

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T19:56:34.370
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 673820655814614400
 2Mass ID (if available) : 07520127+2130156

Uranus 2039-01-23T19:56:34 K14.83 G16.22 PgtRgt

ICRS Star Coord at Epoch: 07h 52m 01.27124s +21:30:15.83462s

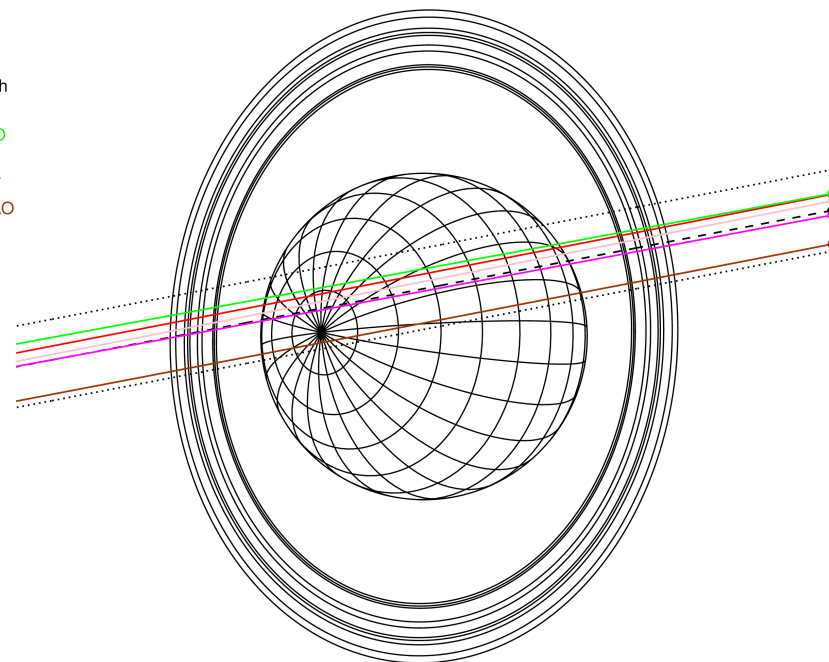
RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.833
 G magnitude : 16.222
 RP magnitude : 15.718
 BP magnitude : 16.546
 DUPflag : 0
 Distance (au) : 17.667
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.04
 Sun-Target sep (deg) : 172.76
 Sun-Moon sep (deg) : 177.17
 B (ring opening deg) : 50.97
 PA of pole (deg) : 87.75

Uranus 2039-01-23T19:56:34 K14.83 G16.22
 PgtRgt



2039-01-23T19:56:34.37000000: 07 52 01.27124 s: +21 30 15.835 C/A 0.583° PA 190.85 deg v_sky -23.04 km/s D 17.67 AU
 Credit: Styled after SORA/Lucky Star

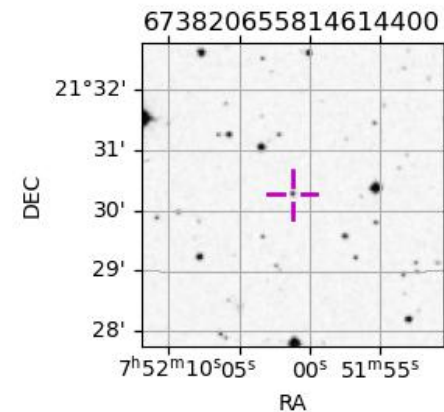
Earth
 PIC
 PMO
 TEN
 KAV
 SAAO



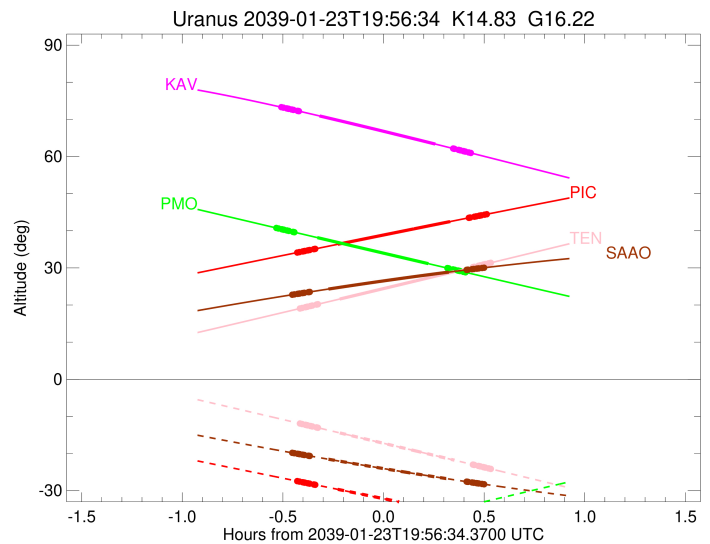
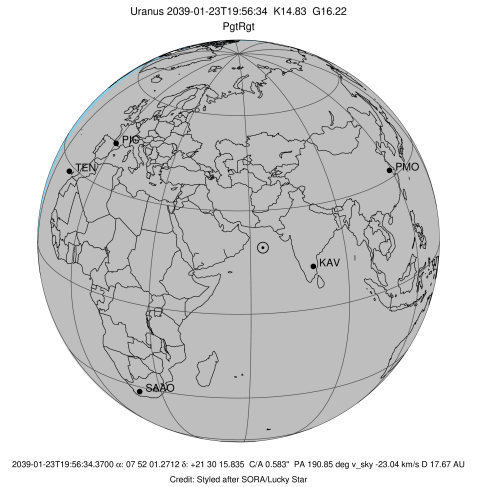
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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 19:30 - JAN 23 20:27	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	JAN 23 19:24 - JAN 23 20:21	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 19:31 - JAN 23 20:28	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	JAN 23 19:26 - JAN 23 20:22	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 19:29 - JAN 23 20:26	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

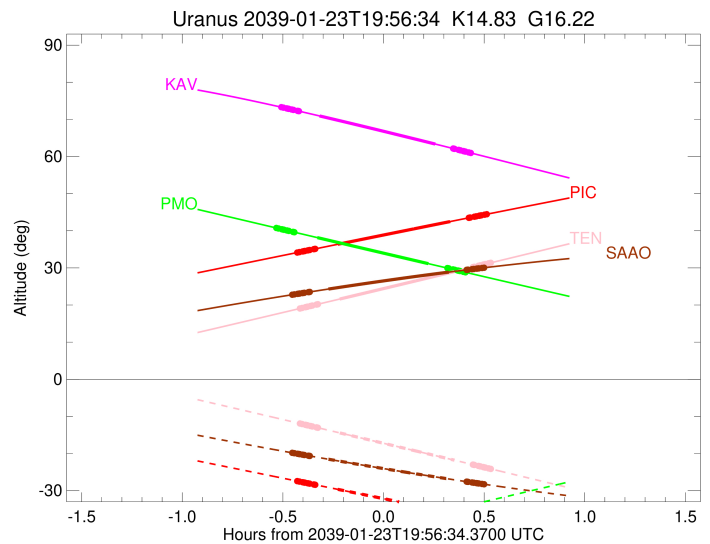
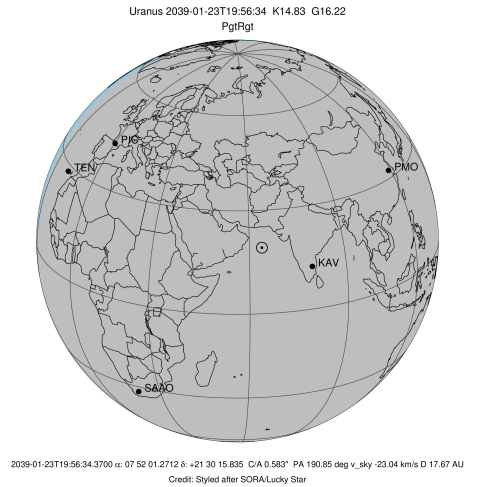


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T19:59:45.130
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 673820655814614400
 2Mass ID (if available) : 07520127+2130156
 ICRS Star Coord at Epoch: 07h 52m 01.27124s +21:30:15.83462s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.833
 G magnitude : 16.222
 RP magnitude : 15.718
 BP magnitude : 16.546
 DUPflag : 0
 Distance (au) : 17.667
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.04
 Sun-Target sep (deg) : 172.76
 Sun-Moon sep (deg) : 176.44
 B (ring opening deg) : 50.97
 PA of pole (deg) : 87.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.751
 C/A sky separation (km) : 9619.6
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



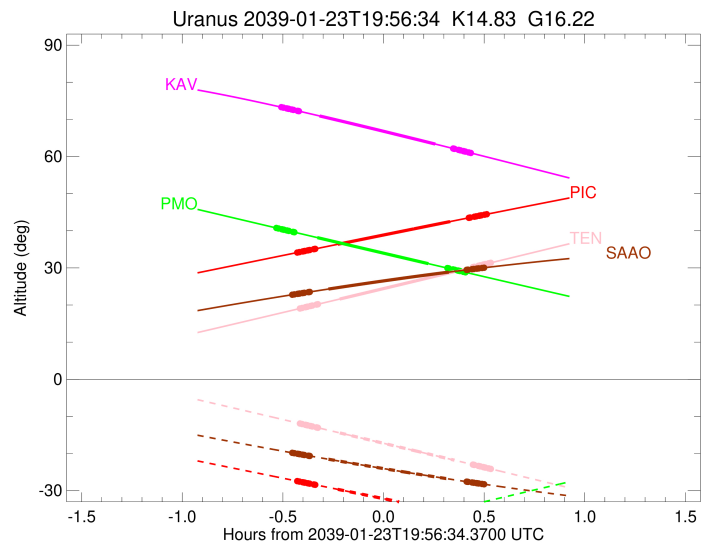
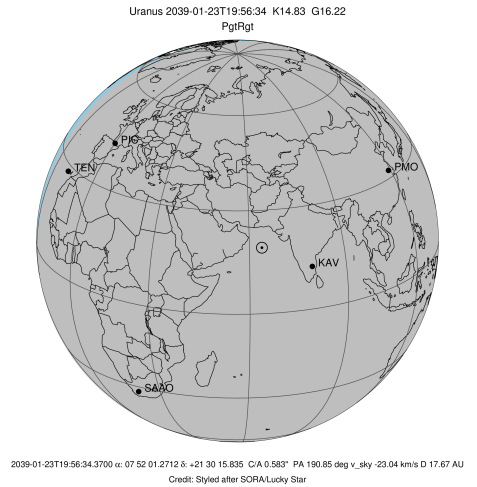
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T19:30:58.947		34.16	-27.46	50945.01	-28.98		
lambda	I	2039-01-23T19:31:30.597		34.26	-27.56	50026.71	-29.00		
delta	I	2039-01-23T19:32:30.161		34.44	-27.74	48300.35	-28.96		
gamma	I	2039-01-23T19:32:53.371		34.51	-27.81	47628.33	-28.95		
eta	I	2039-01-23T19:33:08.997		34.56	-27.86	47176.12	-28.93		
beta	I	2039-01-23T19:34:02.034		34.72	-28.02	45644.03	-28.89		
alpha	I	2039-01-23T19:34:34.741		34.82	-28.12	44689.37	-28.85		
4	I	2039-01-23T19:35:46.913		35.04	-28.34	42611.48	-28.78		
5	I	2039-01-23T19:36:01.088		35.09	-28.38	42190.54	-28.75		
6	I	2039-01-23T19:36:15.709		35.13	-28.43	41795.64	-28.76		
Uranus	I	2039-01-23T19:42:57.294		36.36	-29.66	25324.61		-30.81	-31.98
Uranus	E	2039-01-23T20:16:27.106		42.49	-35.79	25215.83		38.44	39.73
6	E	2039-01-23T20:22:01.277		43.49	-36.80	41870.36	28.82		
5	E	2039-01-23T20:22:14.168		43.53	-36.84	42244.44	28.82		
4	E	2039-01-23T20:22:23.613		43.56	-36.87	42525.94	28.85		
alpha	E	2039-01-23T20:23:40.551		43.79	-37.10	44737.47	28.92		
beta	E	2039-01-23T20:24:12.430		43.89	-37.20	45672.29	28.96		
eta	E	2039-01-23T20:25:04.403		44.04	-37.36	47176.12	29.01		
gamma	E	2039-01-23T20:25:19.786		44.09	-37.40	47622.42	29.02		
delta	E	2039-01-23T20:25:43.140		44.16	-37.48	48300.35	29.04		
lambda	E	2039-01-23T20:26:42.549		44.34	-37.66	50026.71	29.08		
epsilon	E	2039-01-23T20:27:22.922		44.46	-37.78	51201.36	29.06		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T19:53:26.750
 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 : 673820655814614400
 2Mass ID (if available) : 07520127+2130156
 ICRS Star Coord at Epoch: 07h 52m 01.27124s +21:30:15.83462s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.833
 G magnitude : 16.222
 RP magnitude : 15.718
 BP magnitude : 16.546
 DUPflag : 0
 Distance (au) : 17.667
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.04
 Sun-Target sep (deg) : 172.76
 Sun-Moon sep (deg) : 177.39
 B (ring opening deg) : 50.97
 PA of pole (deg) : 87.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.814
 C/A sky separation (km) : 10425.9
 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



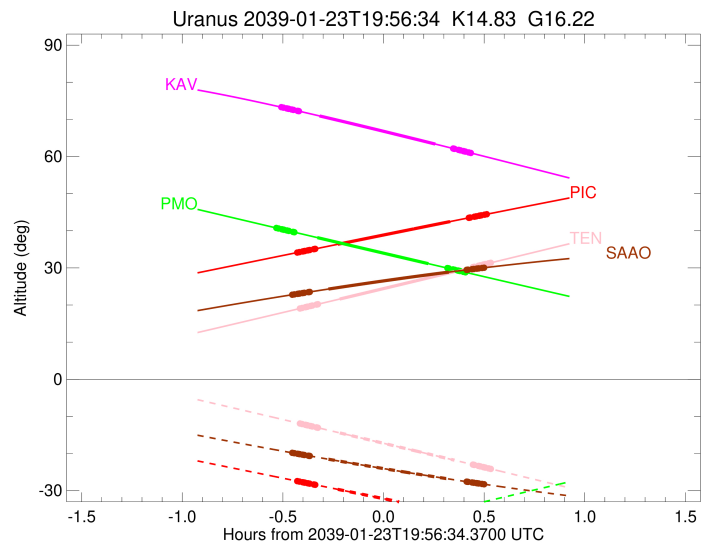
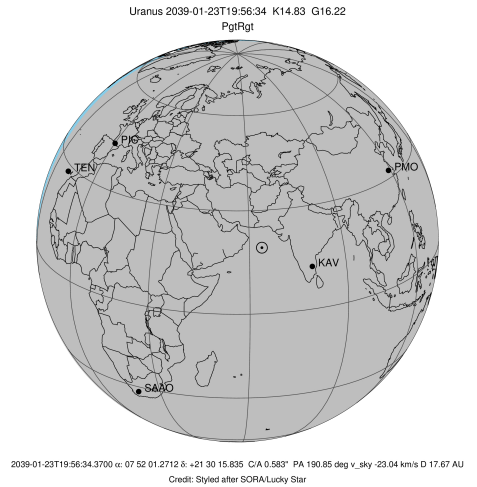
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T19:24:45.337		40.73	-46.11	50942.09	-28.95		
lambda	I	2039-01-23T19:25:16.927		40.62	-46.00	50026.71	-28.96		
delta	I	2039-01-23T19:26:16.583		40.41	-45.79	48300.35	-28.91		
gamma	I	2039-01-23T19:26:39.837		40.32	-45.70	47628.28	-28.89		
eta	I	2039-01-23T19:26:55.492		40.27	-45.65	47176.12	-28.88		
beta	I	2039-01-23T19:27:48.648		40.08	-45.46	45643.92	-28.82		
alpha	I	2039-01-23T19:28:21.443		39.96	-45.35	44689.19	-28.78		
4	I	2039-01-23T19:29:33.822		39.71	-45.09	42611.24	-28.69		
5	I	2039-01-23T19:29:48.062		39.66	-45.04	42189.75	-28.66		
6	I	2039-01-23T19:30:02.727		39.60	-44.99	41795.54	-28.66		
Uranus	I	2039-01-23T19:36:52.267		38.15	-43.54	25332.85		-30.19	-31.36
Uranus	E	2039-01-23T20:09:57.084		31.14	-36.52	25221.27		38.07	39.36
6	E	2039-01-23T20:15:38.083		29.94	-35.32	41869.63	28.56		
5	E	2039-01-23T20:15:50.975		29.90	-35.27	42242.30	28.56		
4	E	2039-01-23T20:16:00.591		29.87	-35.24	42525.93	28.60		
alpha	E	2039-01-23T20:17:18.182		29.59	-34.96	44736.74	28.68		
beta	E	2039-01-23T20:17:50.340		29.48	-34.85	45671.86	28.72		
eta	E	2039-01-23T20:18:42.758		29.30	-34.66	47176.12	28.77		
gamma	E	2039-01-23T20:18:58.263		29.24	-34.61	47622.33	28.78		
delta	E	2039-01-23T20:19:21.810		29.16	-34.52	48300.35	28.81		
lambda	E	2039-01-23T20:20:21.692		28.95	-34.31	50026.71	28.85		
epsilon	E	2039-01-23T20:21:02.056		28.81	-34.17	51191.93	28.83		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T20:00:41.760
 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 : 673820655814614400
 2Mass ID (if available) : 07520127+2130156
 ICRS Star Coord at Epoch: 07h 52m 01.27124s +21:30:15.83462s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.833
 G magnitude : 16.222
 RP magnitude : 15.718
 BP magnitude : 16.546
 DUPflag : 0
 Distance (au) : 17.667
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.04
 Sun-Target sep (deg) : 172.76
 Sun-Moon sep (deg) : 176.34
 B (ring opening deg) : 50.97
 PA of pole (deg) : 87.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.660
 C/A sky separation (km) : 8453.0
 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



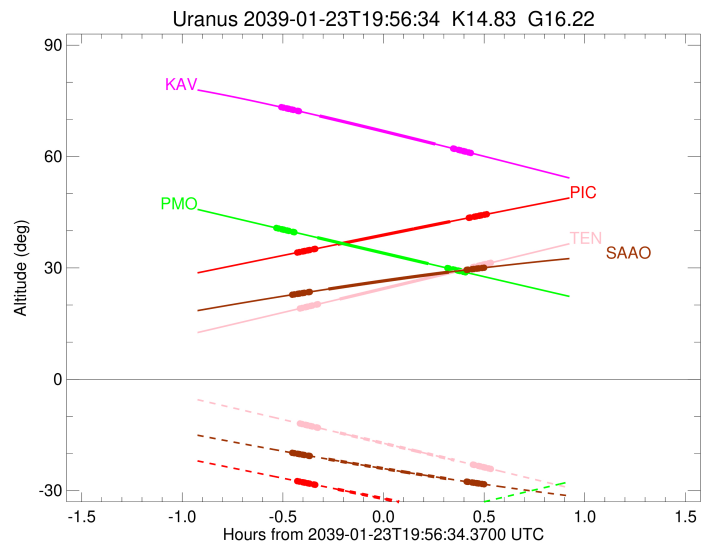
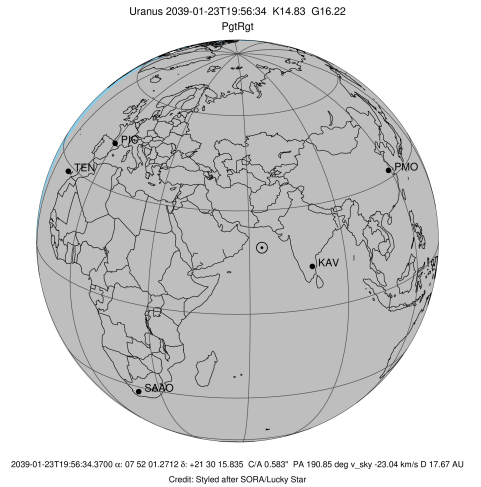
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T19:31:47.190		19.09	-11.95	50952.65	-29.02		
lambda	I	2039-01-23T19:32:19.069		19.21	-12.06	50026.71	-29.04		
delta	I	2039-01-23T19:33:18.551		19.42	-12.27	48300.35	-29.01		
gamma	I	2039-01-23T19:33:41.720		19.50	-12.35	47628.44	-28.99		
eta	I	2039-01-23T19:33:57.322		19.56	-12.41	47176.12	-28.99		
beta	I	2039-01-23T19:34:50.248		19.75	-12.60	45644.29	-28.95		
alpha	I	2039-01-23T19:35:22.867		19.86	-12.71	44689.82	-28.92		
4	I	2039-01-23T19:36:34.857		20.12	-12.97	42612.02	-28.87		
5	I	2039-01-23T19:36:48.946		20.17	-13.02	42192.35	-28.85		
6	I	2039-01-23T19:37:03.531		20.22	-13.07	41795.89	-28.85		
Uranus	I	2039-01-23T19:43:32.722		21.62	-14.45	25309.38		-31.92	-33.12
Uranus	E	2039-01-23T20:17:45.094		29.02	-21.80	25211.09		38.76	40.05
6	E	2039-01-23T20:23:14.268		30.21	-22.99	41871.16	28.94		
5	E	2039-01-23T20:23:27.231		30.26	-23.04	42246.85	28.94		
4	E	2039-01-23T20:23:36.541		30.29	-23.07	42525.97	28.97		
alpha	E	2039-01-23T20:24:53.198		30.57	-23.35	44738.27	29.02		
beta	E	2039-01-23T20:25:24.959		30.69	-23.46	45672.75	29.05		
eta	E	2039-01-23T20:26:16.753		30.88	-23.65	47176.12	29.09		
gamma	E	2039-01-23T20:26:32.096		30.93	-23.71	47622.52	29.10		
delta	E	2039-01-23T20:26:55.383		31.02	-23.79	48300.35	29.12		
lambda	E	2039-01-23T20:27:54.640		31.23	-24.00	50026.71	29.15		
epsilon	E	2039-01-23T20:28:35.268		31.38	-24.15	51211.47	29.13		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T19:54:46.440
 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 : 673820655814614400
 2Mass ID (if available) : 07520127+2130156
 ICRS Star Coord at Epoch: 07h 52m 01.27124s +21:30:15.83462s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.833
 G magnitude : 16.222
 RP magnitude : 15.718
 BP magnitude : 16.546
 DUPflag : 0
 Distance (au) : 17.667
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.04
 Sun-Target sep (deg) : 172.76
 Sun-Moon sep (deg) : 177.56
 B (ring opening deg) : 50.97
 PA of pole (deg) : 87.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.546
 C/A sky separation (km) : 6996.6
 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_itrfr93_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	2039-01-23T19:26:13.328		73.28	-80.10	50966.25	-29.59		
lambda	I	2039-01-23T19:26:45.058		73.17	-80.01	50026.71	-29.60		
delta	I	2039-01-23T19:27:43.394		72.97	-79.84	48300.35	-29.58		
gamma	I	2039-01-23T19:28:06.106		72.89	-79.77	47628.63	-29.57		
eta	I	2039-01-23T19:28:21.410		72.84	-79.73	47176.12	-29.56		
beta	I	2039-01-23T19:29:13.281		72.66	-79.57	45644.76	-29.54		
alpha	I	2039-01-23T19:29:45.227		72.55	-79.47	44690.61	-29.51		
4	I	2039-01-23T19:30:55.785		72.31	-79.26	42612.85	-29.48		
5	I	2039-01-23T19:31:09.514		72.27	-79.21	42195.40	-29.46		
6	I	2039-01-23T19:31:23.809		72.22	-79.17	41796.37	-29.46		
Uranus	I	2039-01-23T19:37:30.320		70.94	-78.00	25287.55		-33.49	-34.71
Uranus	E	2039-01-23T20:11:59.737		63.36	-70.61	25208.24		38.95	40.25
6	E	2039-01-23T20:17:21.182		62.15	-69.41	41871.85	29.41		
5	E	2039-01-23T20:17:34.051		62.11	-69.36	42249.00	29.40		
4	E	2039-01-23T20:17:43.131		62.07	-69.32	42526.05	29.43		
alpha	E	2039-01-23T20:18:58.626		61.79	-69.04	44738.95	29.46		
beta	E	2039-01-23T20:19:29.909		61.67	-68.92	45673.14	29.48		
eta	E	2039-01-23T20:20:20.947		61.48	-68.73	47176.12	29.51		
gamma	E	2039-01-23T20:20:36.077		61.42	-68.67	47622.61	29.51		
delta	E	2039-01-23T20:20:59.037		61.33	-68.58	48300.35	29.52		
lambda	E	2039-01-23T20:21:57.492		61.11	-68.36	50026.71	29.54		
epsilon	E	2039-01-23T20:22:37.866		60.96	-68.21	51219.76	29.53		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T19:58:07.190
 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 : 673820655814614400
 2Mass ID (if available) : 07520127+2130156
 ICRS Star Coord at Epoch: 07h 52m 01.27124s +21:30:15.83462s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.833
 G magnitude : 16.222
 RP magnitude : 15.718
 BP magnitude : 16.546
 DUPflag : 0
 Distance (au) : 17.667
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.04
 Sun-Target sep (deg) : 172.76
 Sun-Moon sep (deg) : 177.20
 B (ring opening deg) : 50.97
 PA of pole (deg) : 87.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.162
 C/A sky separation (km) : 2078.7
 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_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	2039-01-23T19:29:27.886		22.79	-19.83	51000.37	-29.70		
lambda	I	2039-01-23T19:30:00.660		22.87	-19.92	50026.71	-29.71		
delta	I	2039-01-23T19:30:58.775		23.01	-20.08	48300.35	-29.71		
gamma	I	2039-01-23T19:31:21.372		23.06	-20.14	47629.09	-29.70		
eta	I	2039-01-23T19:31:36.621		23.10	-20.18	47176.12	-29.70		
beta	I	2039-01-23T19:32:28.195		23.22	-20.32	45646.06	-29.70		
alpha	I	2039-01-23T19:32:59.904		23.30	-20.40	44692.81	-29.69		
4	I	2039-01-23T19:34:10.086		23.46	-20.59	42614.60	-29.70		
5	I	2039-01-23T19:34:23.520		23.50	-20.63	42203.51	-29.68		
6	I	2039-01-23T19:34:37.712		23.53	-20.67	41797.96	-29.69		
Uranus	I	2039-01-23T19:40:10.690		24.31	-21.54	25239.61		-36.82	-38.10
Uranus	E	2039-01-23T20:16:01.919		28.87	-26.86	25214.40		38.54	39.83
6	E	2039-01-23T20:21:22.143		29.47	-27.59	41874.65	29.75		
5	E	2039-01-23T20:21:35.378		29.50	-27.62	42258.64	29.74		
4	E	2039-01-23T20:21:44.012		29.51	-27.63	42526.78	29.75		
alpha	E	2039-01-23T20:22:58.733		29.65	-27.80	44741.97	29.75		
beta	E	2039-01-23T20:23:29.685		29.71	-27.87	45674.91	29.76		
eta	E	2039-01-23T20:24:20.198		29.80	-27.98	47176.12	29.76		
gamma	E	2039-01-23T20:24:35.214		29.83	-28.02	47623.05	29.76		
delta	E	2039-01-23T20:24:57.968		29.87	-28.07	48300.35	29.77		
lambda	E	2039-01-23T20:25:55.962		29.97	-28.20	50026.71	29.77		
epsilon	E	2039-01-23T20:26:37.403		30.05	-28.29	51260.46	29.76		