

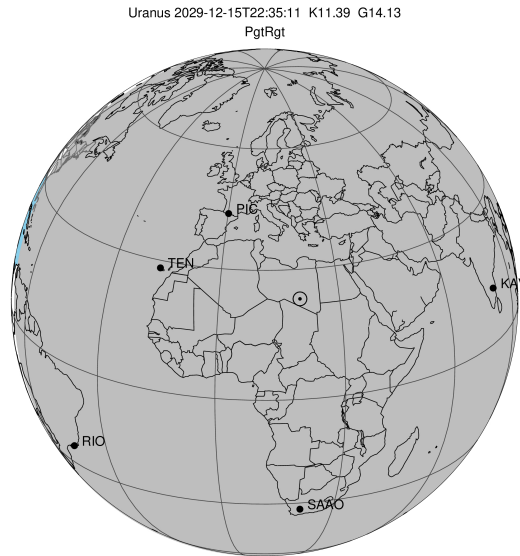
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-15T22:35:11.410
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3412567643723306368
 2Mass ID (if available) : 04581124+2242381

ICRS Star Coord at Epoch: 04h 58m 11.24830s +22:42:38.18778s

RUWE (>1.4 is poor) : 1.02
 K magnitude : 11.395
 G magnitude : 14.134
 RP magnitude : 13.307
 BP magnitude : 14.856
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.16
 Sun-Target sep (deg) : 171.94
 Sun-Moon sep (deg) : 46.96
 B (ring opening deg) : 82.02
 PA of pole (deg) : -19.60

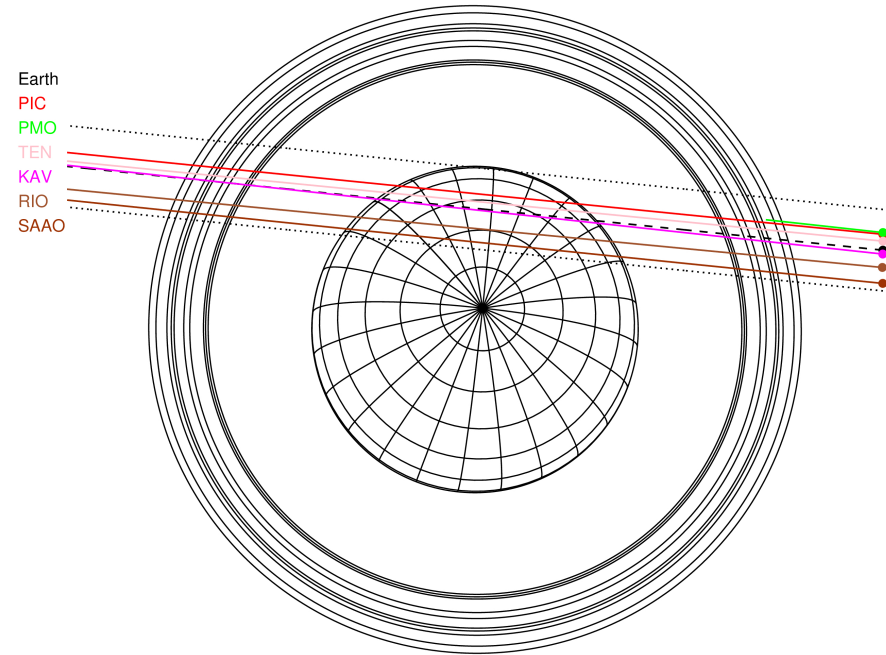
a(km) ring

- 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



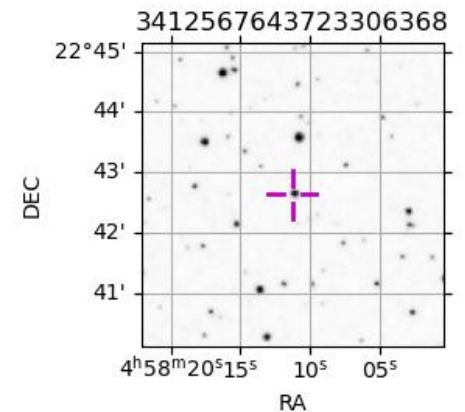
2029-12-15T22:35:11.4100 α: 04 58 11.2483 s: +22 42 38.188 C/A 1.432° PA 174.14 deg v_sky -23.16 km/s D 18.25 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2029-12-15T22:35:11 K11.39 G14.13 PgtRgt

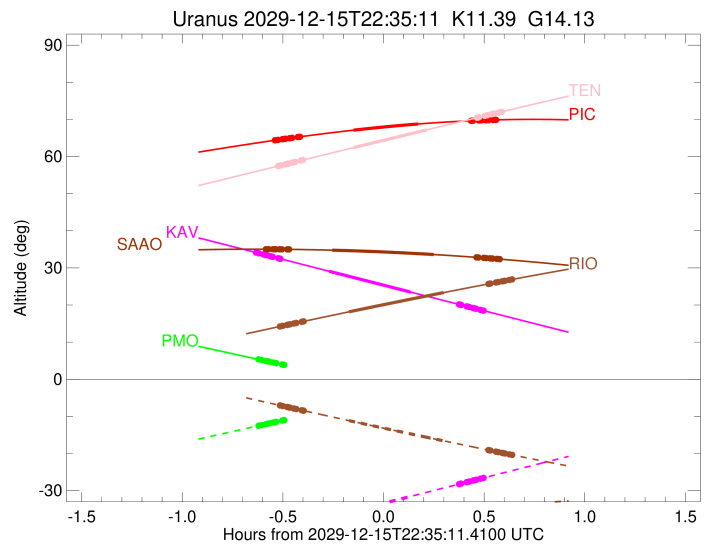
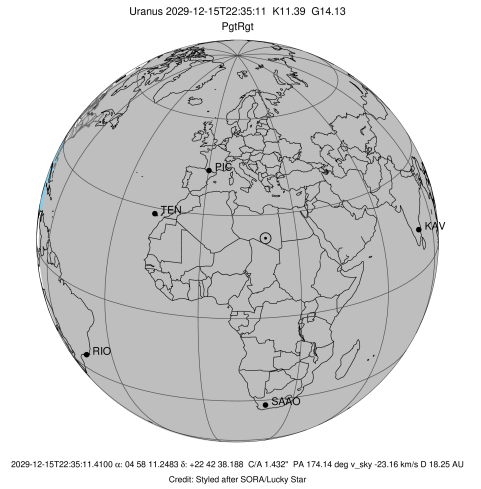


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	DEC 15 22:02 - DEC 15 23:08	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	++			DEC 15 21:57 - DEC 15 21:58	PnnRin
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	+++++	+ +	+++++	DEC 15 22:03 - DEC 15 23:10	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	DEC 15 21:56 - DEC 15 23:04	PieRie
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	DEC 15 22:04 - DEC 15 23:13	PieRie
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	+++++	+ +	+++++	DEC 15 21:59 - DEC 15 23:09	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

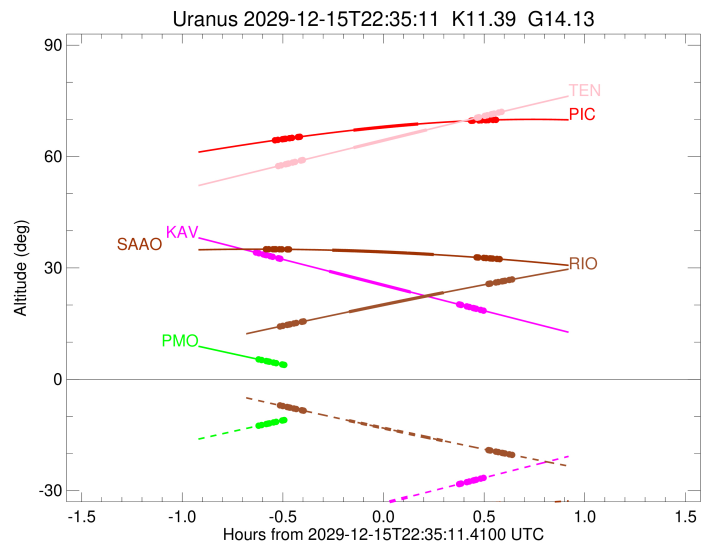
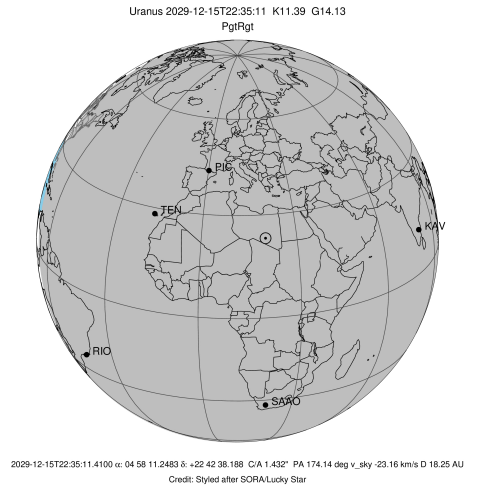


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-15T22:35:42.790
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3412567643723306368
 2Mass ID (if available) : 04581124+2242381
 ICRS Star Coord at Epoch: 04h 58m 11.24830s +22:42:38.18778s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 11.395
 G magnitude : 14.134
 RP magnitude : 13.307
 BP magnitude : 14.856
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.16
 Sun-Target sep (deg) : 171.94
 Sun-Moon sep (deg) : 47.48
 B (ring opening deg) : 82.02
 PA of pole (deg) : -19.60
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.600
 C/A sky separation (km) : 21173.7
 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



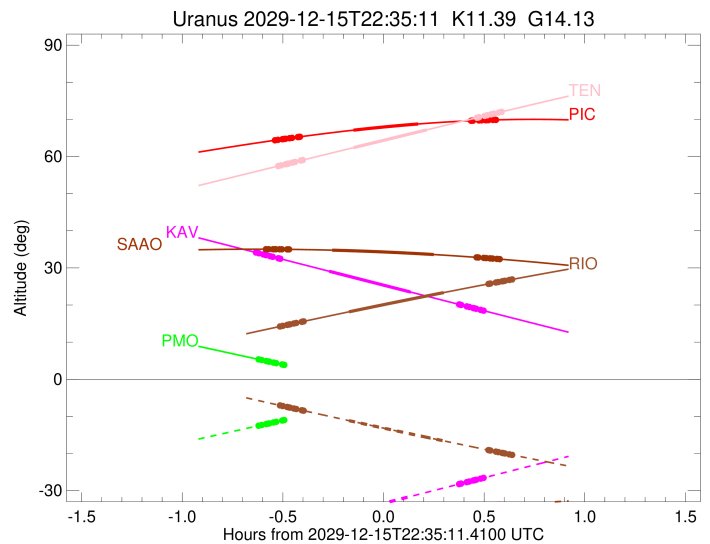
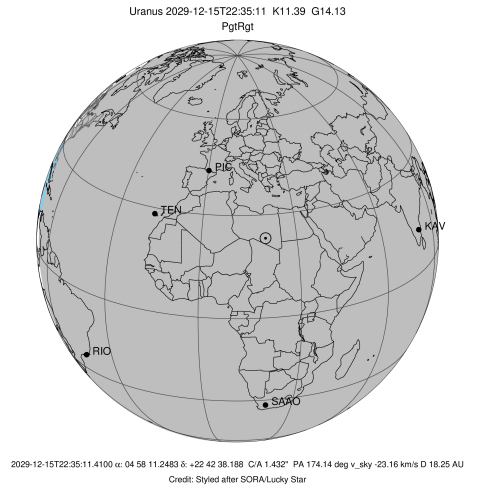
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-15T22:02:31.271		64.34	-59.72	51546.99	-21.39		
lambda	I	2029-12-15T22:03:42.635		64.49	-59.91	50026.71	-21.23		
delta	I	2029-12-15T22:05:04.265		64.67	-60.12	48300.35	-21.06		
gamma	I	2029-12-15T22:05:36.541		64.74	-60.20	47621.79	-20.99		
eta	I	2029-12-15T22:05:57.802		64.78	-60.26	47176.12	-20.94		
beta	I	2029-12-15T22:07:10.306		64.93	-60.44	45665.05	-20.75		
alpha	I	2029-12-15T22:07:57.053		65.03	-60.56	44698.48	-20.63		
4	I	2029-12-15T22:09:39.452		65.24	-60.83	42602.82	-20.31		
5	I	2029-12-15T22:09:53.921		65.27	-60.86	42306.77	-20.26		
6	I	2029-12-15T22:10:15.249		65.31	-60.92	41878.80	-20.19		
Uranus	I	2029-12-15T22:26:13.745		67.10	-63.27	25039.81		7.57	7.92
Uranus	E	2029-12-15T22:45:31.241		68.77	-65.83	25286.99		5.43	5.68
6	E	2029-12-15T23:01:14.768		69.64	-67.61	41809.61	20.20		
5	E	2029-12-15T23:01:32.620		69.65	-67.64	42168.80	20.27		
4	E	2029-12-15T23:01:50.229		69.66	-67.67	42527.40	20.32		
alpha	E	2029-12-15T23:03:38.846		69.73	-67.85	44752.37	20.65		
beta	E	2029-12-15T23:04:21.840		69.75	-67.92	45642.63	20.76		
eta	E	2029-12-15T23:05:35.350		69.79	-68.04	47176.12	20.95		
gamma	E	2029-12-15T23:05:56.827		69.80	-68.08	47626.64	21.00		
delta	E	2029-12-15T23:06:28.847		69.82	-68.13	48300.35	21.08		
lambda	E	2029-12-15T23:07:50.414		69.85	-68.26	50026.71	21.25		
epsilon	E	2029-12-15T23:08:33.762		69.87	-68.32	50949.74	21.40		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-15T22:31:06.140
 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 : 3412567643723306368
 2Mass ID (if available) : 04581124+2242381
 ICRS Star Coord at Epoch: 04h 58m 11.24830s +22:42:38.18778s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 11.395
 G magnitude : 14.134
 RP magnitude : 13.307
 BP magnitude : 14.856
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.16
 Sun-Target sep (deg) : 171.94
 Sun-Moon sep (deg) : 47.43
 B (ring opening deg) : 82.02
 PA of pole (deg) : -19.60
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.666
 C/A sky separation (km) : 22049.7
 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



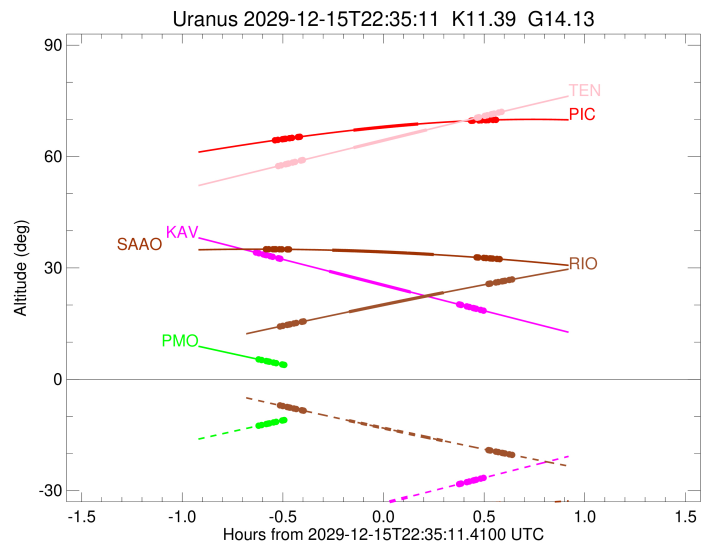
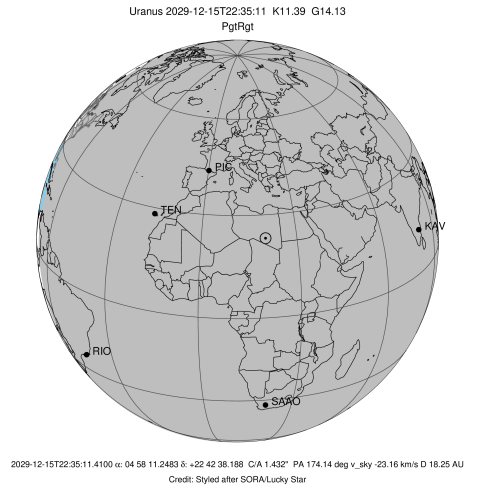
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-15T21:57:38.294		5.42	-12.58	51547.73	-20.87		
lambda	I	2029-12-15T21:58:51.478		5.18	-12.33	50026.71	-20.71		
delta	I	2029-12-15T22:00:15.224		4.91x	-12.06	48300.35	-20.52		
gamma	I	2029-12-15T22:00:48.362		4.80x	-11.95	47621.76	-20.44		
eta	I	2029-12-15T22:01:10.197		4.73x	-11.87	47176.12	-20.38		
beta	I	2029-12-15T22:02:24.725		4.49x	-11.63	45664.80	-20.18		
alpha	I	2029-12-15T22:03:12.784		4.33x	-11.47	44698.85	-20.05		
4	I	2029-12-15T22:04:58.304		3.99x	-11.12	42602.34	-19.69		
5	I	2029-12-15T22:05:13.222		3.94x	-11.07	42306.23	-19.64		
6	I	2029-12-15T22:05:35.212		3.87x	-11.00	41878.66	-19.57		
Uranus	I	2029-12-15T22:22:33.464		0.61x	-7.65	25021.01		7.71	8.07
Uranus	E	2029-12-15T22:39:59.094		-2.67x	-4.27x	25241.54		5.87	6.15
6	E	2029-12-15T22:56:45.078		-5.75x	-1.07x	41810.72	19.49		
5	E	2029-12-15T22:57:03.618		-5.81x	-1.01x	42170.35	19.56		
4	E	2029-12-15T22:57:21.791		-5.86x	-0.95x	42527.80	19.62		
alpha	E	2029-12-15T22:59:14.181		-6.20x	-0.60x	44752.29	19.97		
beta	E	2029-12-15T22:59:58.622		-6.34x	-0.46x	45642.39	20.09		
eta	E	2029-12-15T23:01:14.571		-6.57x	-0.22x	47176.12	20.29		
gamma	E	2029-12-15T23:01:36.738		-6.63x	-0.15x	47626.48	20.34		
delta	E	2029-12-15T23:02:09.796		-6.73x	-0.05x	48300.35	20.42		
lambda	E	2029-12-15T23:03:33.941		-6.98x	0.21x	50026.71	20.61		
epsilon	E	2029-12-15T23:04:19.114		-7.12x	0.35x	50959.68	20.77		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-15T22:37:02.860
 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 : 3412567643723306368
 2Mass ID (if available) : 04581124+2242381
 ICRS Star Coord at Epoch: 04h 58m 11.24830s +22:42:38.18778s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 11.395
 G magnitude : 14.134
 RP magnitude : 13.307
 BP magnitude : 14.856
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.16
 Sun-Target sep (deg) : 171.94
 Sun-Moon sep (deg) : 47.30
 B (ring opening deg) : 82.02
 PA of pole (deg) : -19.60
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.509
 C/A sky separation (km) : 19976.9
 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



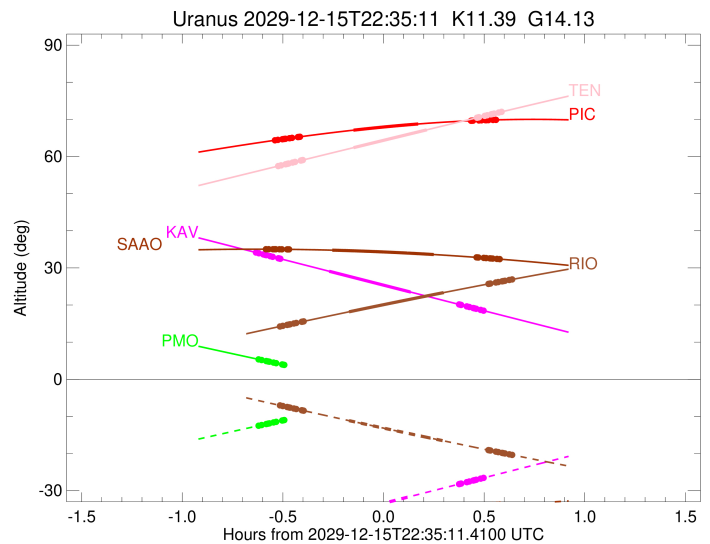
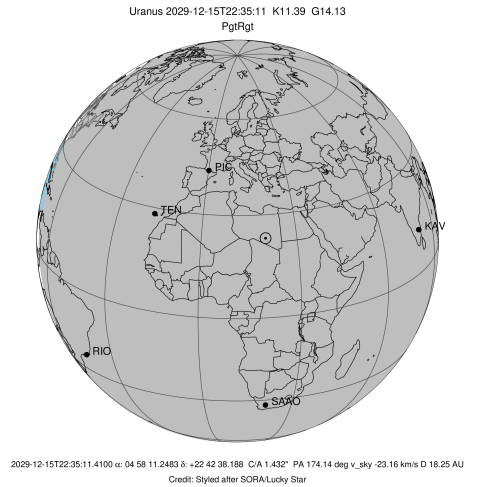
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-15T22:03:29.961		57.37	-49.85	51544.94	-21.63		
lambda	I	2029-12-15T22:04:40.383		57.63	-50.11	50026.71	-21.50		
delta	I	2029-12-15T22:06:00.965		57.92	-50.40	48300.35	-21.35		
gamma	I	2029-12-15T22:06:32.797		58.04	-50.52	47621.86	-21.28		
eta	I	2029-12-15T22:06:53.763		58.12	-50.60	47176.12	-21.24		
beta	I	2029-12-15T22:08:05.168		58.38	-50.86	45665.59	-21.07		
alpha	I	2029-12-15T22:08:51.237		58.55	-51.03	44697.72	-20.97		
4	I	2029-12-15T22:10:31.780		58.92	-51.40	42603.79	-20.69		
5	I	2029-12-15T22:10:45.987		58.97	-51.45	42307.84	-20.65		
6	I	2029-12-15T22:11:06.934		59.05	-51.53	41879.06	-20.59		
Uranus	I	2029-12-15T22:26:18.551		62.40	-54.87	25070.79		7.33	7.67
Uranus	E	2029-12-15T22:48:05.417		67.19	-59.67	25336.08		4.91	5.14
6	E	2029-12-15T23:03:01.933		70.45	-62.96	41808.49	20.63		
5	E	2029-12-15T23:03:19.388		70.51	-63.03	42167.26	20.68		
4	E	2029-12-15T23:03:36.714		70.57	-63.09	42527.03	20.73		
alpha	E	2029-12-15T23:05:23.335		70.96	-63.48	44752.42	21.01		
beta	E	2029-12-15T23:06:05.603		71.11	-63.63	45642.88	21.12		
eta	E	2029-12-15T23:07:17.914		71.37	-63.90	47176.12	21.28		
gamma	E	2029-12-15T23:07:39.066		71.45	-63.98	47626.80	21.33		
delta	E	2029-12-15T23:08:10.597		71.56	-64.09	48300.35	21.39		
lambda	E	2029-12-15T23:09:30.998		71.85	-64.39	50026.71	21.55		
epsilon	E	2029-12-15T23:10:13.308		72.00	-64.54	50939.97	21.69		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-15T22:30:59.900
 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 : 3412567643723306368
 2Mass ID (if available) : 04581124+2242381
 ICRS Star Coord at Epoch: 04h 58m 11.24830s +22:42:38.18778s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 11.395
 G magnitude : 14.134
 RP magnitude : 13.307
 BP magnitude : 14.856
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.16
 Sun-Target sep (deg) : 171.94
 Sun-Moon sep (deg) : 47.79
 B (ring opening deg) : 82.02
 PA of pole (deg) : -19.60
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.407
 C/A sky separation (km) : 18626.9
 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	2029-12-15T21:56:53.155		34.21	-42.20	51541.04	-21.83		
lambda	I	2029-12-15T21:58:02.757		33.94	-41.93	50026.71	-21.70		
delta	I	2029-12-15T21:59:22.540		33.63	-41.63	48300.35	-21.57		
gamma	I	2029-12-15T21:59:54.029		33.51	-41.51	47621.99	-21.51		
eta	I	2029-12-15T22:00:14.772		33.43	-41.43	47176.12	-21.48		
beta	I	2029-12-15T22:01:25.310		33.16	-41.16	45666.44	-21.33		
alpha	I	2029-12-15T22:02:10.896		32.98	-40.98	44696.55	-21.24		
4	I	2029-12-15T22:03:49.929		32.60	-40.61	42605.23	-21.00		
5	I	2029-12-15T22:04:03.939		32.55	-40.55	42309.34	-20.96		
6	I	2029-12-15T22:04:24.599		32.47	-40.47	41879.37	-20.91		
Uranus	I	2029-12-15T22:18:59.053		29.10	-37.13	25113.72		6.99	7.32
Uranus	E	2029-12-15T22:43:18.114		23.49	-31.55	25376.55		4.43	4.64
6	E	2029-12-15T22:57:42.263		20.17	-28.25	41807.68	20.82		
5	E	2029-12-15T22:57:59.531		20.10	-28.18	42166.18	20.87		
4	E	2029-12-15T22:58:16.751		20.04	-28.11	42526.79	20.91		
alpha	E	2029-12-15T23:00:02.587		19.63	-27.71	44752.43	21.15		
beta	E	2029-12-15T23:00:44.615		19.47	-27.55	45643.07	21.23		
eta	E	2029-12-15T23:01:56.571		19.19	-27.27	47176.12	21.37		
gamma	E	2029-12-15T23:02:17.646		19.11	-27.19	47626.91	21.41		
delta	E	2029-12-15T23:02:49.061		18.99	-27.07	48300.35	21.46		
lambda	E	2029-12-15T23:04:09.252		18.68	-26.77	50026.71	21.59		
epsilon	E	2029-12-15T23:04:51.199		18.52	-26.61	50933.69	21.71		

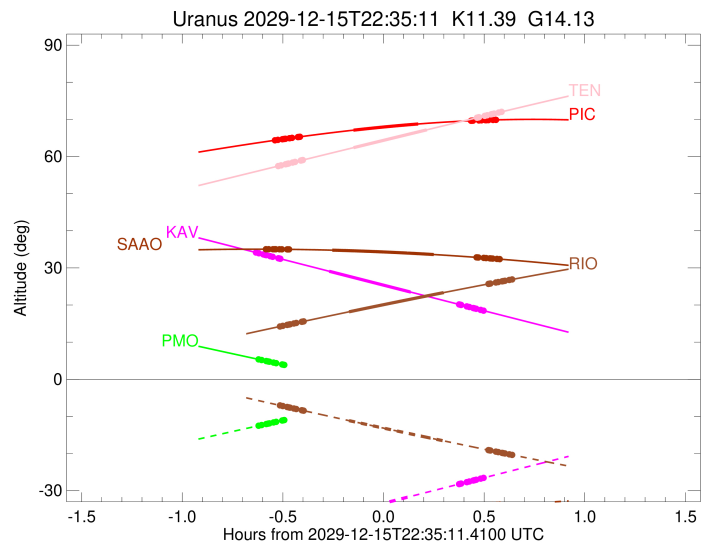
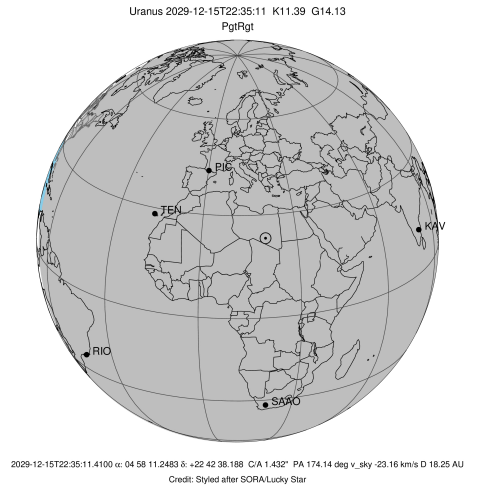
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-15T22:38:54.900
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 3412567643723306368
 2Mass ID (if available) : 04581124+2242381
 ICRS Star Coord at Epoch: 04h 58m 11.24830s +22:42:38.18778s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 11.395
 G magnitude : 14.134
 RP magnitude : 13.307
 BP magnitude : 14.856
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.16
 Sun-Target sep (deg) : 171.94
 Sun-Moon sep (deg) : 46.72
 B (ring opening deg) : 82.02
 PA of pole (deg) : -19.60
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.190
 C/A sky separation (km) : 15748.6
 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	2029-12-15T22:04:02.239		14.17	-6.98	51535.52	-22.23		
lambda	I	2029-12-15T22:05:10.273		14.39	-7.21	50026.71	-22.14		
delta	I	2029-12-15T22:06:28.397		14.64	-7.47	48300.35	-22.05		
gamma	I	2029-12-15T22:06:59.177		14.74	-7.58	47622.17	-22.01		
eta	I	2029-12-15T22:07:19.450		14.81	-7.64	47176.12	-21.99		
beta	I	2029-12-15T22:08:28.217		15.03	-7.87	45667.52	-21.89		
alpha	I	2029-12-15T22:09:12.719		15.17	-8.02	44695.09	-21.83		
4	I	2029-12-15T22:10:48.740		15.48	-8.34	42607.03	-21.67		
5	I	2029-12-15T22:11:02.337		15.53	-8.39	42311.09	-21.64		
6	I	2029-12-15T22:11:22.381		15.59	-8.46	41879.65	-21.61		
Uranus	I	2029-12-15T22:24:54.291		18.17	-11.14	25189.70		6.35	6.65
Uranus	E	2029-12-15T22:53:09.524		23.35	-16.60	25460.49		3.25	3.40
6	E	2029-12-15T23:06:27.395		25.68	-19.08	41805.08	21.69		
5	E	2029-12-15T23:06:43.916		25.73	-19.13	42162.82	21.72		
4	E	2029-12-15T23:07:00.617		25.78	-19.18	42526.19	21.74		
alpha	E	2029-12-15T23:08:42.585		26.07	-19.49	44752.32	21.92		
beta	E	2029-12-15T23:09:23.205		26.19	-19.62	45643.85	21.98		
eta	E	2029-12-15T23:10:32.760		26.38	-19.83	47176.12	22.08		
gamma	E	2029-12-15T23:10:53.184		26.44	-19.89	47627.32	22.10		
delta	E	2029-12-15T23:11:23.604		26.53	-19.99	48300.35	22.14		
lambda	E	2029-12-15T23:12:41.398		26.75	-20.22	50026.71	22.24		
epsilon	E	2029-12-15T23:13:21.041		26.86	-20.34	50909.14	22.33		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2029-12-15T22:34:56.070
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       : 3412567643723306368
2Mass ID (if available) : 04581124+2242381
ICRS Star Coord at Epoch: 04h 58m 11.24830s +22:42:38.18778s
RUWE (>1.4 is poor) : 1.02
K magnitude          : 11.395
G magnitude          : 14.134
RP magnitude         : 13.307
BP magnitude         : 14.856
DUPflag             : 0
Distance (au)        : 18.248
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.16
Sun-Target sep (deg) : 171.94
Sun-Moon sep (deg)   : 47.42
B (ring opening deg) : 82.02
PA of pole (deg)     : -19.60
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.030
C/A sky separation (km) : 13631.5
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.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	2029-12-15T21:59:51.949		35.04	-33.95	51528.86	-22.72		
lambda	I	2029-12-15T22:00:58.188		35.03	-33.99	50026.71	-22.65		
delta	I	2029-12-15T22:02:14.517		35.03	-34.03	48300.35	-22.58		
gamma	I	2029-12-15T22:02:44.560		35.02	-34.04	47622.35	-22.55		
eta	I	2029-12-15T22:03:04.354		35.02	-34.05	47176.12	-22.53		
beta	I	2029-12-15T22:04:11.371		35.02	-34.08	45668.57	-22.46		
alpha	I	2029-12-15T22:04:54.835		35.01	-34.10	44693.74	-22.42		
4	I	2029-12-15T22:06:28.131		35.00	-34.15	42608.61	-22.29		
5	I	2029-12-15T22:06:41.372		34.99	-34.15	42312.48	-22.27		
6	I	2029-12-15T22:07:00.880		34.99	-34.16	41879.74	-22.25		
Uranus	I	2029-12-15T22:19:53.433		34.78	-34.41	25252.27		5.77	6.04
Uranus	E	2029-12-15T22:50:11.282		33.60	-34.32	25498.98		2.53	2.65
6	E	2029-12-15T23:02:53.699		32.84	-34.00	41803.78	22.23		
5	E	2029-12-15T23:03:09.790		32.82	-34.00	42161.24	22.26		
4	E	2029-12-15T23:03:26.161		32.81	-33.99	42526.01	22.28		
alpha	E	2029-12-15T23:05:05.814		32.69	-33.93	44752.17	22.40		
beta	E	2029-12-15T23:05:45.599		32.65	-33.91	45644.30	22.44		
eta	E	2029-12-15T23:06:53.732		32.57	-33.87	47176.12	22.52		
gamma	E	2029-12-15T23:07:13.770		32.55	-33.86	47627.54	22.54		
delta	E	2029-12-15T23:07:43.605		32.51	-33.84	48300.35	22.57		
lambda	E	2029-12-15T23:08:59.993		32.42	-33.79	50026.71	22.63		
epsilon	E	2029-12-15T23:09:38.424		32.38	-33.77	50897.14	22.70		