

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-23T19:05:12.960
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 865639702049428480
 2Mass ID (if available) : 07313899+2216252

Uranus 2038-01-23T19:05:12 K13.98 G16.88 PgtRgt

ICRS Star Coord at Epoch: 07h 31m 38.99715s +22:16:24.91875s

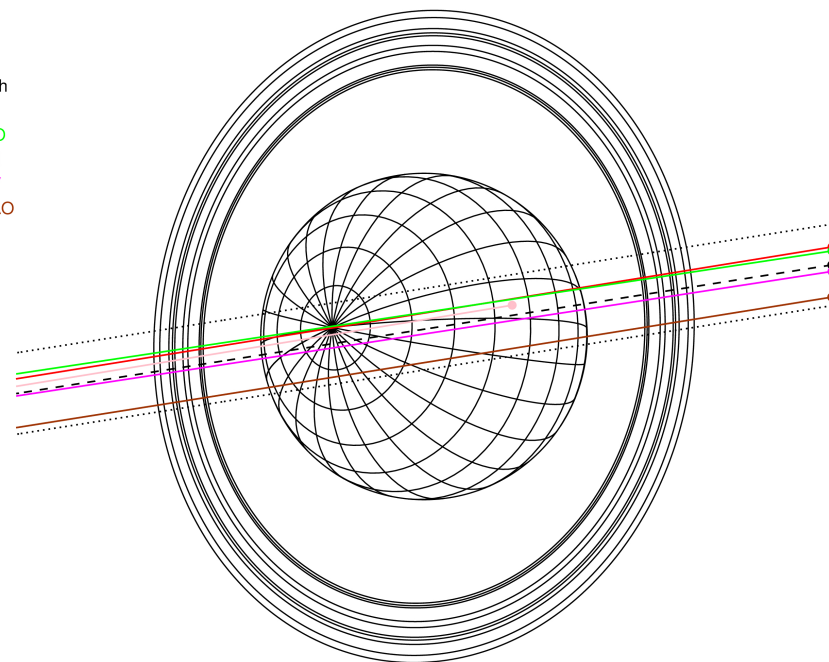
RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.977
 G magnitude : 16.877
 RP magnitude : 15.923
 BP magnitude : 17.801
 DUPflag : 0
 Distance (au) : 17.739
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.61
 Sun-Target sep (deg) : 167.76
 Sun-Moon sep (deg) : 47.23
 B (ring opening deg) : 55.63
 PA of pole (deg) : 84.39

Uranus 2038-01-23T19:05:12 K13.98 G16.88
 PgtRgt



2038-01-23T19:05:12.9600 ra: 07 31 38.9971 s: +22 16 24.919 C/A 0.095° PA 188.96 deg v_sky -22.61 km/s D 17.74 AU
 Credit: Styled after SORA/Lucky Star

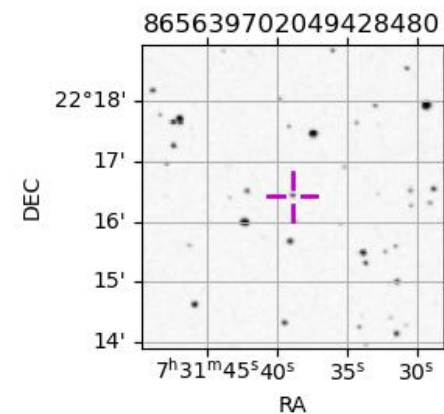
Earth
 PIC
 PMO
 TEN
 KAV
 SAAO



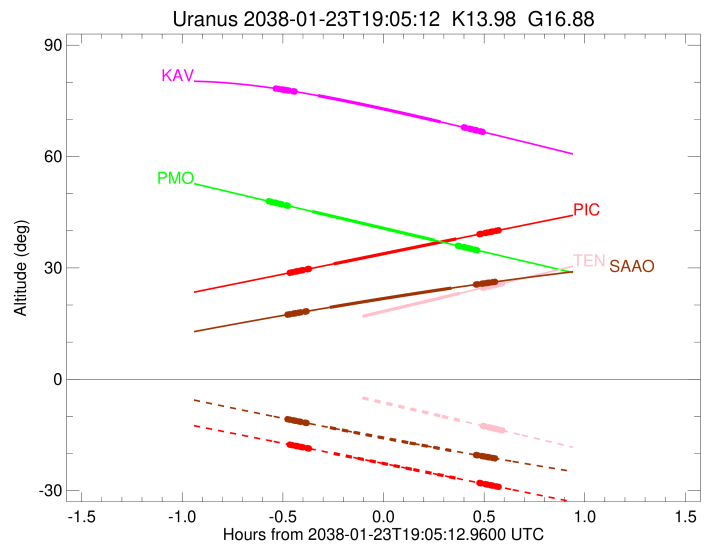
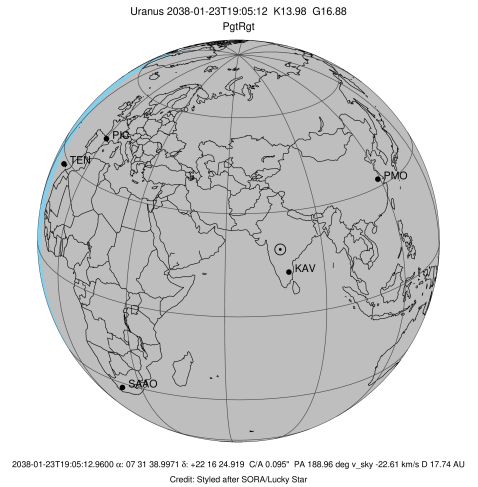
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++	+ +	+++++	JAN 23 18:37 - JAN 23 19:39	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	JAN 23 18:31 - JAN 23 19:33	PieRie
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		+	+++++	JAN 23 19:27 - JAN 23 19:40	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	JAN 23 18:33 - JAN 23 19:34	PieRie
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	+++++	+ +	+++++	JAN 23 18:36 - JAN 23 19:38	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

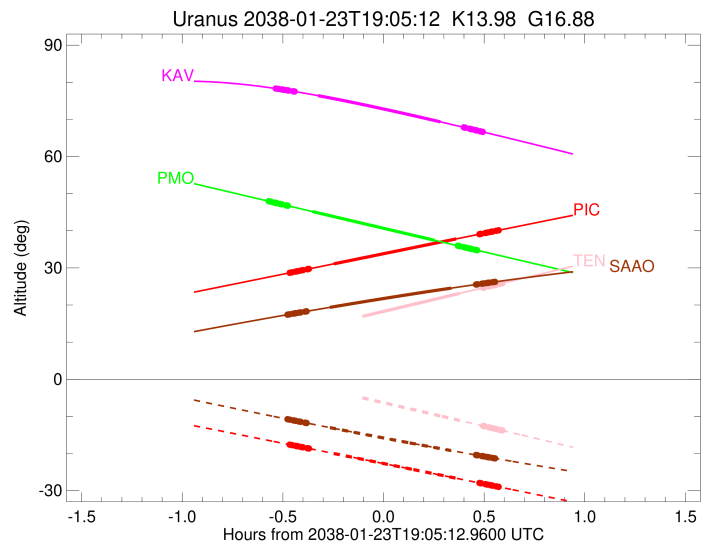
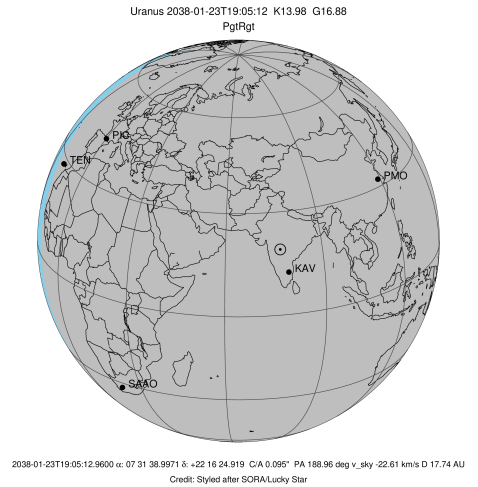


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-23T19:08:38.070
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 865639702049428480
 2Mass ID (if available) : 07313899+2216252
 ICRS Star Coord at Epoch: 07h 31m 38.99715s +22:16:24.91875s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.977
 G magnitude : 16.877
 RP magnitude : 15.923
 BP magnitude : 17.801
 DUPflag : 0
 Distance (au) : 17.739
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.61
 Sun-Target sep (deg) : 167.76
 Sun-Moon sep (deg) : 48.10
 B (ring opening deg) : 55.63
 PA of pole (deg) : 84.39
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.281
 C/A sky separation (km) : 3614.7
 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



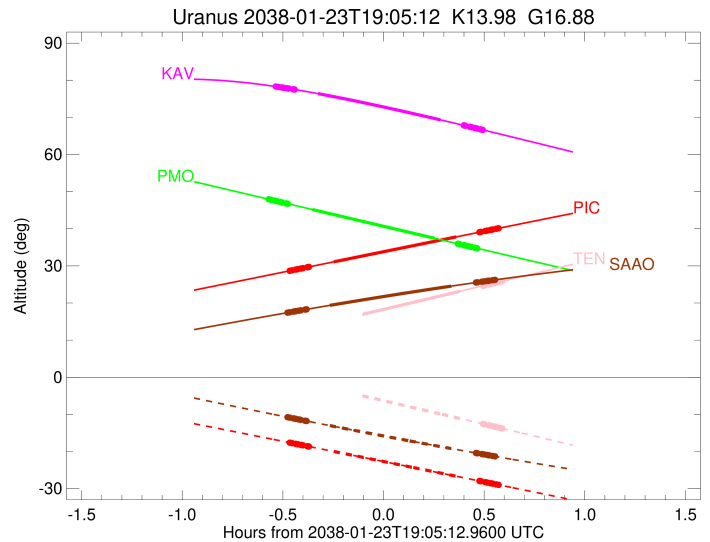
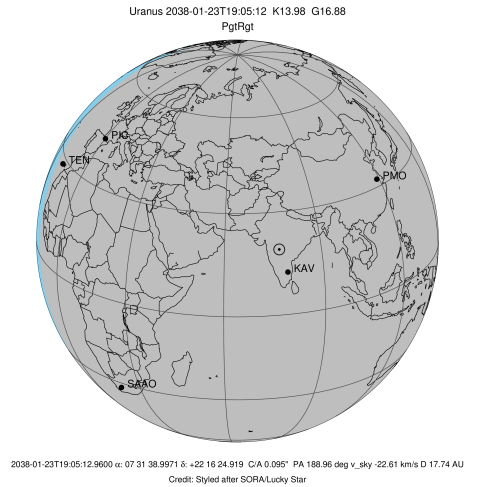
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-23T18:37:21.449		28.70	-17.64	51012.75	-27.20		
lambda	I	2038-01-23T18:37:57.723		28.81	-17.74	50026.71	-27.18		
delta	I	2038-01-23T18:39:01.238		29.00	-17.94	48300.35	-27.18		
gamma	I	2038-01-23T18:39:25.858		29.08	-18.01	47631.23	-27.18		
eta	I	2038-01-23T18:39:42.605		29.13	-18.06	47176.12	-27.17		
beta	I	2038-01-23T18:40:39.141		29.30	-18.23	45642.02	-27.17		
alpha	I	2038-01-23T18:41:13.936		29.41	-18.34	44692.23	-27.17		
4	I	2038-01-23T18:42:32.431		29.65	-18.57	42553.94	-27.15		
5	I	2038-01-23T18:42:40.921		29.67	-18.60	42313.89	-27.14		
6	I	2038-01-23T18:43:00.134		29.73	-18.66	41838.61	-27.17		
Uranus	I	2038-01-23T18:50:21.891		31.09	-19.99	25221.00		-31.30	-32.48
Uranus	E	2038-01-23T19:26:50.777		37.80	-26.65	25166.27		34.12	35.35
6	E	2038-01-23T19:33:48.026		39.08	-27.93	41828.34	27.24		
5	E	2038-01-23T19:34:01.844		39.12	-27.97	42154.83	27.22		
4	E	2038-01-23T19:34:17.625		39.17	-28.02	42595.47	27.23		
alpha	E	2038-01-23T19:35:36.284		39.41	-28.26	44747.97	27.25		
beta	E	2038-01-23T19:36:10.322		39.51	-28.36	45679.01	27.25		
eta	E	2038-01-23T19:37:05.341		39.68	-28.53	47176.12	27.26		
gamma	E	2038-01-23T19:37:21.685		39.73	-28.58	47621.65	27.26		
delta	E	2038-01-23T19:37:46.580		39.81	-28.66	48300.35	27.26		
lambda	E	2038-01-23T19:38:49.892		40.00	-28.85	50026.71	27.27		
epsilon	E	2038-01-23T19:39:37.840		40.15	-29.00	51334.44	27.29		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-23T19:02:13.930
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 865639702049428480
 2Mass ID (if available) : 07313899+2216252
 ICRS Star Coord at Epoch: 07h 31m 38.99715s +22:16:24.91875s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.977
 G magnitude : 16.877
 RP magnitude : 15.923
 BP magnitude : 17.801
 DUPflag : 0
 Distance (au) : 17.739
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.61
 Sun-Target sep (deg) : 167.76
 Sun-Moon sep (deg) : 47.25
 B (ring opening deg) : 55.63
 PA of pole (deg) : 84.39
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.289
 C/A sky separation (km) : 3714.1
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



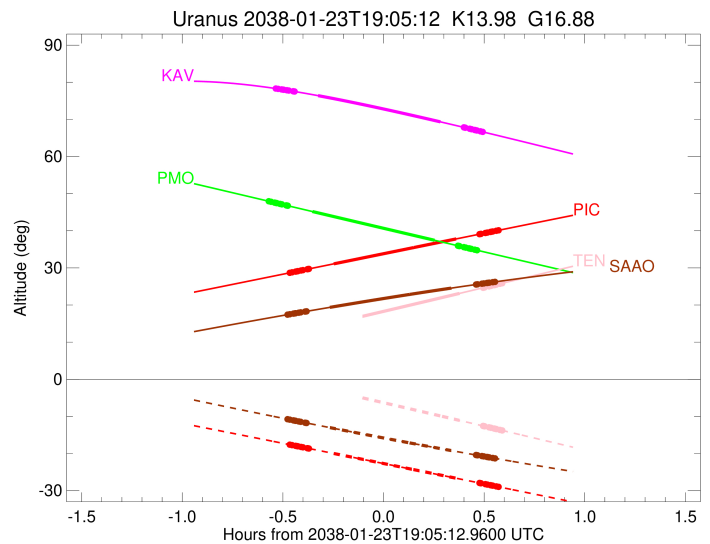
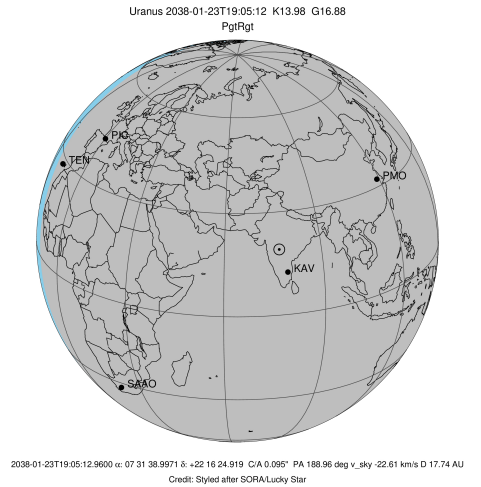
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-23T18:31:06.014		47.94	-57.32	51010.03	-27.37		
lambda	I	2038-01-23T18:31:41.969		47.81	-57.20	50026.71	-27.35		
delta	I	2038-01-23T18:32:45.108		47.58	-56.98	48300.35	-27.34		
gamma	I	2038-01-23T18:33:09.585		47.50	-56.90	47631.22	-27.34		
eta	I	2038-01-23T18:33:26.235		47.44	-56.84	47176.12	-27.33		
beta	I	2038-01-23T18:34:22.447		47.24	-56.65	45642.07	-27.33		
alpha	I	2038-01-23T18:34:57.055		47.12	-56.53	44692.08	-27.32		
4	I	2038-01-23T18:36:15.118		46.84	-56.26	42553.66	-27.30		
5	I	2038-01-23T18:36:23.546		46.81	-56.23	42313.98	-27.29		
6	I	2038-01-23T18:36:42.656		46.74	-56.16	41838.89	-27.32		
Uranus	I	2038-01-23T18:44:01.476		45.18	-54.65	25219.09		-31.40	-32.59
Uranus	E	2038-01-23T19:20:25.307		37.45	-47.01	25165.07		34.18	35.41
6	E	2038-01-23T19:27:22.202		35.97	-45.54	41827.88	27.22		
5	E	2038-01-23T19:27:36.052		35.93	-45.49	42154.82	27.20		
4	E	2038-01-23T19:27:51.857		35.87	-45.44	42595.89	27.21		
alpha	E	2038-01-23T19:29:10.566		35.59	-45.16	44748.15	27.22		
beta	E	2038-01-23T19:29:44.629		35.47	-45.04	45678.91	27.23		
eta	E	2038-01-23T19:30:39.708		35.28	-44.85	47176.12	27.23		
gamma	E	2038-01-23T19:30:56.071		35.22	-44.79	47621.68	27.23		
delta	E	2038-01-23T19:31:20.993		35.13	-44.70	48300.35	27.23		
lambda	E	2038-01-23T19:32:24.382		34.91	-44.48	50026.71	27.24		
epsilon	E	2038-01-23T19:33:12.534		34.74	-44.31	51338.28	27.25		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-23T19:09:31.790
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 865639702049428480
 2Mass ID (if available) : 07313899+2216252
 ICRS Star Coord at Epoch: 07h 31m 38.99715s +22:16:24.91875s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.977
 G magnitude : 16.877
 RP magnitude : 15.923
 BP magnitude : 17.801
 DUPflag : 0
 Distance (au) : 17.739
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.61
 Sun-Target sep (deg) : 167.76
 Sun-Moon sep (deg) : 48.06
 B (ring opening deg) : 55.63
 PA of pole (deg) : 84.39
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.202
 C/A sky separation (km) : 2599.5
 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



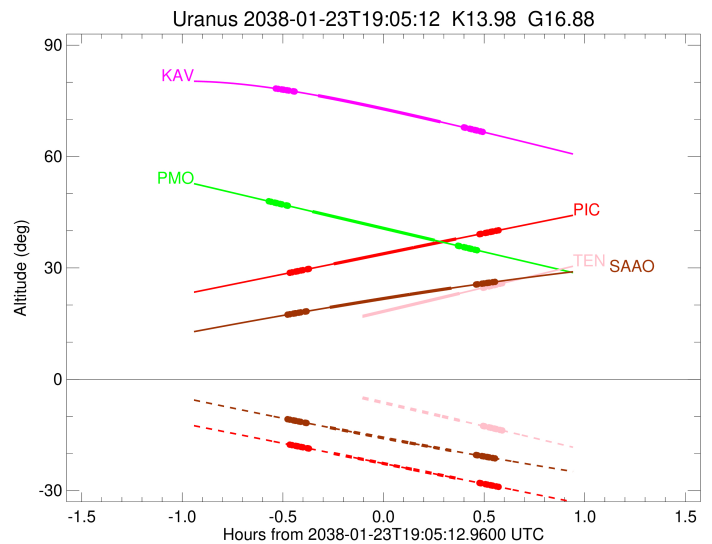
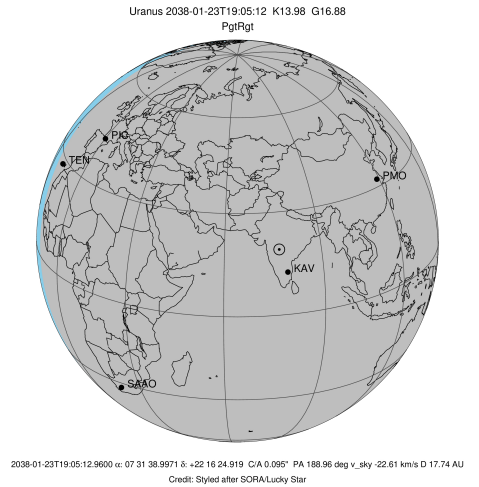
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-23T18:38:09.726		12.57	-0.71x	51005.80	-27.12		
lambda	I	2038-01-23T18:38:45.841		12.70	-0.84x	50026.71	-27.11		
delta	I	2038-01-23T18:39:49.522		12.92	-1.05x	48300.35	-27.11		
gamma	I	2038-01-23T18:40:14.206		13.01	-1.14x	47631.20	-27.11		
eta	I	2038-01-23T18:40:30.993		13.07	-1.20x	47176.12	-27.11		
beta	I	2038-01-23T18:41:27.663		13.27	-1.39x	45642.16	-27.11		
alpha	I	2038-01-23T18:42:02.563		13.39	-1.51x	44691.78	-27.10		
4	I	2038-01-23T18:43:21.230		13.66	-1.78x	42553.01	-27.10		
5	I	2038-01-23T18:43:29.683		13.69	-1.81x	42314.20	-27.09		
6	I	2038-01-23T18:43:48.933		13.76	-1.87x	41839.58	-27.12		
Uranus	I	2038-01-23T18:51:06.814		15.30	-3.38x	25210.61		-31.84	-33.04
Uranus	E	2038-01-23T19:27:53.536		23.13	-11.08	25170.73		33.89	35.12
6	E	2038-01-23T19:34:52.829		24.64	-12.57	41829.44	27.22		
5	E	2038-01-23T19:35:06.610		24.68	-12.61	42154.87	27.19		
4	E	2038-01-23T19:35:22.376		24.74	-12.67	42594.47	27.20		
alpha	E	2038-01-23T19:36:41.164		25.02	-12.95	44747.54	27.21		
beta	E	2038-01-23T19:37:15.261		25.15	-13.07	45679.23	27.22		
eta	E	2038-01-23T19:38:10.340		25.34	-13.27	47176.12	27.22		
gamma	E	2038-01-23T19:38:26.704		25.40	-13.32	47621.59	27.22		
delta	E	2038-01-23T19:38:51.635		25.49	-13.41	48300.35	27.23		
lambda	E	2038-01-23T19:39:55.036		25.72	-13.64	50026.71	27.23		
epsilon	E	2038-01-23T19:40:42.761		25.89	-13.81	51326.47	27.25		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-23T19:03:57.410
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 865639702049428480
 2Mass ID (if available) : 07313899+2216252
 ICRS Star Coord at Epoch: 07h 31m 38.99715s +22:16:24.91875s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.977
 G magnitude : 16.877
 RP magnitude : 15.923
 BP magnitude : 17.801
 DUPflag : 0
 Distance (au) : 17.739
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.61
 Sun-Target sep (deg) : 167.76
 Sun-Moon sep (deg) : 47.76
 B (ring opening deg) : 55.63
 PA of pole (deg) : 84.39
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.030
 C/A sky separation (km) : 383.6
 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	2038-01-23T18:33:12.775		78.30	-81.20	50985.95	-27.65		
lambda	I	2038-01-23T18:33:47.473		78.22	-81.29	50026.71	-27.64		
delta	I	2038-01-23T18:34:49.923		78.08	-81.44	48300.35	-27.64		
gamma	I	2038-01-23T18:35:14.134		78.02	-81.50	47631.08	-27.64		
eta	I	2038-01-23T18:35:30.592		77.99	-81.54	47176.12	-27.64		
beta	I	2038-01-23T18:36:26.154		77.85	-81.67	45642.57	-27.64		
alpha	I	2038-01-23T18:37:00.448		77.77	-81.75	44690.60	-27.64		
4	I	2038-01-23T18:38:17.589		77.58	-81.92	42550.49	-27.63		
5	I	2038-01-23T18:38:25.742		77.56	-81.94	42314.85	-27.62		
6	I	2038-01-23T18:38:44.597		77.51	-81.98	41842.22	-27.66		
Uranus	I	2038-01-23T18:45:44.445		76.40	-82.74	25187.93		-33.01	-34.23
Uranus	E	2038-01-23T19:22:10.719		69.34	-80.83	25182.16		33.31	34.53
6	E	2038-01-23T19:29:08.287		67.86	-79.64	41831.30	27.62		
5	E	2038-01-23T19:29:21.784		67.82	-79.59	42155.07	27.59		
4	E	2038-01-23T19:29:37.267		67.76	-79.55	42592.75	27.59		
alpha	E	2038-01-23T19:30:55.010		67.48	-79.31	44746.80	27.60		
beta	E	2038-01-23T19:31:28.663		67.36	-79.20	45679.57	27.60		
eta	E	2038-01-23T19:32:22.971		67.16	-79.03	47176.12	27.60		
gamma	E	2038-01-23T19:32:39.108		67.11	-78.98	47621.50	27.60		
delta	E	2038-01-23T19:33:03.705		67.02	-78.91	48300.35	27.60		
lambda	E	2038-01-23T19:34:06.256		66.79	-78.71	50026.71	27.60		
epsilon	E	2038-01-23T19:34:52.889		66.62	-78.56	51313.74	27.60		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-23T19:07:19.200
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 865639702049428480
 2Mass ID (if available) : 07313899+2216252
 ICRS Star Coord at Epoch: 07h 31m 38.99715s +22:16:24.91875s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.977
 G magnitude : 16.877
 RP magnitude : 15.923
 BP magnitude : 17.801
 DUPflag : 0
 Distance (au) : 17.739
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.61
 Sun-Target sep (deg) : 167.76
 Sun-Moon sep (deg) : 47.86
 B (ring opening deg) : 55.63
 PA of pole (deg) : 84.39
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.315
 C/A sky separation (km) : 4047.8
 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_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	2038-01-23T18:36:43.750		17.43	-10.78	50956.18	-27.31		
lambda	I	2038-01-23T18:37:17.760		17.52	-10.88	50026.71	-27.33		
delta	I	2038-01-23T18:38:20.940		17.68	-11.07	48300.35	-27.32		
gamma	I	2038-01-23T18:38:45.446		17.75	-11.15	47630.86	-27.32		
eta	I	2038-01-23T18:39:02.092		17.79	-11.20	47176.12	-27.32		
beta	I	2038-01-23T18:39:58.298		17.94	-11.37	45643.35	-27.31		
alpha	I	2038-01-23T18:40:33.122		18.03	-11.47	44688.91	-27.30		
4	I	2038-01-23T18:41:51.225		18.23	-11.70	42546.59	-27.29		
5	I	2038-01-23T18:41:59.295		18.25	-11.73	42315.25	-27.28		
6	I	2038-01-23T18:42:18.303		18.30	-11.79	41846.47	-27.31		
Uranus	I	2038-01-23T18:49:14.659		19.37	-13.02	25164.77		-34.19	-35.43
Uranus	E	2038-01-23T19:25:25.571		24.56	-19.21	25225.39		31.07	32.25
6	E	2038-01-23T19:32:46.216		25.52	-20.40	41836.09	27.38		
5	E	2038-01-23T19:32:59.608		25.55	-20.43	42156.29	27.34		
4	E	2038-01-23T19:33:15.054		25.58	-20.48	42588.19	27.35		
alpha	E	2038-01-23T19:34:33.634		25.75	-20.69	44744.66	27.37		
beta	E	2038-01-23T19:35:07.644		25.82	-20.78	45680.30	27.38		
eta	E	2038-01-23T19:36:02.344		25.93	-20.92	47176.12	27.39		
gamma	E	2038-01-23T19:36:18.597		25.97	-20.97	47621.29	27.39		
delta	E	2038-01-23T19:36:43.386		26.02	-21.03	48300.35	27.39		
lambda	E	2038-01-23T19:37:46.394		26.15	-21.20	50026.71	27.40		
epsilon	E	2038-01-23T19:38:32.062		26.25	-21.32	51278.31	27.39		