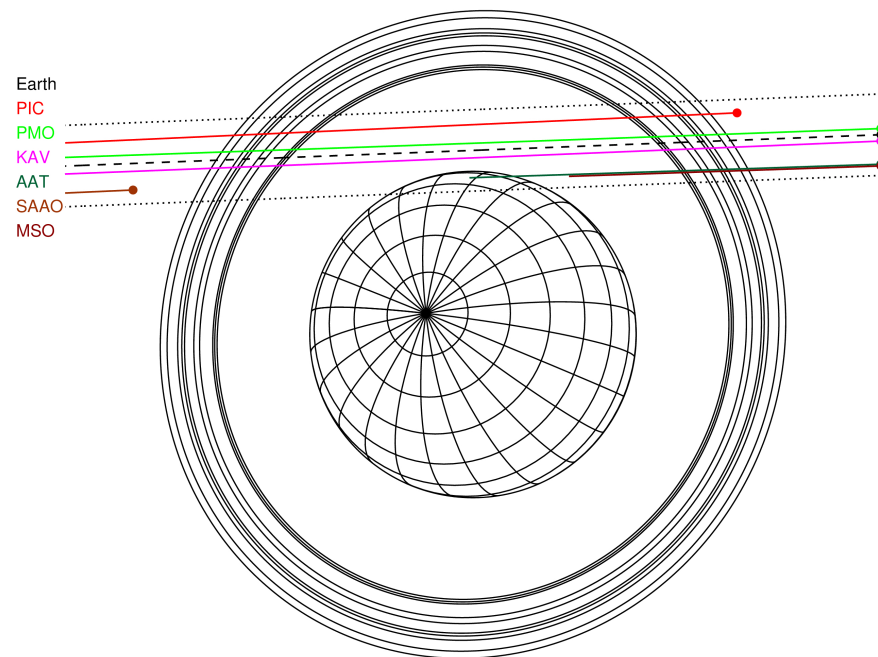
a(km) ring

- 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



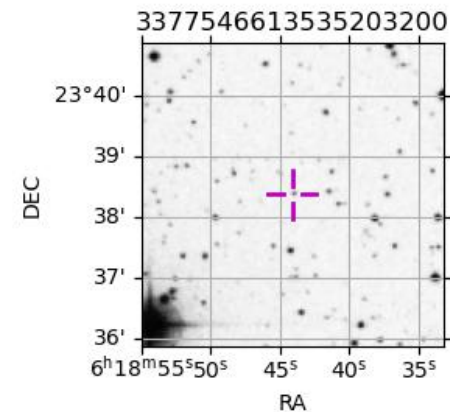
2033-12-08T18:34:01.3300 ex: 06 18 44.1033 s: +23 38 22.426 C/A 2.213° PA 182.20 deg v_sky -21.96 km/s D 18.02 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-12-08T18:34:01 K14.08 G17.04 PtRgt

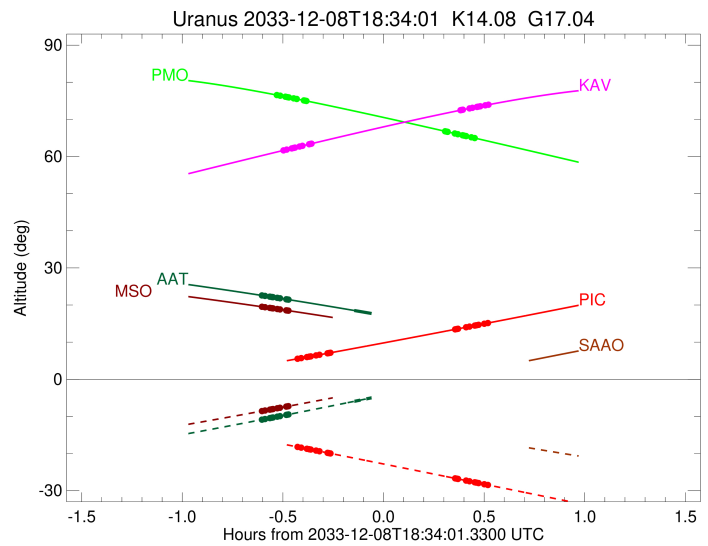
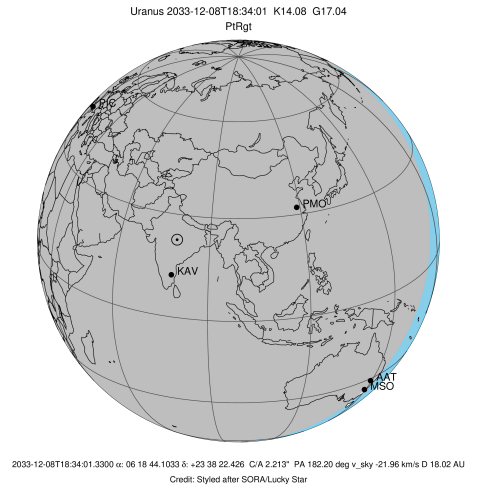


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 08 18:08 - DEC 08 19:05	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	DEC 08 18:02 - DEC 08 19:01	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	+++++		+++++	DEC 08 18:04 - DEC 08 19:05	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	+++++	+		DEC 08 17:58 - DEC 08 18:25	PinRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++			DEC 08 17:58 - DEC 08 18:05	PnnRin



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-08T18:37:49.650
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3377546613535203200
 2Mass ID (if available) : 06184407+2338225
 ICRS Star Coord at Epoch: 06h 18m 44.10328s +23:38:22.42571s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.077
 G magnitude : 17.044
 RP magnitude : 16.090
 BP magnitude : 18.006
 DUPflag : 0
 Distance (au) : 18.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.96
 Sun-Target sep (deg) : 162.22
 Sun-Moon sep (deg) : 16.70
 B (ring opening deg) : 71.58
 PA of pole (deg) : 65.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.512
 C/A sky separation (km) : 32828.2
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

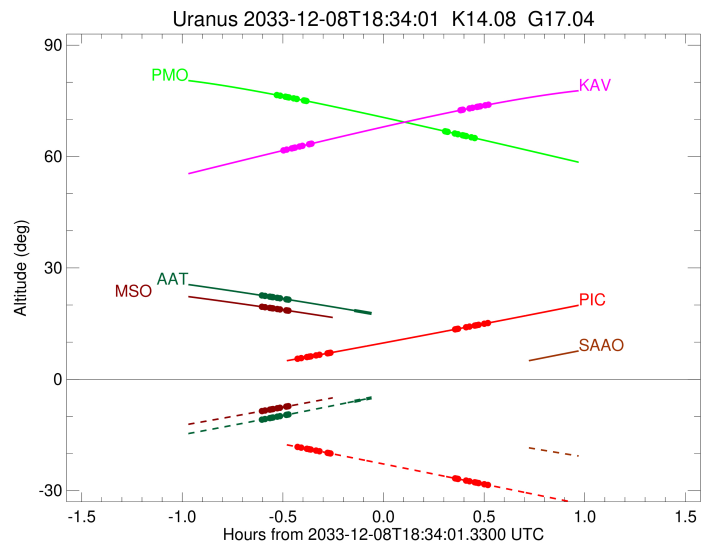
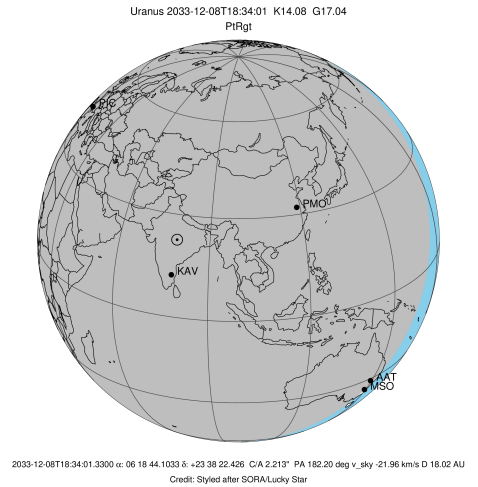


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-08T18:08:48.126		5.59	-18.30	50744.00	-17.27		
lambda	I	2033-12-08T18:09:29.891		5.70	-18.43	50026.71	-17.08		
delta	I	2033-12-08T18:11:12.422		5.98	-18.73	48300.35	-16.59		
gamma	I	2033-12-08T18:11:53.566		6.09	-18.85	47622.26	-16.37		
eta	I	2033-12-08T18:12:20.937		6.17	-18.93	47176.12	-16.23		
beta	I	2033-12-08T18:13:54.704		6.43	-19.21	45679.32	-15.69		
alpha	I	2033-12-08T18:14:55.080		6.59	-19.39	44743.01	-15.32		
4	I	2033-12-08T18:17:22.818		7.00	-19.83	42555.64	-14.32		
5	I	2033-12-08T18:17:48.298		7.07	-19.91	42189.83	-14.07		
6	I	2033-12-08T18:18:10.592		7.13	-19.97	41876.79	-13.93		

No planet occultations

6	E	2033-12-08T18:55:23.226		13.45	-26.70	41862.43	13.97		
5	E	2033-12-08T18:55:44.648		13.51	-26.76	42159.83	14.11		
4	E	2033-12-08T18:56:16.166		13.60	-26.86	42609.45	14.36		
alpha	E	2033-12-08T18:58:39.134		14.01	-27.29	44744.31	15.37		
beta	E	2033-12-08T18:59:37.929		14.18	-27.47	45653.63	15.74		
eta	E	2033-12-08T19:01:12.934		14.46	-27.76	47176.12	16.28		
gamma	E	2033-12-08T19:01:40.246		14.54	-27.84	47622.90	16.43		
delta	E	2033-12-08T19:02:21.202		14.66	-27.97	48300.35	16.65		
lambda	E	2033-12-08T19:04:03.339		14.95	-28.28	50026.71	17.15		
epsilon	E	2033-12-08T19:05:12.742		15.16	-28.49	51227.74	17.34		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-08T18:32:36.550
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3377546613535203200
 2Mass ID (if available) : 06184407+2338225
 ICRS Star Coord at Epoch: 06h 18m 44.10328s +23:38:22.42571s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.077
 G magnitude : 17.044
 RP magnitude : 16.090
 BP magnitude : 18.006
 DUPflag : 0
 Distance (au) : 18.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.96
 Sun-Target sep (deg) : 162.22
 Sun-Moon sep (deg) : 15.85
 B (ring opening deg) : 71.58
 PA of pole (deg) : 65.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.290
 C/A sky separation (km) : 29928.8
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



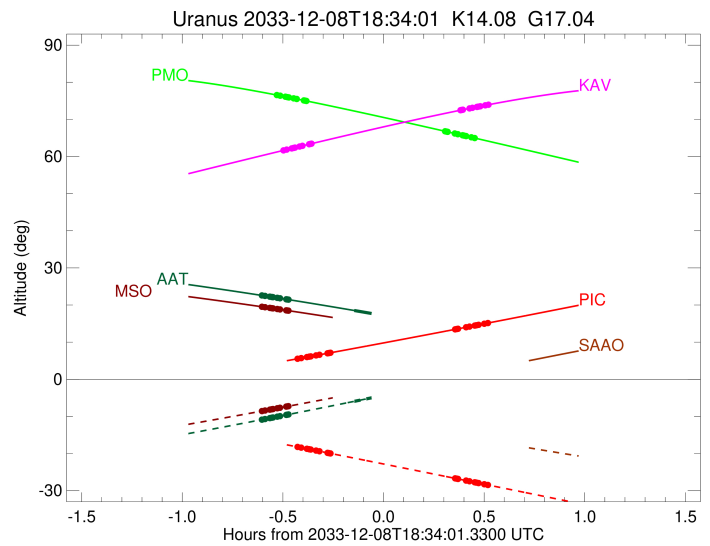
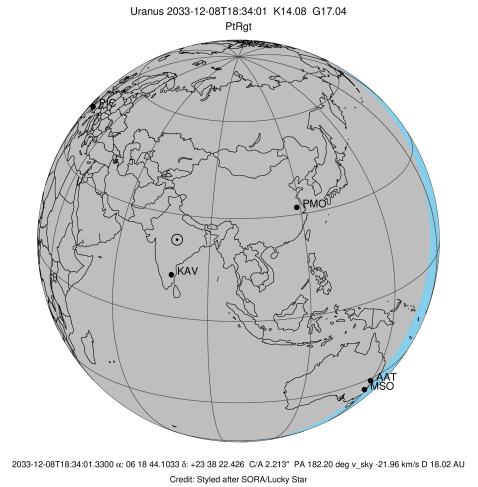
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-08T18:02:35.447		76.50	-60.74	50743.74	-18.73		
lambda	I	2033-12-08T18:03:13.884		76.38	-60.61	50026.71	-18.58		
delta	I	2033-12-08T18:04:47.781		76.11	-60.28	48300.35	-18.18		
gamma	I	2033-12-08T18:05:25.223		76.00	-60.15	47622.59	-18.01		
eta	I	2033-12-08T18:05:50.085		75.92	-60.07	47176.12	-17.90		
beta	I	2033-12-08T18:07:14.637		75.67	-59.77	45680.07	-17.48		
alpha	I	2033-12-08T18:08:08.836		75.51	-59.58	44740.49	-17.20		
4	I	2033-12-08T18:10:19.273		75.11	-59.13	42550.97	-16.42		
5	I	2033-12-08T18:10:40.528		75.04	-59.05	42197.70	-16.23		
6	I	2033-12-08T18:11:00.420		74.98	-58.98	41874.71	-16.13		

No planet occultations

6	E	2033-12-08T18:52:23.896		66.80	-50.24	41858.93	16.12		
5	E	2033-12-08T18:52:42.897		66.74	-50.17	42162.87	16.21		
4	E	2033-12-08T18:53:10.243		66.64	-50.08	42611.58	16.41		
alpha	E	2033-12-08T18:55:16.622		66.21	-49.63	44742.37	17.18		
beta	E	2033-12-08T18:56:09.467		66.03	-49.44	45652.16	17.46		
eta	E	2033-12-08T18:57:35.645		65.73	-49.14	47176.12	17.88		
gamma	E	2033-12-08T18:58:00.569		65.64	-49.05	47623.21	17.99		
delta	E	2033-12-08T18:58:38.021		65.51	-48.92	48300.35	18.16		
lambda	E	2033-12-08T19:00:12.032		65.19	-48.59	50026.71	18.56		
epsilon	E	2033-12-08T19:01:17.677		64.96	-48.35	51253.16	18.70		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-08T18:35:36.830
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3377546613535203200
 2Mass ID (if available) : 06184407+2338225
 ICRS Star Coord at Epoch: 06h 18m 44.10328s +23:38:22.42571s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.077
 G magnitude : 17.044
 RP magnitude : 16.090
 BP magnitude : 18.006
 DUPflag : 0
 Distance (au) : 18.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.96
 Sun-Target sep (deg) : 162.22
 Sun-Moon sep (deg) : 16.28
 B (ring opening deg) : 71.58
 PA of pole (deg) : 65.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.115
 C/A sky separation (km) : 27638.1
 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



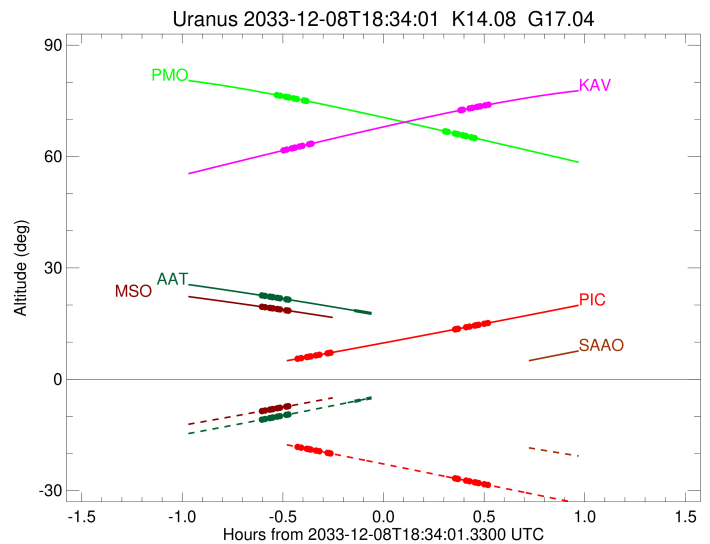
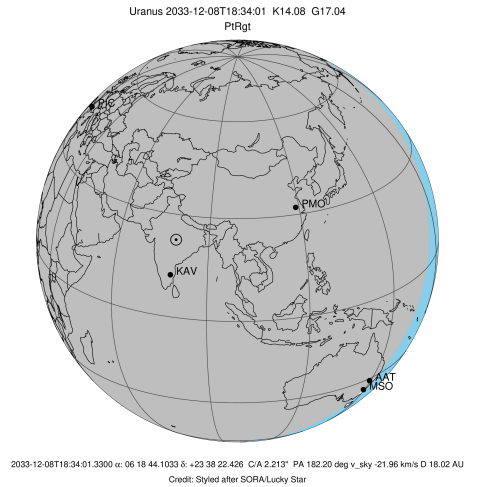
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-08T18:04:33.345		61.73	-77.17	50744.93	-19.48		
lambda	I	2033-12-08T18:05:10.316		61.87	-77.25	50026.71	-19.36		
delta	I	2033-12-08T18:06:40.197		62.19	-77.46	48300.35	-19.04		
gamma	I	2033-12-08T18:07:15.902		62.32	-77.54	47622.82	-18.91		
eta	I	2033-12-08T18:07:39.587		62.41	-77.59	47176.12	-18.81		
beta	I	2033-12-08T18:08:59.797		62.70	-77.77	45680.45	-18.47		
alpha	I	2033-12-08T18:09:51.098		62.88	-77.87	44738.82	-18.25		
4	I	2033-12-08T18:11:53.414		63.32	-78.12	42548.21	-17.63		
5	I	2033-12-08T18:12:12.667		63.39	-78.16	42202.81	-17.47		
6	I	2033-12-08T18:12:31.508		63.46	-78.20	41873.18	-17.40		

No planet occultations

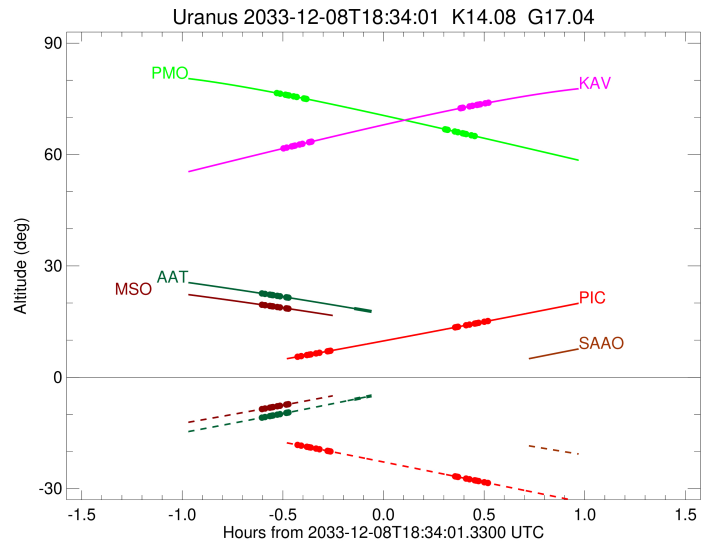
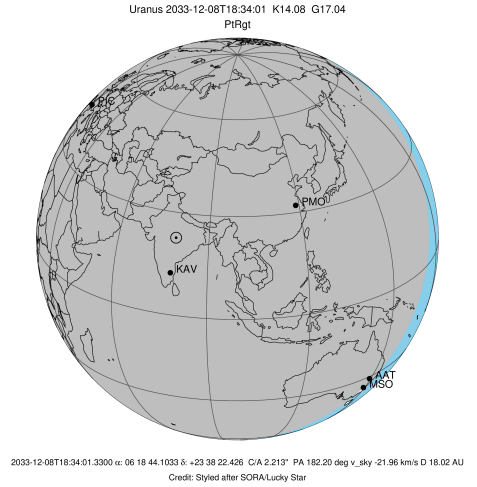
6	E	2033-12-08T18:56:59.552		72.48	-78.63	41855.89	17.42		
5	E	2033-12-08T18:57:17.485		72.54	-78.60	42165.91	17.50		
4	E	2033-12-08T18:57:42.694		72.61	-78.56	42613.08	17.65		
alpha	E	2033-12-08T18:59:40.678		72.97	-78.35	44740.56	18.28		
beta	E	2033-12-08T19:00:30.474		73.12	-78.25	45650.92	18.50		
eta	E	2033-12-08T19:01:52.073		73.36	-78.09	47176.12	18.85		
gamma	E	2033-12-08T19:02:15.750		73.43	-78.05	47623.50	18.94		
delta	E	2033-12-08T19:02:51.350		73.53	-77.97	48300.35	19.08		
lambda	E	2033-12-08T19:04:21.053		73.79	-77.79	50026.71	19.40		
epsilon	E	2033-12-08T19:05:25.104		73.98	-77.65	51276.43	19.52		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-08T18:30:37.840
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3377546613535203200
 2Mass ID (if available) : 06184407+2338225
 ICRS Star Coord at Epoch: 06h 18m 44.10328s +23:38:22.42571s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.077
 G magnitude : 17.044
 RP magnitude : 16.090
 BP magnitude : 18.006
 DUPflag : 0
 Distance (au) : 18.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.96
 Sun-Target sep (deg) : 162.22
 Sun-Moon sep (deg) : 15.06
 B (ring opening deg) : 71.58
 PA of pole (deg) : 65.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.879
 C/A sky separation (km) : 24547.8
 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	2033-12-08T17:58:06.555		22.53	-10.82	50748.89	-20.25		
lambda	I	2033-12-08T17:58:42.273		22.45	-10.71	50026.71	-20.17		
delta	I	2033-12-08T18:00:08.364		22.25	-10.46	48300.35	-19.93		
gamma	I	2033-12-08T18:00:42.429		22.17	-10.36	47623.18	-19.83		
eta	I	2033-12-08T18:01:05.018		22.11	-10.30	47176.12	-19.76		
beta	I	2033-12-08T18:02:21.174		21.93	-10.07	45680.87	-19.50		
alpha	I	2033-12-08T18:03:09.849		21.82	-9.93	44736.18	-19.33		
4	I	2033-12-08T18:05:04.748		21.54	-9.59	42544.38	-18.88		
5	I	2033-12-08T18:05:21.999		21.50	-9.54	42210.51	-18.76		
6	I	2033-12-08T18:05:40.078		21.46	-9.49	41870.63	-18.71		
Uranus	I	2033-12-08T18:25:20.236		18.52	-5.94	25542.54		3.15	3.30
Uranus	E	2033-12-08T18:35:19.680		16.95	-4.10x	25333.91		11.81	12.35
6	E	2033-12-08T18:54:07.636		13.90	-0.56x	41852.42	18.66		
5	E	2033-12-08T18:54:24.775		13.85	-0.51x	42169.75	18.71		
4	E	2033-12-08T18:54:48.168		13.78	-0.43x	42614.43	18.83		
alpha	E	2033-12-08T18:56:39.296		13.47	-0.08x	44738.45	19.28		
beta	E	2033-12-08T18:57:26.638		13.34	0.07x	45649.63	19.44		
eta	E	2033-12-08T18:58:44.586		13.12	0.32x	47176.12	19.69		
gamma	E	2033-12-08T18:59:07.280		13.06	0.39x	47623.83	19.76		
delta	E	2033-12-08T18:59:41.424		12.96	0.50x	48300.35	19.86		
lambda	E	2033-12-08T19:01:07.806		12.72	0.77x	50026.71	20.10		
epsilon	E	2033-12-08T19:02:10.940		12.54	0.98x	51300.95	20.18		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-08T18:30:46.250
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3377546613535203200
 2Mass ID (if available) : 06184407+2338225
 ICRS Star Coord at Epoch: 06h 18m 44.10328s +23:38:22.42571s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.077
 G magnitude : 17.044
 RP magnitude : 16.090
 BP magnitude : 18.006
 DUPflag : 0
 Distance (au) : 18.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.96
 Sun-Target sep (deg) : 162.22
 Sun-Moon sep (deg) : 15.06
 B (ring opening deg) : 71.58
 PA of pole (deg) : 65.80
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.857
 C/A sky separation (km) : 24260.7
 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	2033-12-08T17:58:07.389		19.49	-8.52	50749.31	-20.31		
lambda	I	2033-12-08T17:58:43.018		19.41	-8.42	50026.71	-20.24		
delta	I	2033-12-08T18:00:08.821		19.22	-8.18	48300.35	-20.00		
gamma	I	2033-12-08T18:00:42.761		19.14	-8.08	47623.21	-19.90		
eta	I	2033-12-08T18:01:05.267		19.09	-8.02	47176.12	-19.83		
beta	I	2033-12-08T18:02:21.115		18.93	-7.81	45680.90	-19.58		
alpha	I	2033-12-08T18:03:09.592		18.82	-7.68	44735.96	-19.42		
4	I	2033-12-08T18:05:03.931		18.56	-7.36	42544.09	-18.98		
5	I	2033-12-08T18:05:21.033		18.52	-7.31	42211.14	-18.86		
6	I	2033-12-08T18:05:39.056		18.48	-7.26	41870.41	-18.81		
Uranus	I	2033-12-08T18:24:45.626		15.81	-3.98x	25548.97		2.46	2.58
Uranus	E	2033-12-08T18:36:11.509		14.12	-1.98x	25313.00		12.36	12.93
6	E	2033-12-08T18:54:26.356		11.32	1.30x	41852.07	18.77		
5	E	2033-12-08T18:54:43.437		11.27	1.35x	42170.16	18.81		
4	E	2033-12-08T18:55:06.677		11.21	1.42x	42614.54	18.93		
alpha	E	2033-12-08T18:56:57.233		10.92	1.76x	44738.23	19.37		
beta	E	2033-12-08T18:57:44.366		10.80	1.90x	45649.50	19.53		
eta	E	2033-12-08T18:59:01.996		10.59	2.14x	47176.12	19.77		
gamma	E	2033-12-08T18:59:24.604		10.53	2.21x	47623.87	19.84		
delta	E	2033-12-08T18:59:58.618		10.44	2.31x	48300.35	19.94		
lambda	E	2033-12-08T19:01:24.698		10.21	2.57x	50026.71	20.17		
epsilon	E	2033-12-08T19:02:27.756		10.04	2.77x	51303.48	20.24		