

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-30T23:59:12.900
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3424867296189250944
 2Mass ID (if available) : 05595810+2338554

Uranus 2032-11-30T23:59:12 K13.84 G16.84 PtRgt

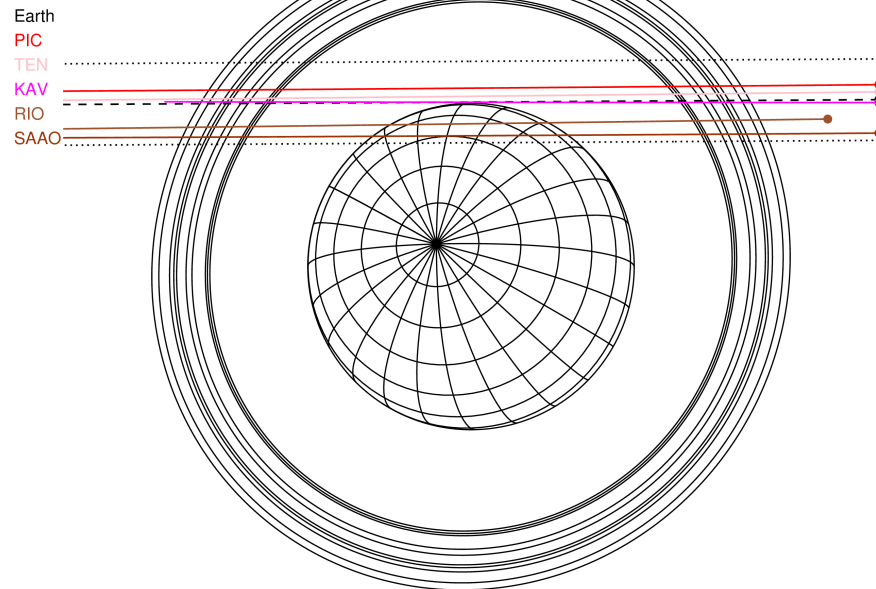
ICRS Star Coord at Epoch: 05h 59m 58.10435s +23:38:55.19824s

RUWE (>1.4 is poor) : 4.27
 K magnitude : 13.837
 G magnitude : 16.842
 RP magnitude : 15.768
 BP magnitude : 17.401
 DUPflag : 0
 Distance (au) : 18.100
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.43
 Sun-Target sep (deg) : 158.89
 Sun-Moon sep (deg) : 136.19
 B (ring opening deg) : 75.36
 PA of pole (deg) : 56.94

Uranus 2032-11-30T23:59:12 K13.84 G16.84 PtRgt



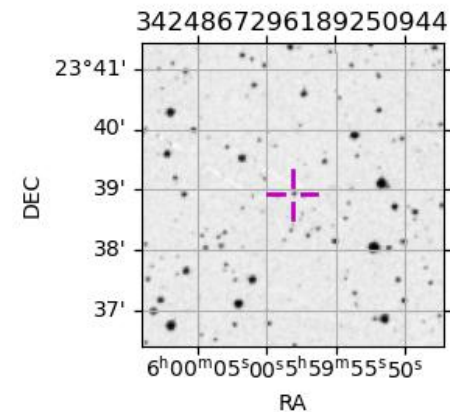
2032-11-30T23:59:12.9000 ra: 05 59 58.1043 s: +23 38 55.198 C/A 1.969° PA 180.34 deg v_sky -21.43 km/s D 18.10 AU
 Credit: Styled after SORA/Lucky Star



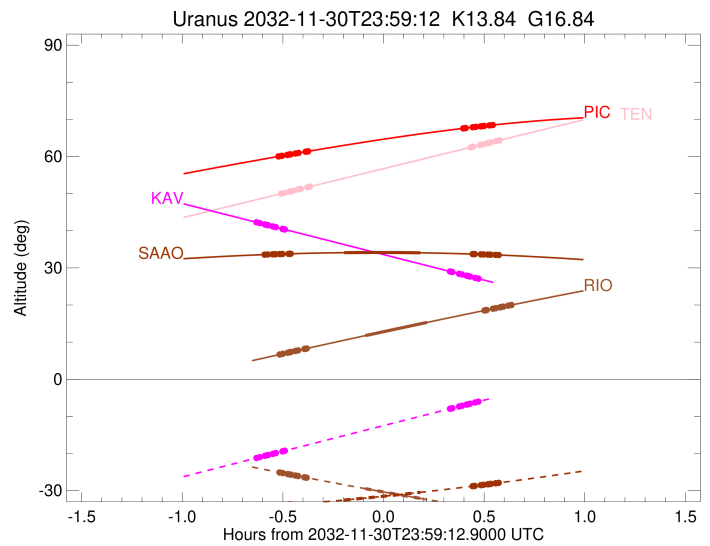
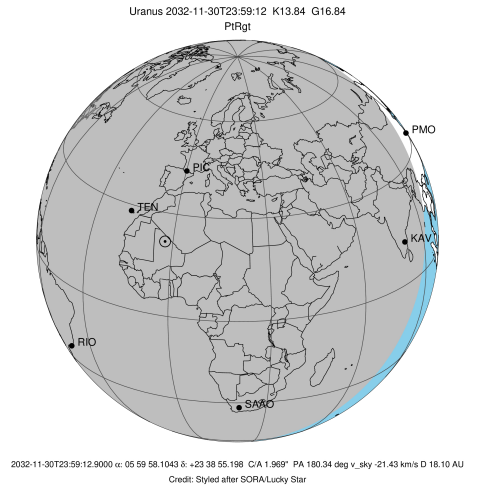
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++		+++++	NOV 30 23:27 - DEC 01 00:31	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
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	+++++		+++++	NOV 30 23:28 - DEC 01 00:33	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	NOV 30 23:21 - DEC 01 00:27	PnnRie
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	NOV 30 23:28 - DEC 01 00:37	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	+++++	+ +	+++++	NOV 30 23:23 - DEC 01 00:33	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-01T00:00:30.470
 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 : 3424867296189250944
 2Mass ID (if available) : 05595810+2338554
 ICRS Star Coord at Epoch: 05h 59m 58.10435s +23:38:55.19824s
 RUWE (>1.4 is poor) : 4.27
 K magnitude : 13.837
 G magnitude : 16.842
 RP magnitude : 15.768
 BP magnitude : 17.401
 DUPflag : 0
 Distance (au) : 18.100
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.43
 Sun-Target sep (deg) : 158.89
 Sun-Moon sep (deg) : 136.61
 B (ring opening deg) : 75.36
 PA of pole (deg) : 56.94
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.128
 C/A sky separation (km) : 27928.2
 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



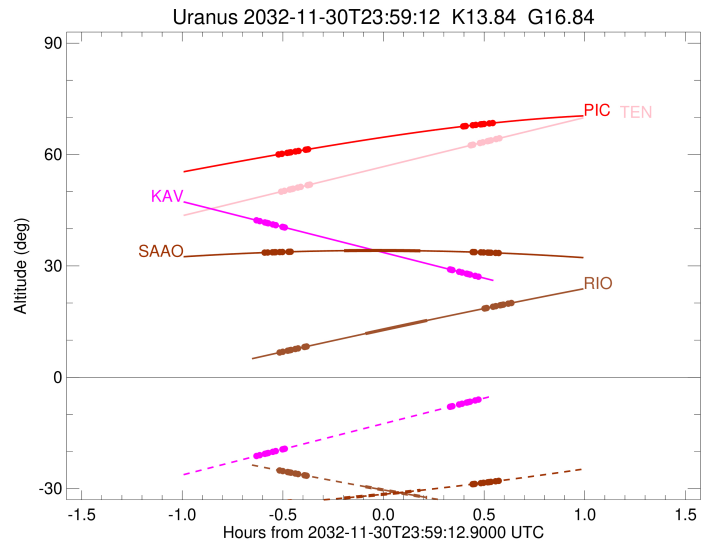
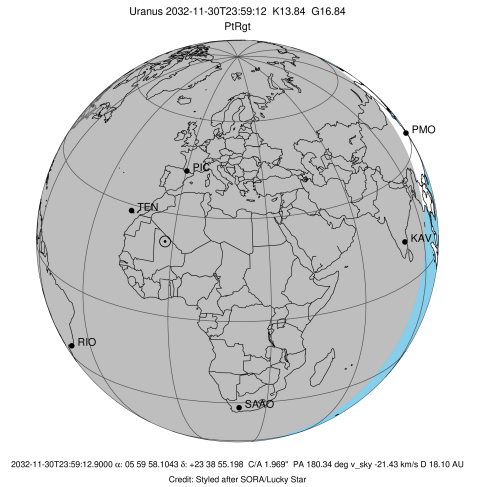
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T23:27:38.155		59.99	-68.65	51473.74	-18.66		
lambda	I	2032-11-30T23:28:56.435		60.19	-68.71	50026.71	-18.37		
delta	I	2032-11-30T23:30:31.227		60.44	-68.77	48300.35	-18.05		
gamma	I	2032-11-30T23:31:08.575		60.54	-68.79	47628.61	-17.92		
eta	I	2032-11-30T23:31:33.892		60.61	-68.80	47176.12	-17.83		
beta	I	2032-11-30T23:32:58.983		60.83	-68.85	45673.05	-17.49		
alpha	I	2032-11-30T23:33:52.532		60.97	-68.88	44743.73	-17.26		
4	I	2032-11-30T23:36:02.231		61.30	-68.94	42542.97	-16.64		
5	I	2032-11-30T23:36:16.633		61.34	-68.95	42304.53	-16.56		
6	I	2032-11-30T23:36:44.448		61.41	-68.96	41843.09	-16.44		

No planet occultations

6	E	2032-12-01T00:23:01.160		67.59	-67.89	41878.64	16.46		
5	E	2032-12-01T00:23:19.793		67.63	-67.87	42187.79	16.58		
4	E	2032-12-01T00:23:40.035		67.66	-67.85	42539.37	16.66		
alpha	E	2032-12-01T00:25:47.081		67.89	-67.70	44691.23	17.28		
beta	E	2032-12-01T00:26:41.863		67.98	-67.63	45642.63	17.51		
eta	E	2032-12-01T00:28:08.521		68.13	-67.52	47176.12	17.86		
gamma	E	2032-12-01T00:28:33.373		68.17	-67.49	47621.02	17.95		
delta	E	2032-12-01T00:29:11.079		68.23	-67.44	48300.35	18.08		
lambda	E	2032-12-01T00:30:45.702		68.39	-67.32	50026.71	18.40		
epsilon	E	2032-12-01T00:31:51.317		68.49	-67.23	51240.66	18.70		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-01T00:01:53.260
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3424867296189250944
 2Mass ID (if available) : 05595810+2338554
 ICRS Star Coord at Epoch: 05h 59m 58.10435s +23:38:55.19824s
 RUWE (>1.4 is poor) : 4.27
 K magnitude : 13.837
 G magnitude : 16.842
 RP magnitude : 15.768
 BP magnitude : 17.401
 DUPflag : 0
 Distance (au) : 18.100
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.43
 Sun-Target sep (deg) : 158.89
 Sun-Moon sep (deg) : 136.37
 B (ring opening deg) : 75.36
 PA of pole (deg) : 56.94
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.030
 C/A sky separation (km) : 26648.1
 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

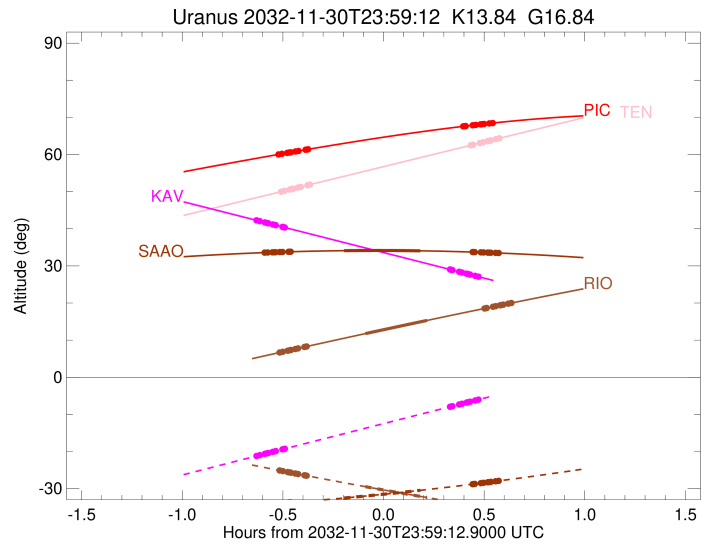
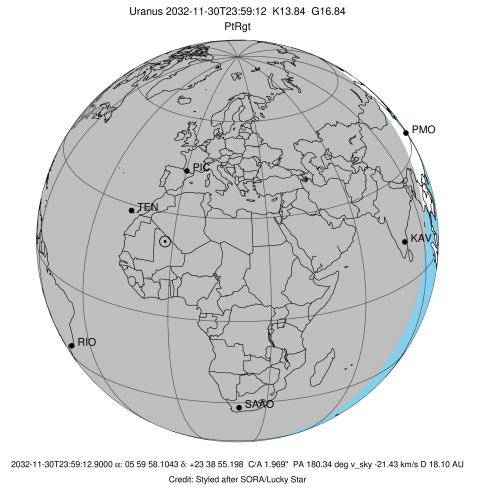


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T23:28:26.285		49.94	-69.44	51466.92	-19.00		
lambda	I	2032-11-30T23:29:42.718		50.22	-69.72	50026.71	-18.74		
delta	I	2032-11-30T23:31:15.532		50.56	-70.05	48300.35	-18.46		
gamma	I	2032-11-30T23:31:52.032		50.70	-70.18	47628.75	-18.34		
eta	I	2032-11-30T23:32:16.768		50.79	-70.27	47176.12	-18.26		
beta	I	2032-11-30T23:33:39.710		51.09	-70.56	45673.58	-17.96		
alpha	I	2032-11-30T23:34:31.805		51.29	-70.75	44744.50	-17.75		
4	I	2032-11-30T23:36:37.522		51.75	-71.19	42544.32	-17.21		
5	I	2032-11-30T23:36:51.431		51.80	-71.24	42306.00	-17.14		
6	I	2032-11-30T23:37:18.450		51.90	-71.34	41841.46	-17.03		

No planet occultations

6	E	2032-12-01T00:25:15.256		62.49	-80.79	41878.18	17.08		
5	E	2032-12-01T00:25:33.067		62.56	-80.84	42185.08	17.19		
4	E	2032-12-01T00:25:52.848		62.63	-80.90	42540.76	17.25		
alpha	E	2032-12-01T00:27:55.726		63.09	-81.23	44690.47	17.81		
beta	E	2032-12-01T00:28:48.981		63.28	-81.36	45642.35	18.01		
eta	E	2032-12-01T00:30:13.370		63.59	-81.58	47176.12	18.32		
gamma	E	2032-12-01T00:30:37.604		63.68	-81.64	47621.00	18.40		
delta	E	2032-12-01T00:31:14.406		63.82	-81.73	48300.35	18.52		
lambda	E	2032-12-01T00:32:46.906		64.16	-81.95	50026.71	18.80		
epsilon	E	2032-12-01T00:33:50.490		64.39	-82.10	51227.97	19.07		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-30T23:54:59.230
 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 : 3424867296189250944
 2Mass ID (if available) : 05595810+2338554
 ICRS Star Coord at Epoch: 05h 59m 58.10435s +23:38:55.19824s
 RUWE (>1.4 is poor) : 4.27
 K magnitude : 13.837
 G magnitude : 16.842
 RP magnitude : 15.768
 BP magnitude : 17.401
 DUPflag : 0
 Distance (au) : 18.100
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.43
 Sun-Target sep (deg) : 158.89
 Sun-Moon sep (deg) : 137.11
 B (ring opening deg) : 75.36
 PA of pole (deg) : 56.94
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.959
 C/A sky separation (km) : 25719.8
 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



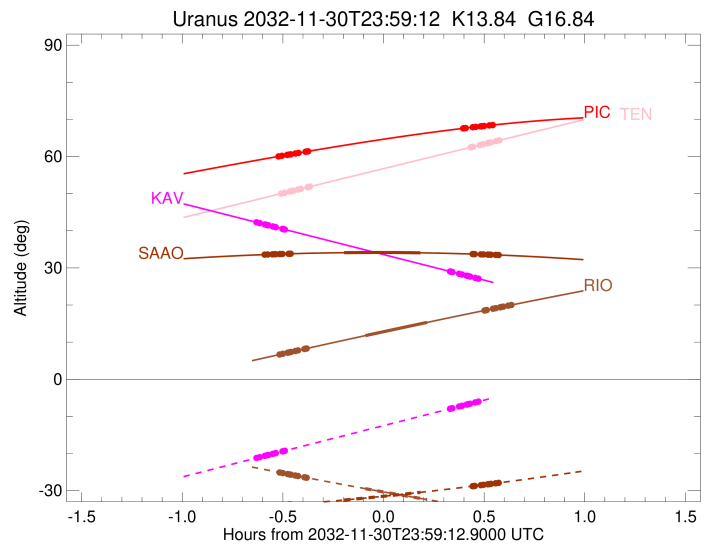
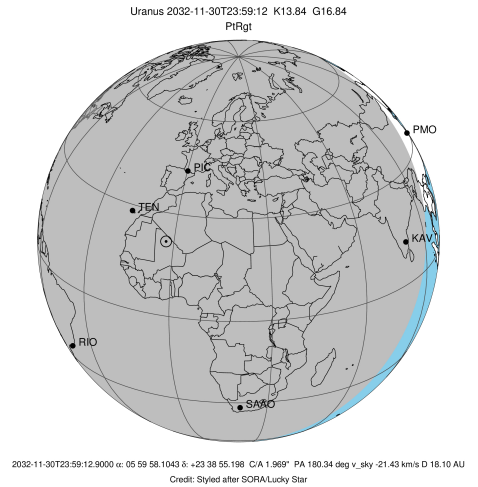
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T23:21:05.268	42.34	-21.27	51458.43	-19.26		
lambda	I	2032-11-30T23:22:20.218	42.06	-20.98	50026.71	-19.00		
delta	I	2032-11-30T23:23:51.672	41.71	-20.63	48300.35	-18.74		
gamma	I	2032-11-30T23:24:27.595	41.57	-20.49	47628.92	-18.63		
eta	I	2032-11-30T23:24:51.943	41.48	-20.39	47176.12	-18.56		
beta	I	2032-11-30T23:26:13.447	41.17	-20.08	45674.15	-18.28		
alpha	I	2032-11-30T23:27:04.588	40.97	-19.88	44745.30	-18.09		
4	I	2032-11-30T23:29:07.733	40.50	-19.41	42545.78	-17.59		
5	I	2032-11-30T23:29:21.330	40.45	-19.36	42307.44	-17.53		
6	I	2032-11-30T23:29:47.901	40.35	-19.26	41839.75	-17.43		

No planet occultations

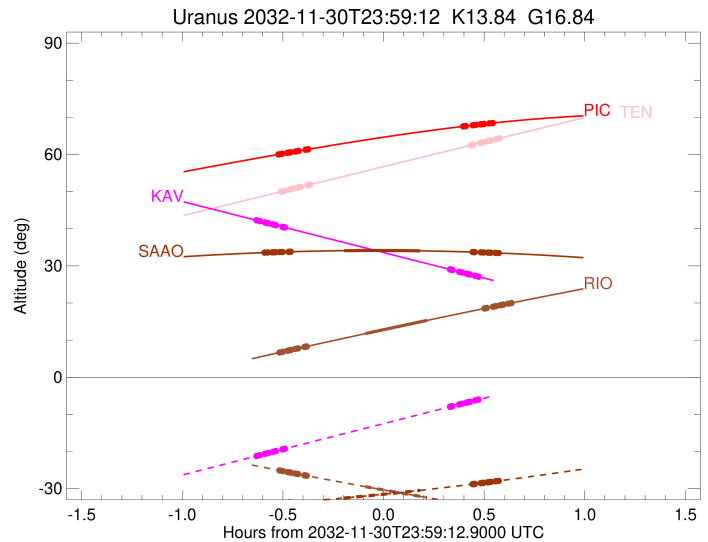
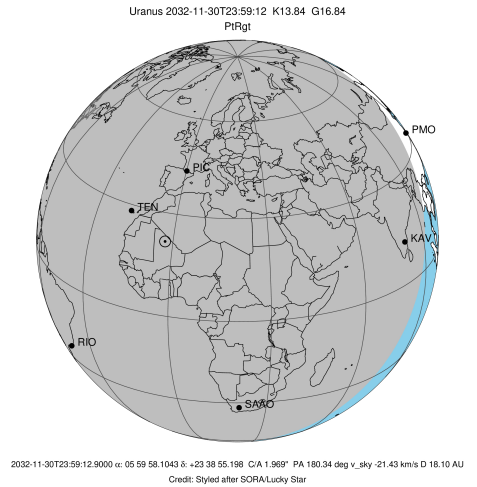
6	E	2032-12-01T00:19:05.232	29.03	-7.94	41877.97	17.37		
5	E	2032-12-01T00:19:22.689	28.97	-7.88	42183.97	17.47		
4	E	2032-12-01T00:19:42.258	28.89	-7.80	42541.34	17.53		
alpha	E	2032-12-01T00:21:43.399	28.43	-7.34	44690.18	18.02		
beta	E	2032-12-01T00:22:36.061	28.23	-7.14	45642.25	18.21		
eta	E	2032-12-01T00:23:59.628	27.91	-6.82	47176.12	18.48		
gamma	E	2032-12-01T00:24:23.652	27.81	-6.73	47620.99	18.55		
delta	E	2032-12-01T00:25:00.159	27.68	-6.59	48300.35	18.66		
lambda	E	2032-12-01T00:26:32.024	27.32	-6.25	50026.71	18.92		
epsilon	E	2032-12-01T00:27:35.035	27.08	-6.01	51223.79	19.16		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-01T00:03:21.880
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3424867296189250944
 2Mass ID (if available) : 05595810+2338554
 ICRS Star Coord at Epoch: 05h 59m 58.10435s +23:38:55.19824s
 RUWE (>1.4 is poor) : 4.27
 K magnitude : 13.837
 G magnitude : 16.842
 RP magnitude : 15.768
 BP magnitude : 17.401
 DUPflag : 0
 Distance (au) : 18.100
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.43
 Sun-Target sep (deg) : 158.89
 Sun-Moon sep (deg) : 135.76
 B (ring opening deg) : 75.36
 PA of pole (deg) : 56.94
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.703
 C/A sky separation (km) : 22349.7
 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	2032-11-30T23:28:00.448		6.62	-25.07	51441.74	-19.88		
lambda	I	2032-11-30T23:29:12.056		6.86	-25.28	50026.71	-19.69		
delta	I	2032-11-30T23:30:40.120		7.16	-25.53	48300.35	-19.51		
gamma	I	2032-11-30T23:31:14.585		7.28	-25.63	47629.23	-19.43		
eta	I	2032-11-30T23:31:37.933		7.35	-25.70	47176.12	-19.38		
beta	I	2032-11-30T23:32:55.734		7.61	-25.93	45675.25	-19.18		
alpha	I	2032-11-30T23:33:44.378		7.78	-26.07	44746.81	-19.06		
4	I	2032-11-30T23:35:40.699		8.17	-26.41	42549.00	-18.70		
5	I	2032-11-30T23:35:53.488		8.21	-26.44	42310.09	-18.66		
6	I	2032-11-30T23:36:18.721		8.29	-26.52	41836.10	-18.60		
Uranus	I	2032-11-30T23:53:48.926		11.76	-29.47	25555.04		1.21	1.27
Uranus	E	2032-12-01T00:12:13.350		15.32	-32.40	25136.29		12.78	13.36
6	E	2032-12-01T00:29:21.795		18.54	-34.95	41876.34	18.68		
5	E	2032-12-01T00:29:37.722		18.59	-34.98	42177.39	18.75		
4	E	2032-12-01T00:29:56.561		18.65	-35.03	42545.30	18.79		
alpha	E	2032-12-01T00:31:49.774		18.99	-35.30	44688.40	19.15		
beta	E	2032-12-01T00:32:39.502		19.15	-35.41	45641.65	19.28		
eta	E	2032-12-01T00:33:58.626		19.39	-35.60	47176.12	19.48		
gamma	E	2032-12-01T00:34:21.428		19.46	-35.65	47620.96	19.54		
delta	E	2032-12-01T00:34:56.134		19.56	-35.73	48300.35	19.62		
lambda	E	2032-12-01T00:36:23.717		19.83	-35.93	50026.71	19.80		
epsilon	E	2032-12-01T00:37:22.191		20.01	-36.07	51188.11	20.00		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-30T23:59:08.100
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3424867296189250944
 2Mass ID (if available) : 05595810+2338554
 ICRS Star Coord at Epoch: 05h 59m 58.10435s +23:38:55.19824s
 RUWE (>1.4 is poor) : 4.27
 K magnitude : 13.837
 G magnitude : 16.842
 RP magnitude : 15.768
 BP magnitude : 17.401
 DUPflag : 0
 Distance (au) : 18.100
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.43
 Sun-Target sep (deg) : 158.89
 Sun-Moon sep (deg) : 136.53
 B (ring opening deg) : 75.36
 PA of pole (deg) : 56.94
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.560
 C/A sky separation (km) : 20473.4
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-30T23:23:32.874		33.57	-34.21	51428.01	-20.50		
lambda	I	2032-11-30T23:24:41.604		33.61	-34.15	50026.71	-20.33		
delta	I	2032-11-30T23:26:06.828		33.66	-34.06	48300.35	-20.18		
gamma	I	2032-11-30T23:26:40.129		33.68	-34.02	47629.45	-20.11		
eta	I	2032-11-30T23:27:02.692		33.69	-34.00	47176.12	-20.07		
beta	I	2032-11-30T23:28:17.710		33.72	-33.92	45676.00	-19.91		
alpha	I	2032-11-30T23:29:04.559		33.75	-33.87	44747.80	-19.80		
4	I	2032-11-30T23:30:56.257		33.80	-33.75	42551.35	-19.50		
5	I	2032-11-30T23:31:08.537		33.80	-33.74	42311.63	-19.47		
6	I	2032-11-30T23:31:32.898		33.82	-33.71	41833.56	-19.42		
Uranus	I	2032-11-30T23:47:27.365		34.10	-32.53	25557.05		-0.85	-0.89
Uranus	E	2032-12-01T00:10:11.752		34.06	-30.46	25081.41		13.62	14.24
6	E	2032-12-01T00:25:49.397		33.73	-28.80	41875.53	19.42		
5	E	2032-12-01T00:26:04.613		33.72	-28.77	42174.92	19.48		
4	E	2032-12-01T00:26:22.979		33.71	-28.74	42546.98	19.51		
alpha	E	2032-12-01T00:28:12.097		33.65	-28.53	44687.78	19.80		
beta	E	2032-12-01T00:29:00.238		33.63	-28.44	45641.47	19.91		
eta	E	2032-12-01T00:30:16.941		33.59	-28.29	47176.12	20.08		
gamma	E	2032-12-01T00:30:39.074		33.57	-28.25	47620.96	20.12		
delta	E	2032-12-01T00:31:12.784		33.55	-28.18	48300.35	20.19		
lambda	E	2032-12-01T00:32:37.976		33.50	-28.02	50026.71	20.34		
epsilon	E	2032-12-01T00:33:34.277		33.47	-27.91	51174.51	20.50		