

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-11T23:07:39.050
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3425562217600045184
 2Mass ID (if available) : 06181000+2338361

Uranus 2033-12-11T23:07:39 K10.06 G11.92 PgtRgt

ICRS Star Coord at Epoch: 06h 18m 09.99705s +23:38:35.93955s

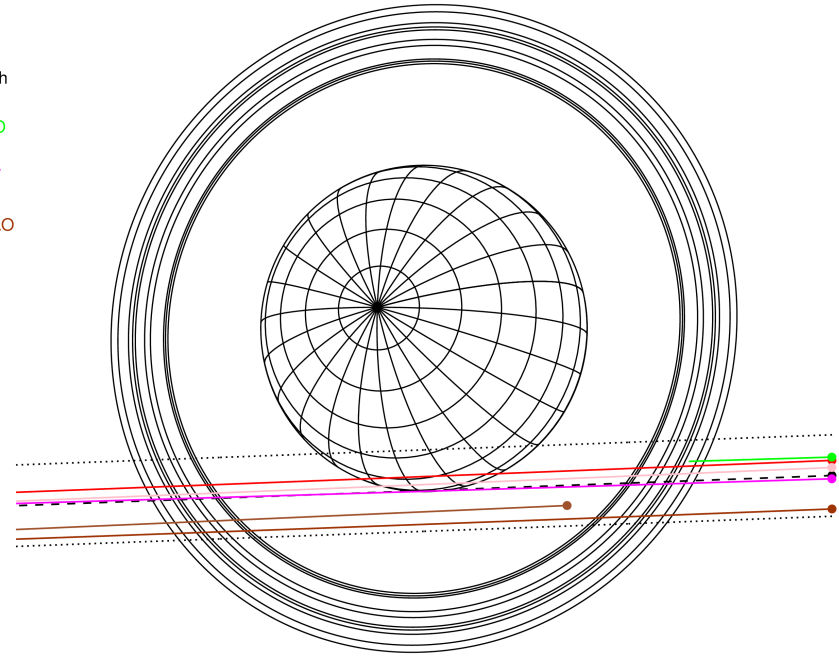
RUWE (>1.4 is poor) : 0.81
 K magnitude : 10.056
 G magnitude : 11.920
 RP magnitude : 11.276
 BP magnitude : 12.394
 DUPflag : 0
 Distance (au) : 18.001
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.45
 Sun-Target sep (deg) : 165.59
 Sun-Moon sep (deg) : 56.88
 B (ring opening deg) : 71.70
 PA of pole (deg) : 65.57

Uranus 2033-12-11T23:07:39 K10.06 G11.92
 PgtRgt



2033-12-11T23:07:39.0500 α: 06 18 09.9971 δ: +23 38 35.940 C/A 1.936° PA 2.12 deg v_sky -22.45 km/s D 18.00 AU
 Credit: Styled after SORA/Lucky Star

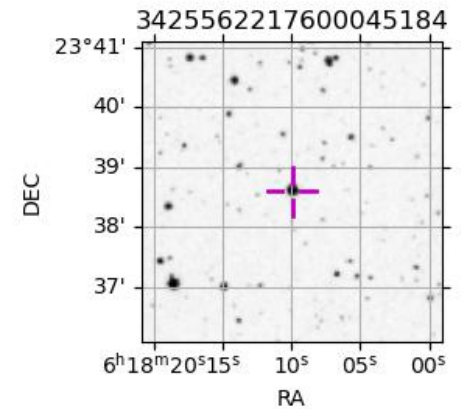
Earth
 PIC
 PMO
 TEN
 KAV
 RIO
 SAAO



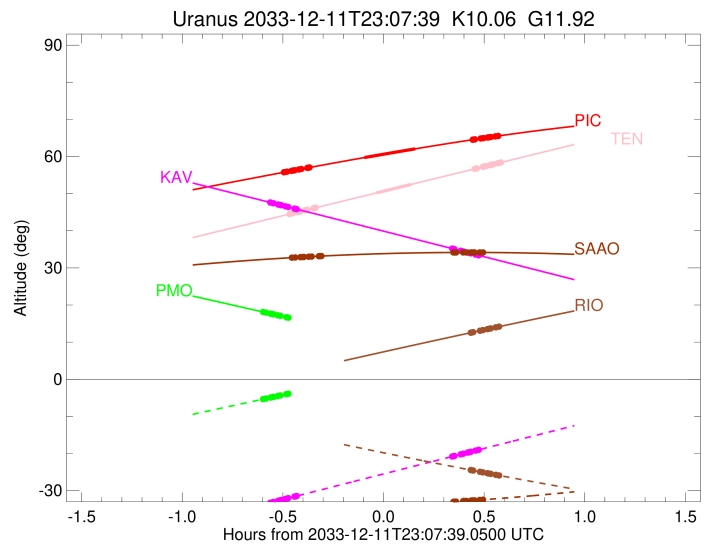
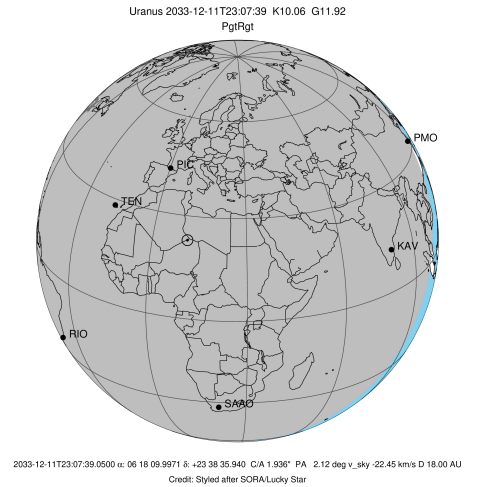
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++	+ +	+++++	DEC 11 22:38 - DEC 11 23:42	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	++			DEC 11 22:31 - DEC 11 22:32	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 11 22:39 - DEC 11 23:42	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	DEC 11 22:34 - DEC 11 23:36	PnnRie
RIO	Rio de Janeiro	-22.9	316.8			+++++	DEC 11 23:33 - DEC 11 23:42	PnnRne
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 11 22:40 - DEC 11 23:37	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

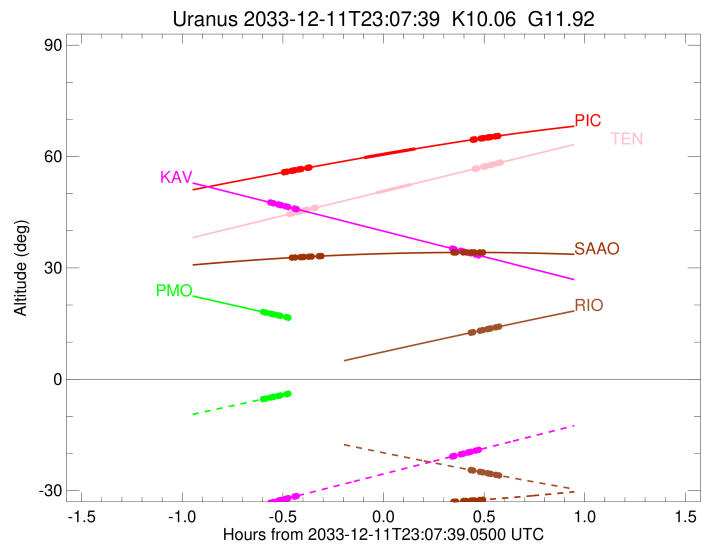
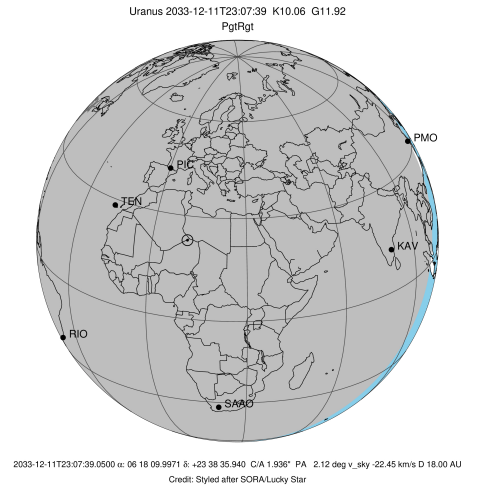


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-11T23:09:14.260
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3425562217600045184
 2Mass ID (if available) : 06181000+2338361
 ICRS Star Coord at Epoch: 06h 18m 09.99705s +23:38:35.93955s
 RUWE (>1.4 is poor) : 0.81
 K magnitude : 10.056
 G magnitude : 11.920
 RP magnitude : 11.276
 BP magnitude : 12.394
 DUPflag : 0
 Distance (au) : 18.001
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.45
 Sun-Target sep (deg) : 165.59
 Sun-Moon sep (deg) : 57.74
 B (ring opening deg) : 71.70
 PA of pole (deg) : 65.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.775
 C/A sky separation (km) : 23174.8
 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



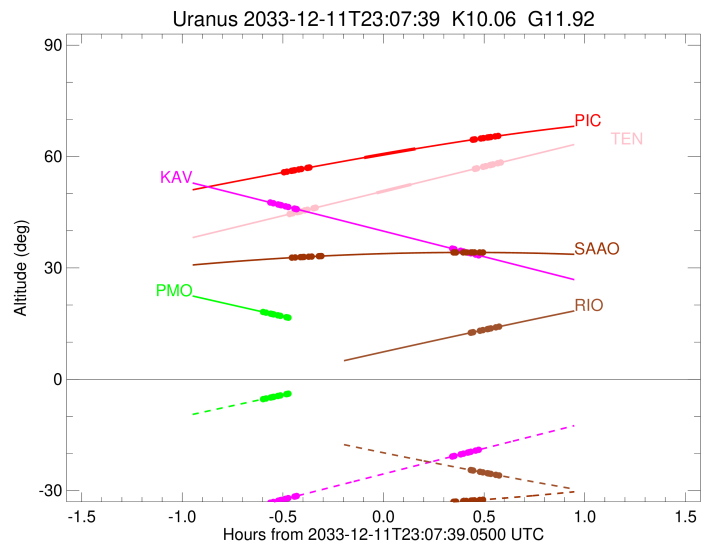
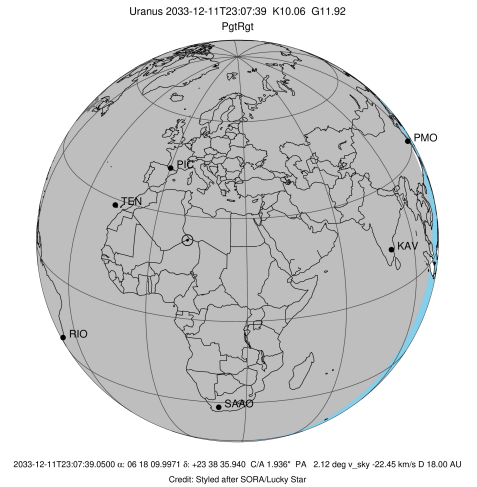
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T22:38:05.515		55.79	-64.95	51007.15	-21.13		
lambda	I	2033-12-11T22:38:52.207		55.92	-65.04	50026.71	-20.94		
delta	I	2033-12-11T22:40:15.059		56.15	-65.22	48300.35	-20.73		
gamma	I	2033-12-11T22:40:47.520		56.24	-65.29	47628.96	-20.64		
eta	I	2033-12-11T22:41:09.496		56.31	-65.33	47176.12	-20.57		
beta	I	2033-12-11T22:42:22.961		56.51	-65.48	45671.50	-20.34		
alpha	I	2033-12-11T22:43:11.296		56.65	-65.58	44696.53	-20.18		
4	I	2033-12-11T22:44:59.443		56.95	-65.80	42529.60	-19.79		
5	I	2033-12-11T22:45:10.393		56.98	-65.82	42304.46	-19.75		
6	I	2033-12-11T22:45:35.221		57.05	-65.87	41817.94	-19.62		
Uranus	I	2033-12-11T23:01:54.269		59.71	-67.66	25244.99		-13.93	-14.56
Uranus	E	2033-12-11T23:17:07.813		62.07	-68.97	25558.51		-0.54	-0.57
6	E	2033-12-11T23:34:14.513		64.53	-69.95	41809.33	19.65		
5	E	2033-12-11T23:34:36.544		64.58	-69.96	42244.86	19.78		
4	E	2033-12-11T23:34:54.214		64.62	-69.98	42604.17	19.83		
alpha	E	2033-12-11T23:36:39.270		64.86	-70.04	44705.44	20.22		
beta	E	2033-12-11T23:37:25.353		64.96	-70.07	45641.08	20.38		
eta	E	2033-12-11T23:38:40.224		65.13	-70.11	47176.12	20.61		
gamma	E	2033-12-11T23:39:02.149		65.18	-70.12	47628.79	20.68		
delta	E	2033-12-11T23:39:34.554		65.25	-70.13	48300.35	20.77		
lambda	E	2033-12-11T23:40:57.236		65.43	-70.17	50026.71	20.99		
epsilon	E	2033-12-11T23:42:09.048		65.58	-70.20	51539.95	21.18		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-11T23:03:50.830
 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 : 3425562217600045184
 2Mass ID (if available) : 06181000+2338361
 ICRS Star Coord at Epoch: 06h 18m 09.99705s +23:38:35.93955s
 RUWE (>1.4 is poor) : 0.81
 K magnitude : 10.056
 G magnitude : 11.920
 RP magnitude : 11.276
 BP magnitude : 12.394
 DUPflag : 0
 Distance (au) : 18.001
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.45
 Sun-Target sep (deg) : 165.59
 Sun-Moon sep (deg) : 56.62
 B (ring opening deg) : 71.70
 PA of pole (deg) : 65.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.689
 C/A sky separation (km) : 22046.1
 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	2033-12-11T22:31:53.066		18.10	-5.33	51001.12	-21.18		
lambda	I	2033-12-11T22:32:39.340		17.95	-5.18	50026.71	-21.01		
delta	I	2033-12-11T22:34:01.891		17.67	-4.91x	48300.35	-20.81		
gamma	I	2033-12-11T22:34:34.213		17.56	-4.81x	47628.87	-20.73		
eta	I	2033-12-11T22:34:56.078		17.48	-4.74x	47176.12	-20.68		
beta	I	2033-12-11T22:36:09.116		17.23	-4.50x	45671.85	-20.47		
alpha	I	2033-12-11T22:36:57.116		17.07	-4.35x	44697.07	-20.33		
4	I	2033-12-11T22:38:44.424		16.71	-4.00x	42529.20	-19.98		
5	I	2033-12-11T22:38:55.276		16.67	-3.97x	42303.51	-19.94		
6	I	2033-12-11T22:39:19.755		16.59	-3.89x	41818.85	-19.83		
Uranus	I	2033-12-11T22:54:47.096		13.48	-0.94x	25200.30		-14.93	-15.60
Uranus	E	2033-12-11T23:13:26.949		9.76	2.56x	25556.04		1.33	1.39
6	E	2033-12-11T23:29:42.987		6.57	5.53x	41810.68	19.76		
5	E	2033-12-11T23:30:04.677		6.50	5.60x	42241.62	19.87		
4	E	2033-12-11T23:30:22.462		6.44	5.65x	42605.40	19.91		
alpha	E	2033-12-11T23:32:07.232		6.10	5.96x	44706.65	20.25		
beta	E	2033-12-11T23:32:53.219		5.95	6.10x	45641.05	20.39		
eta	E	2033-12-11T23:34:08.120		5.71	6.33x	47176.12	20.59		
gamma	E	2033-12-11T23:34:30.066		5.64	6.39x	47628.62	20.65		
delta	E	2033-12-11T23:35:02.540		5.53	6.49x	48300.35	20.72		
lambda	E	2033-12-11T23:36:25.459		5.27	6.74x	50026.71	20.91		
epsilon	E	2033-12-11T23:37:37.378		5.03	6.95x	51536.04	21.08		

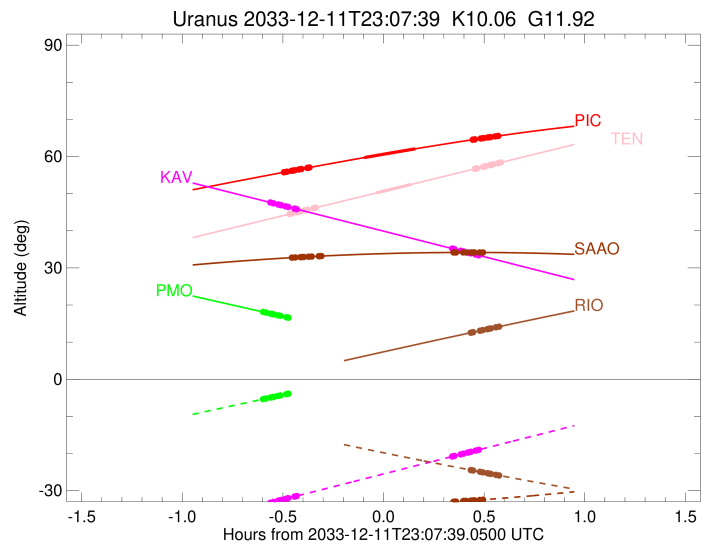
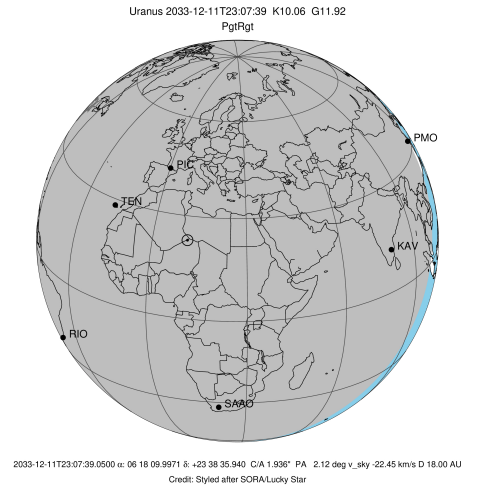
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-11T23:10:26.780
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3425562217600045184
 2Mass ID (if available) : 06181000+2338361
 ICRS Star Coord at Epoch: 06h 18m 09.99705s +23:38:35.93955s
 RUWE (>1.4 is poor) : 0.81
 K magnitude : 10.056
 G magnitude : 11.920
 RP magnitude : 11.276
 BP magnitude : 12.394
 DUPflag : 0
 Distance (au) : 18.001
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.45
 Sun-Target sep (deg) : 165.59
 Sun-Moon sep (deg) : 57.79
 B (ring opening deg) : 71.70
 PA of pole (deg) : 65.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.871
 C/A sky separation (km) : 24424.8
 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



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	2033-12-11T22:39:47.357	44.53	-58.21	51017.00	-20.81		
lambda	I	2033-12-11T22:40:35.293	44.71	-58.38	50026.71	-20.59		
delta	I	2033-12-11T22:41:59.603	45.01	-58.69	48300.35	-20.35		
gamma	I	2033-12-11T22:42:32.664	45.14	-58.81	47629.09	-20.25		
eta	I	2033-12-11T22:42:55.070	45.22	-58.89	47176.12	-20.18		
beta	I	2033-12-11T22:44:10.056	45.49	-59.17	45670.97	-19.92		
alpha	I	2033-12-11T22:44:59.463	45.67	-59.35	44695.73	-19.74		
4	I	2033-12-11T22:46:50.126	46.08	-59.76	42530.23	-19.30		
5	I	2033-12-11T22:47:01.355	46.12	-59.80	42305.80	-19.24		
6	I	2033-12-11T22:47:26.988	46.21	-59.89	41816.63	-19.10		
Uranus	I	2033-12-11T23:05:33.801	50.21	-63.88	25318.02		-12.15	-12.70
Uranus	E	2033-12-11T23:15:55.285	52.49	-66.15	25543.31		-3.06	-3.20
6	E	2033-12-11T23:34:51.836	56.68	-70.28	41808.10	19.15		
5	E	2033-12-11T23:35:14.655	56.76	-70.37	42247.92	19.30		
4	E	2033-12-11T23:35:32.576	56.83	-70.43	42602.96	19.35		
alpha	E	2033-12-11T23:37:20.031	57.22	-70.82	44704.33	19.80		
beta	E	2033-12-11T23:38:07.116	57.40	-70.99	45641.12	19.98		
eta	E	2033-12-11T23:39:23.413	57.68	-71.26	47176.12	20.25		
gamma	E	2033-12-11T23:39:45.738	57.76	-71.34	47628.94	20.32		
delta	E	2033-12-11T23:40:18.697	57.88	-71.46	48300.35	20.42		
lambda	E	2033-12-11T23:41:42.716	58.19	-71.77	50026.71	20.67		
epsilon	E	2033-12-11T23:42:55.740	58.46	-72.03	51543.10	20.88		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-11T23:04:11.380
 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 : 3425562217600045184
 2Mass ID (if available) : 06181000+2338361
 ICRS Star Coord at Epoch: 06h 18m 09.99705s +23:38:35.93955s
 RUWE (>1.4 is poor) : 0.81
 K magnitude : 10.056
 G magnitude : 11.920
 RP magnitude : 11.276
 BP magnitude : 12.394
 DUPflag : 0
 Distance (au) : 18.001
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.45
 Sun-Target sep (deg) : 165.59
 Sun-Moon sep (deg) : 56.99
 B (ring opening deg) : 71.70
 PA of pole (deg) : 65.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.953
 C/A sky separation (km) : 25491.4
 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



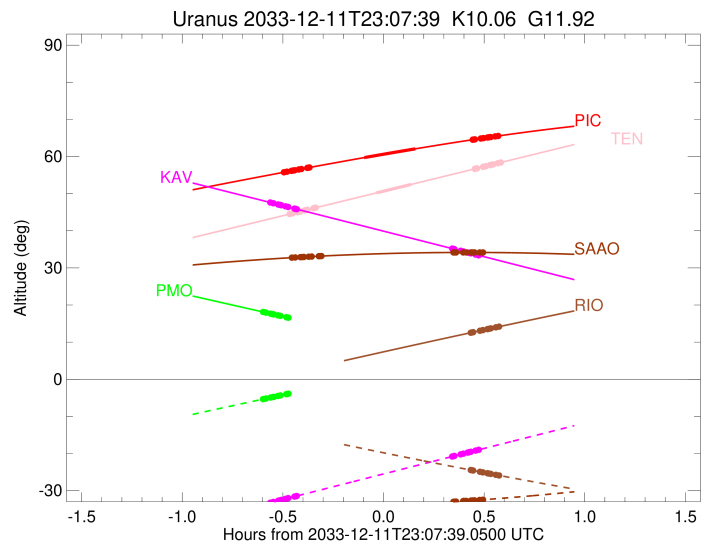
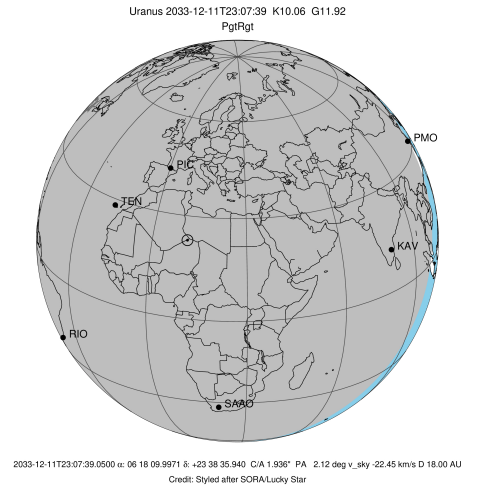
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T22:34:00.303		47.60	-33.24	51030.33	-20.60		
lambda	I	2033-12-11T22:34:49.418		47.41	-33.05	50026.71	-20.36		
delta	I	2033-12-11T22:36:14.762		47.09	-32.72	48300.35	-20.09		
gamma	I	2033-12-11T22:36:48.260		46.96	-32.59	47629.25	-19.98		
eta	I	2033-12-11T22:37:10.989		46.87	-32.50	47176.12	-19.90		
beta	I	2033-12-11T22:38:27.149		46.58	-32.21	45670.29	-19.60		
alpha	I	2033-12-11T22:39:17.402		46.39	-32.02	44694.76	-19.40		
4	I	2033-12-11T22:41:10.067		45.96	-31.59	42531.07	-18.90		
5	I	2033-12-11T22:41:21.537		45.92	-31.54	42307.33	-18.84		
6	I	2033-12-11T22:41:47.900		45.82	-31.44	41815.07	-18.68		

No planet occultations

6	E	2033-12-11T23:28:06.355		35.21	-20.81	41807.44	18.63		
5	E	2033-12-11T23:28:29.930		35.12	-20.72	42249.58	18.79		
4	E	2033-12-11T23:28:48.230		35.05	-20.65	42602.28	18.85		
alpha	E	2033-12-11T23:30:38.394		34.63	-20.23	44703.76	19.34		
beta	E	2033-12-11T23:31:26.601		34.44	-20.05	45641.15	19.54		
eta	E	2033-12-11T23:32:44.566		34.14	-19.75	47176.12	19.83		
gamma	E	2033-12-11T23:33:07.362		34.05	-19.67	47629.01	19.91		
delta	E	2033-12-11T23:33:40.991		33.93	-19.54	48300.35	20.02		
lambda	E	2033-12-11T23:35:06.647		33.60	-19.21	50026.71	20.29		
epsilon	E	2033-12-11T23:36:21.074		33.31	-18.93	51544.38	20.52		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-11T23:11:29.640
 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 : 3425562217600045184
 2Mass ID (if available) : 06181000+2338361
 ICRS Star Coord at Epoch: 06h 18m 09.99705s +23:38:35.93955s
 RUWE (>1.4 is poor) : 0.81
 K magnitude : 10.056
 G magnitude : 11.920
 RP magnitude : 11.276
 BP magnitude : 12.394
 DUPflag : 0
 Distance (au) : 18.001
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.45
 Sun-Target sep (deg) : 165.59
 Sun-Moon sep (deg) : 57.38
 B (ring opening deg) : 71.70
 PA of pole (deg) : 65.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.197
 C/A sky separation (km) : 28682.1
 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



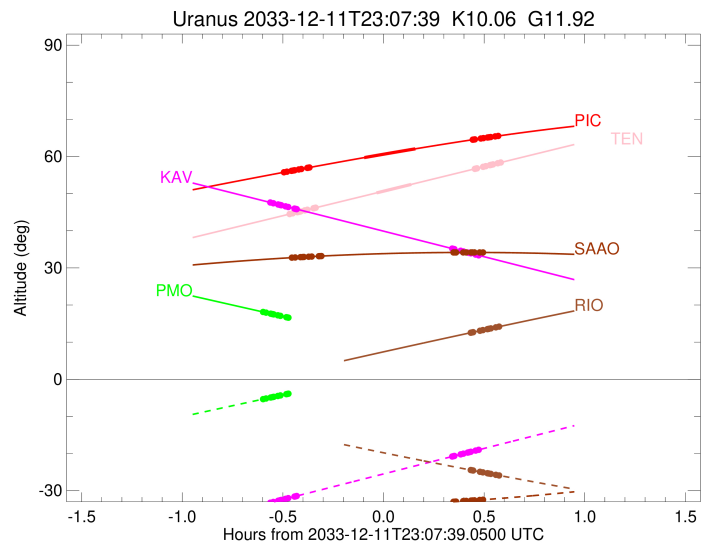
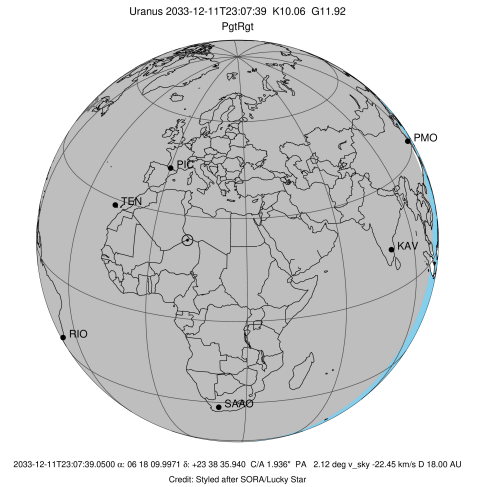
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T22:42:36.795		2.28x	-15.09	51054.56	-19.46		
lambda	I	2033-12-11T22:43:30.163		2.47x	-15.26	50026.71	-19.16		
delta	I	2033-12-11T22:45:01.075		2.78x	-15.55	48300.35	-18.81		
gamma	I	2033-12-11T22:45:36.879		2.90x	-15.67	47629.55	-18.66		
eta	I	2033-12-11T22:46:01.248		2.99x	-15.75	47176.12	-18.55		
beta	I	2033-12-11T22:47:23.238		3.27x	-16.01	45668.91	-18.17		
alpha	I	2033-12-11T22:48:17.611		3.45x	-16.18	44692.92	-17.89		
4	I	2033-12-11T22:50:20.212		3.87x	-16.57	42533.03	-17.23		
5	I	2033-12-11T22:50:32.855		3.91x	-16.61	42310.10	-17.14		
6	I	2033-12-11T22:51:02.247		4.01x	-16.70	41811.90	-16.93		

No planet occultations

6	E	2033-12-11T23:33:38.156	12.53	-24.45	41804.14	16.99
5	E	2033-12-11T23:34:04.674	12.62	-24.53	42258.43	17.20
4	E	2033-12-11T23:34:24.020	12.68	-24.58	42598.38	17.29
alpha	E	2033-12-11T23:36:23.329	13.07	-24.93	44700.65	17.97
beta	E	2033-12-11T23:37:15.264	13.24	-25.08	45641.46	18.24
eta	E	2033-12-11T23:38:38.483	13.51	-25.31	47176.12	18.63
gamma	E	2033-12-11T23:39:02.741	13.58	-25.38	47629.44	18.74
delta	E	2033-12-11T23:39:38.394	13.70	-25.48	48300.35	18.89
lambda	E	2033-12-11T23:41:08.890	13.99	-25.74	50026.71	19.25
epsilon	E	2033-12-11T23:42:27.476	14.24	-25.96	51551.06	19.55

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-12-11T23:07:55.740
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      : 3425562217600045184
2Mass ID (if available) : 06181000+2338361
ICRS Star Coord at Epoch: 06h 18m 09.99705s +23:38:35.93955s
RUWE (>1.4 is poor) : 0.81
K magnitude         : 10.056
G magnitude         : 11.920
RP magnitude        : 11.276
BP magnitude        : 12.394
DUPflag            : 0
Distance (au)       : 18.001
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -22.45
Sun-Target sep (deg) : 165.59
Sun-Moon sep (deg)  : 57.32
B (ring opening deg) : 71.70
PA of pole (deg)    : 65.57
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.348
C/A sky separation (km) : 30653.8
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.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	2033-12-11T22:40:24.706		32.77	-34.67	51075.97	-19.04		
lambda	I	2033-12-11T22:41:20.485		32.81	-34.66	50026.71	-18.69		
delta	I	2033-12-11T22:42:53.888		32.89	-34.64	48300.35	-18.27		
gamma	I	2033-12-11T22:43:30.781		32.92	-34.63	47629.80	-18.08		
eta	I	2033-12-11T22:43:55.957		32.95	-34.63	47176.12	-17.96		
beta	I	2033-12-11T22:45:20.972		33.01	-34.61	45667.71	-17.49		
alpha	I	2033-12-11T22:46:17.588		33.06	-34.59	44691.51	-17.15		
4	I	2033-12-11T22:48:25.955		33.16	-34.56	42534.89	-16.33		
5	I	2033-12-11T22:48:39.387		33.17	-34.55	42311.96	-16.22		
6	I	2033-12-11T22:49:10.773		33.19	-34.54	41809.43	-15.97		

No planet occultations

6	E	2033-12-11T23:28:28.630		34.16	-33.00	41802.57	15.98		
5	E	2033-12-11T23:28:57.175		34.16	-32.97	42262.99	16.23		
4	E	2033-12-11T23:29:17.315		34.16	-32.95	42596.19	16.34		
alpha	E	2033-12-11T23:31:22.857		34.17	-32.83	44699.14	17.16		
beta	E	2033-12-11T23:32:17.205		34.17	-32.77	45641.69	17.50		
eta	E	2033-12-11T23:33:43.722		34.17	-32.68	47176.12	17.97		
gamma	E	2033-12-11T23:34:08.873		34.17	-32.66	47629.63	18.10		
delta	E	2033-12-11T23:34:45.751		34.17	-32.62	48300.35	18.28		
lambda	E	2033-12-11T23:36:19.090		34.16	-32.52	50026.71	18.71		
epsilon	E	2033-12-11T23:37:39.952		34.16	-32.43	51553.12	19.05		