

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-17T20:28:57.460
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3424693573351145216
 2Mass ID (if available) : 06020285+2338392

ICRS Star Coord at Epoch: 06h 02m 02.86290s +23:38:39.18285s

RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.591
 G magnitude : 15.656
 RP magnitude : 14.953
 BP magnitude : 16.185
 DUPflag : 0
 Distance (au) : 18.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.12
 Sun-Moon sep (deg) : 27.69
 B (ring opening deg) : 74.96
 PA of pole (deg) : 58.13

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

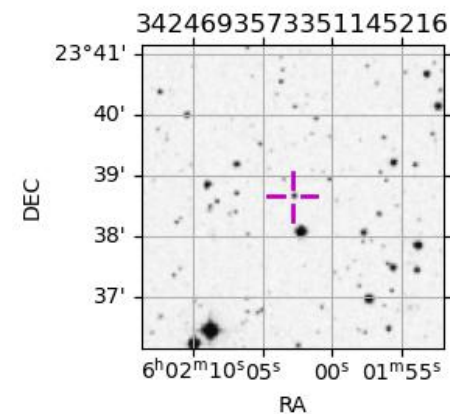
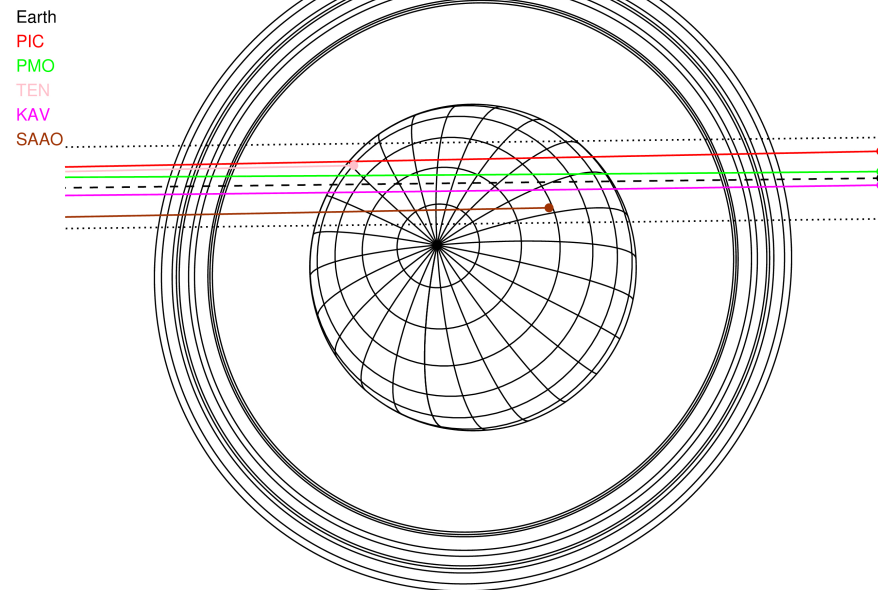
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	NOV 17 19:49 - NOV 17 21:16	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	NOV 17 19:42 - NOV 17 21:09	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		+	+++++	NOV 17 20:51 - NOV 17 21:17	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	NOV 17 19:45 - NOV 17 21:12	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		+	+++++	NOV 17 20:54 - NOV 17 21:17	PneRne
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

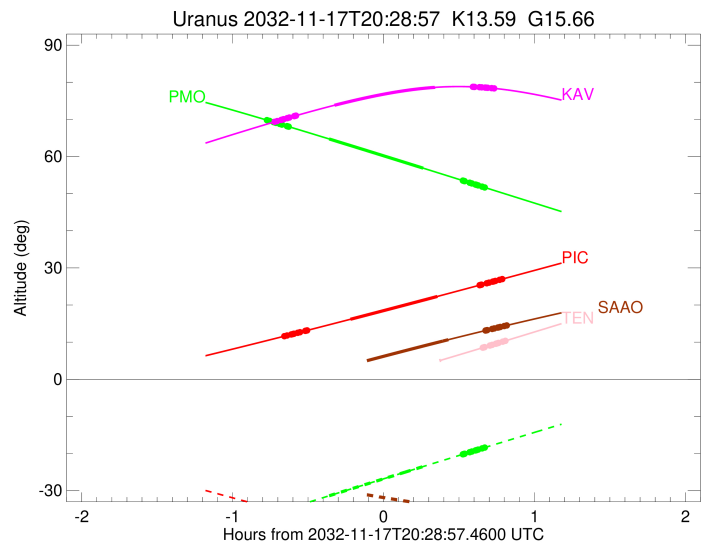
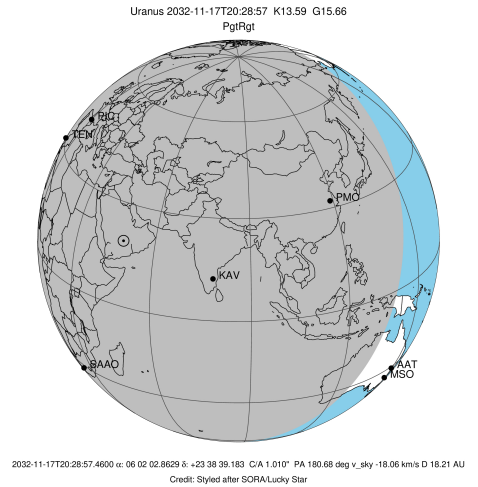


2032-11-17T20:28:57.4600 ra: 06 02 02.8629 s: +23 38 39.183 C/A 1.010° PA 180.68 deg v_sky -18.06 km/s D 18.21 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2032-11-17T20:28:57 K13.59 G15.66 PgtRgt

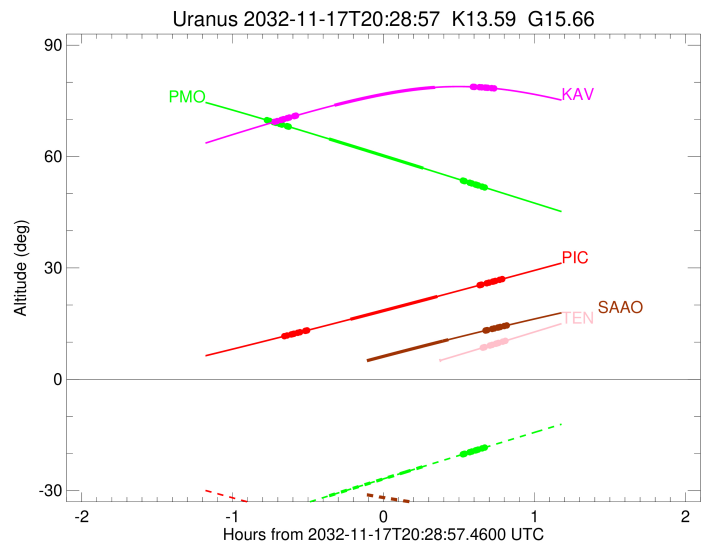
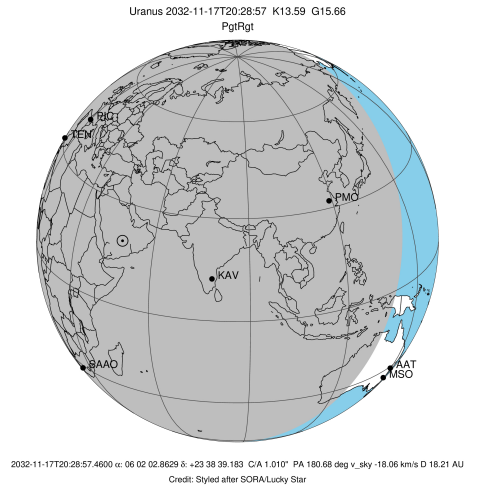


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-17T20:33:25.810
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3424693573351145216
 2Mass ID (if available) : 06020285+2338392
 ICRS Star Coord at Epoch: 06h 02m 02.86290s +23:38:39.18285s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.591
 G magnitude : 15.656
 RP magnitude : 14.953
 BP magnitude : 16.185
 DUPflag : 0
 Distance (au) : 18.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.12
 Sun-Moon sep (deg) : 27.27
 B (ring opening deg) : 74.96
 PA of pole (deg) : 58.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.285
 C/A sky separation (km) : 16961.3
 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	2032-11-17T19:49:13.654		11.55	-35.64	51492.20	-17.44		
lambda	I	2032-11-17T19:50:37.966		11.79	-35.90	50026.71	-17.35		
delta	I	2032-11-17T19:52:17.698		12.08	-36.20	48300.35	-17.27		
gamma	I	2032-11-17T19:52:56.678		12.19	-36.32	47627.90	-17.23		
eta	I	2032-11-17T19:53:22.911		12.26	-36.40	47176.12	-17.21		
beta	I	2032-11-17T19:54:50.620		12.51	-36.67	45669.74	-17.12		
alpha	I	2032-11-17T19:55:45.230		12.67	-36.83	44738.18	-17.06		
4	I	2032-11-17T19:57:55.068		13.04	-37.23	42533.94	-16.91		
5	I	2032-11-17T19:58:09.187		13.09	-37.27	42289.08	-16.88		
6	I	2032-11-17T19:58:34.631		13.16	-37.35	41856.16	-16.86		
Uranus	I	2032-11-17T20:15:51.136		16.17	-40.48	25519.50		-3.94	-4.13
Uranus	E	2032-11-17T20:50:22.143		22.31	-46.59	25027.89		14.82	15.49
6	E	2032-11-17T21:07:11.404		25.35	-49.48	41853.13	16.97		
5	E	2032-11-17T21:07:29.255		25.41	-49.53	42154.83	16.99		
4	E	2032-11-17T21:07:53.124		25.48	-49.60	42577.30	17.02		
alpha	E	2032-11-17T21:09:56.685		25.85	-49.94	44685.06	17.18		
beta	E	2032-11-17T21:10:52.343		26.02	-50.10	45642.32	17.24		
eta	E	2032-11-17T21:12:21.003		26.29	-50.35	47176.12	17.34		
gamma	E	2032-11-17T21:12:46.682		26.37	-50.42	47621.66	17.36		
delta	E	2032-11-17T21:13:25.728		26.49	-50.53	48300.35	17.40		
lambda	E	2032-11-17T21:15:04.690		26.79	-50.80	50026.71	17.49		
epsilon	E	2032-11-17T21:16:01.205		26.96	-50.96	51016.37	17.58		

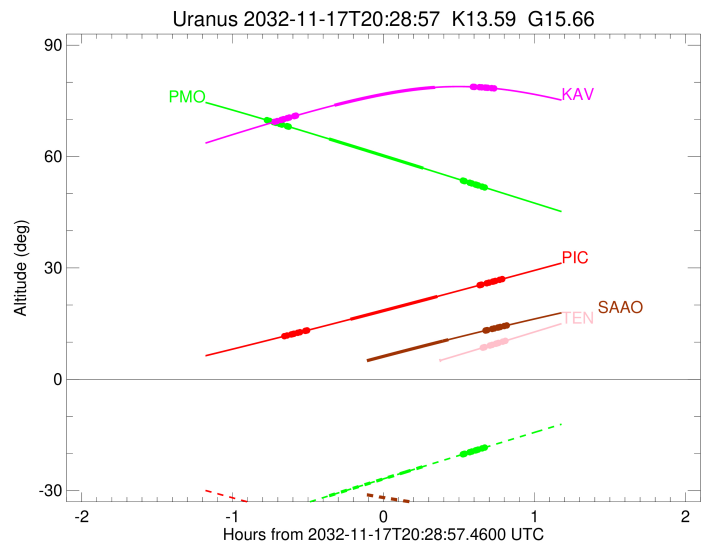
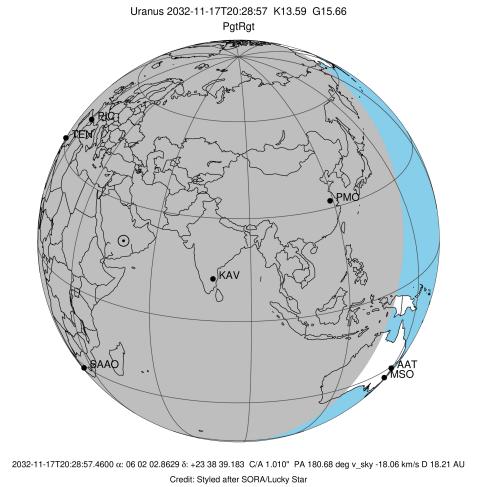
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-17T20:26:16.670
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3424693573351145216
 2Mass ID (if available) : 06020285+2338392
 ICRS Star Coord at Epoch: 06h 02m 02.86290s +23:38:39.18285s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.591
 G magnitude : 15.656
 RP magnitude : 14.953
 BP magnitude : 16.185
 DUPflag : 0
 Distance (au) : 18.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.12
 Sun-Moon sep (deg) : 28.50
 B (ring opening deg) : 74.96
 PA of pole (deg) : 58.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.099
 C/A sky separation (km) : 14517.8
 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

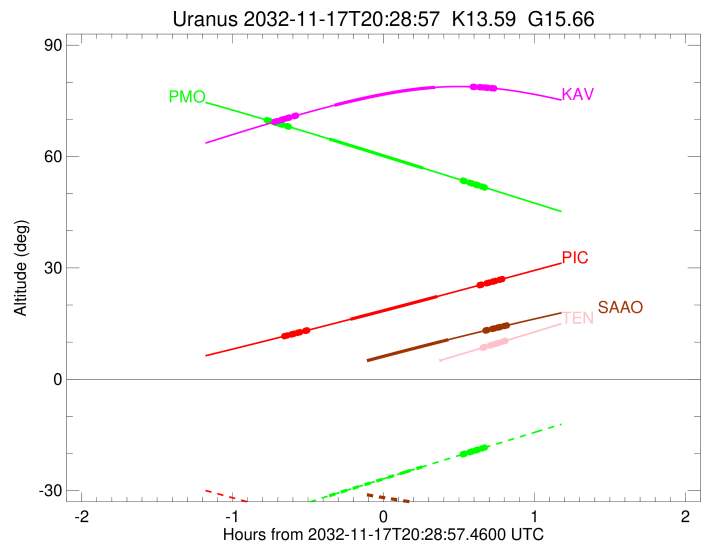
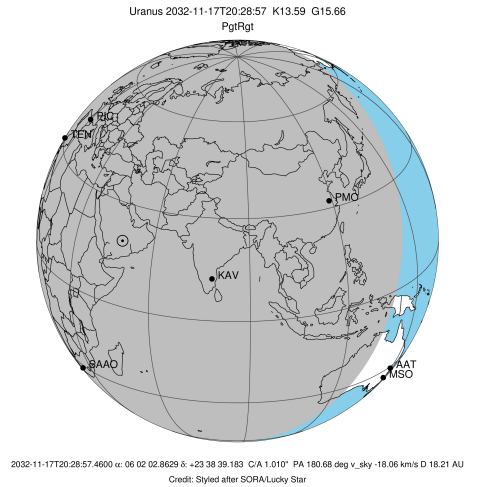
Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-17T19:42:19.296	69.87	-36.69	51478.02	-18.13		
lambda	I	2032-11-17T19:43:39.567	69.60	-36.41	50026.71	-18.06		
delta	I	2032-11-17T19:45:15.343	69.28	-36.07	48300.35	-17.99		
gamma	I	2032-11-17T19:45:52.725	69.15	-35.94	47628.23	-17.97		
eta	I	2032-11-17T19:46:17.902	69.06	-35.85	47176.12	-17.95		
beta	I	2032-11-17T19:47:41.875	68.78	-35.55	45670.97	-17.88		
alpha	I	2032-11-17T19:48:34.110	68.60	-35.37	44740.08	-17.84		
4	I	2032-11-17T19:50:38.187	68.18	-34.93	42535.95	-17.72		
5	I	2032-11-17T19:50:51.461	68.14	-34.88	42293.36	-17.70		
6	I	2032-11-17T19:51:16.131	68.05	-34.79	41853.25	-17.68		
Uranus	I	2032-11-17T20:07:19.320	64.74	-31.39	25473.56		-5.81	-6.09
Uranus	E	2032-11-17T20:44:44.333	56.87	-23.51	25014.57		15.02	15.70
6	E	2032-11-17T21:00:30.941	53.52	-20.21	41851.08	17.64		
5	E	2032-11-17T21:00:48.210	53.46	-20.15	42154.90	17.65		
4	E	2032-11-17T21:01:11.326	53.37	-20.07	42579.55	17.67		
alpha	E	2032-11-17T21:03:10.398	52.95	-19.66	44685.36	17.79		
beta	E	2032-11-17T21:04:04.210	52.76	-19.47	45642.66	17.83		
eta	E	2032-11-17T21:05:30.016	52.46	-19.17	47176.12	17.89		
gamma	E	2032-11-17T21:05:54.909	52.37	-19.09	47621.77	17.91		
delta	E	2032-11-17T21:06:32.765	52.24	-18.96	48300.35	17.94		
lambda	E	2032-11-17T21:08:08.842	51.89	-18.62	50026.71	18.00		
epsilon	E	2032-11-17T21:09:02.968	51.70	-18.44	51001.76	18.07		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-17T20:34:13.390
 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 : 3424693573351145216
 2Mass ID (if available) : 06020285+2338392
 ICRS Star Coord at Epoch: 06h 02m 02.86290s +23:38:39.18285s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.591
 G magnitude : 15.656
 RP magnitude : 14.953
 BP magnitude : 16.185
 DUPflag : 0
 Distance (au) : 18.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.12
 Sun-Moon sep (deg) : 27.01
 B (ring opening deg) : 74.96
 PA of pole (deg) : 58.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.238
 C/A sky separation (km) : 16352.1
 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



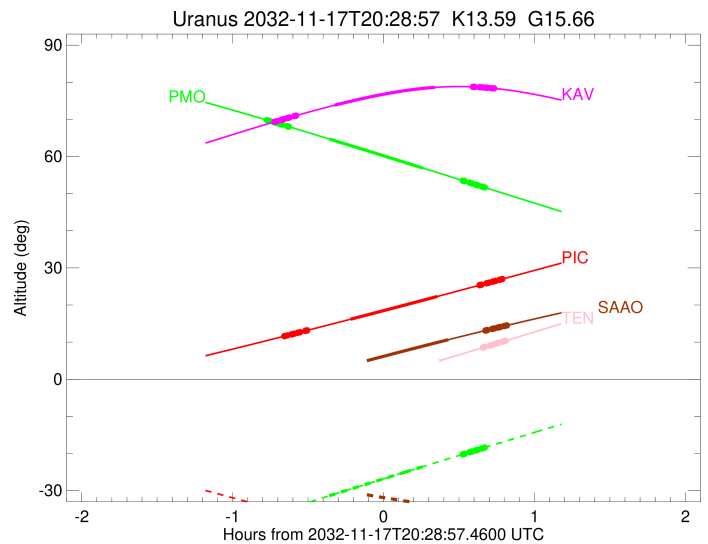
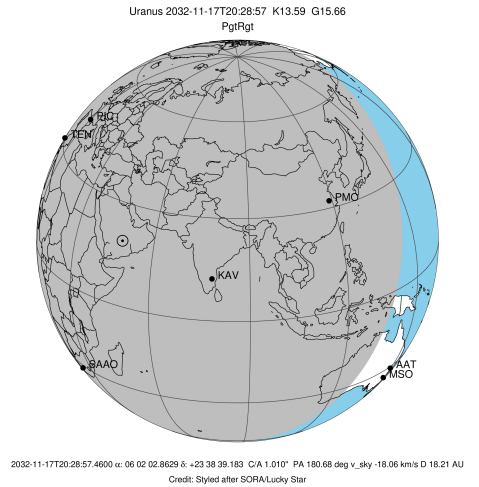
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-11-17T19:49:33.316	-7.04x	-21.45	51489.70	-17.39			
lambda	I	2032-11-17T19:50:57.682	-6.78x	-21.75	50026.71	-17.31			
delta	I	2032-11-17T19:52:37.615	-6.46x	-22.11	48300.35	-17.24			
gamma	I	2032-11-17T19:53:16.658	-6.34x	-22.25	47627.96	-17.21			
eta	I	2032-11-17T19:53:42.936	-6.26x	-22.35	47176.12	-17.18			
beta	I	2032-11-17T19:55:10.745	-5.98x	-22.67	45669.97	-17.10			
alpha	I	2032-11-17T19:56:05.399	-5.81x	-22.86	44738.55	-17.05			
4	I	2032-11-17T19:58:15.295	-5.40x	-23.33	42534.32	-16.91			
5	I	2032-11-17T19:58:29.371	-5.35x	-23.38	42289.94	-16.88			
6	I	2032-11-17T19:58:54.894	-5.27x	-23.48	41855.60	-16.87			
Uranus	I	2032-11-17T20:16:03.407	-1.97x	-27.21	25510.54	-4.37		-4.58	
Uranus	E	2032-11-17T20:51:45.655	5.12	-35.03	25022.49	14.90		15.58	
6	E	2032-11-17T21:08:26.572	8.51	-38.70	41852.44	16.99			
5	E	2032-11-17T21:08:44.428	8.57	-38.76	42154.83	17.01			
4	E	2032-11-17T21:09:08.316	8.65	-38.85	42578.08	17.04			
alpha	E	2032-11-17T21:11:11.735	9.07	-39.30	44685.16	17.19			
beta	E	2032-11-17T21:12:07.378	9.26	-39.51	45642.43	17.25			
eta	E	2032-11-17T21:13:36.031	9.57	-39.83	47176.12	17.33			
gamma	E	2032-11-17T21:14:01.718	9.65	-39.93	47621.70	17.36			
delta	E	2032-11-17T21:14:40.777	9.79	-40.07	48300.35	17.39			
lambda	E	2032-11-17T21:16:19.800	10.13	-40.43	50026.71	17.47			
epsilon	E	2032-11-17T21:17:16.051	10.32	-40.64	51010.88	17.56			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-17T20:29:40.860
 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 : 3424693573351145216
 2Mass ID (if available) : 06020285+2338392
 ICRS Star Coord at Epoch: 06h 02m 02.86290s +23:38:39.18285s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.591
 G magnitude : 15.656
 RP magnitude : 14.953
 BP magnitude : 16.185
 DUPflag : 0
 Distance (au) : 18.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.12
 Sun-Moon sep (deg) : 28.01
 B (ring opening deg) : 74.96
 PA of pole (deg) : 58.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.909
 C/A sky separation (km) : 12008.4
 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	2032-11-17T19:45:24.761		69.29	-70.61	51466.87	-18.44		
lambda	I	2032-11-17T19:46:43.032		69.55	-70.32	50026.71	-18.38		
delta	I	2032-11-17T19:48:17.040		69.86	-69.97	48300.35	-18.34		
gamma	I	2032-11-17T19:48:53.686		69.98	-69.83	47628.48	-18.33		
eta	I	2032-11-17T19:49:18.378		70.07	-69.73	47176.12	-18.31		
beta	I	2032-11-17T19:50:40.570		70.33	-69.42	45671.88	-18.27		
alpha	I	2032-11-17T19:51:31.650		70.50	-69.23	44741.45	-18.24		
4	I	2032-11-17T19:53:32.846		70.89	-68.77	42537.63	-18.16		
5	I	2032-11-17T19:53:45.665		70.93	-68.72	42296.43	-18.15		
6	I	2032-11-17T19:54:10.020		71.01	-68.63	41850.93	-18.14		
Uranus	I	2032-11-17T20:09:30.103		73.82	-65.11	25425.86		-7.27	-7.61
Uranus	E	2032-11-17T20:49:25.829		78.63	-55.81	25015.34		15.01	15.68
6	E	2032-11-17T21:04:29.278		78.77	-52.27	41848.27	18.17		
5	E	2032-11-17T21:04:46.181		78.77	-52.20	42155.32	18.18		
4	E	2032-11-17T21:05:08.790		78.75	-52.12	42582.56	18.20		
alpha	E	2032-11-17T21:07:04.413		78.68	-51.66	44685.88	18.27		
beta	E	2032-11-17T21:07:56.817		78.65	-51.46	45643.19	18.30		
eta	E	2032-11-17T21:09:20.410		78.58	-51.13	47176.12	18.35		
gamma	E	2032-11-17T21:09:44.697		78.56	-51.03	47621.96	18.36		
delta	E	2032-11-17T21:10:21.621		78.52	-50.89	48300.35	18.38		
lambda	E	2032-11-17T21:11:55.430		78.43	-50.52	50026.71	18.42		
epsilon	E	2032-11-17T21:12:47.177		78.37	-50.32	50980.66	18.48		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-11-17T20:33:27.120
 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 : 3424693573351145216
 2Mass ID (if available) : 06020285+2338392
 ICRS Star Coord at Epoch: 06h 02m 02.86290s +23:38:39.18285s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.591
 G magnitude : 15.656
 RP magnitude : 14.953
 BP magnitude : 16.185
 DUPflag : 0
 Distance (au) : 18.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.06
 Sun-Target sep (deg) : 145.12
 Sun-Moon sep (deg) : 27.02
 B (ring opening deg) : 74.96
 PA of pole (deg) : 58.13
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.690
 C/A sky separation (km) : 9112.3
 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	2032-11-17T19:47:57.869	-1.34x	-26.72	51453.22	-18.32			
lambda	I	2032-11-17T19:49:15.843	-1.09x	-26.90	50026.71	-18.29			
delta	I	2032-11-17T19:50:50.301	-0.80x	-27.12	48300.35	-18.27			
gamma	I	2032-11-17T19:51:27.078	-0.68x	-27.20	47628.75	-18.26			
eta	I	2032-11-17T19:51:51.874	-0.61x	-27.26	47176.12	-18.25			
beta	I	2032-11-17T19:53:14.247	-0.35x	-27.45	45672.87	-18.23			
alpha	I	2032-11-17T19:54:05.398	-0.19x	-27.56	44742.94	-18.21			
4	I	2032-11-17T19:56:06.654	0.19x	-27.83	42539.67	-18.17			
5	I	2032-11-17T19:56:19.340	0.23x	-27.86	42299.67	-18.16			
6	I	2032-11-17T19:56:44.007	0.30x	-27.92	41848.24	-18.16			
Uranus	I	2032-11-17T20:11:47.508	3.08x	-29.86	25366.78	-8.76		-9.17	
Uranus	E	2032-11-17T20:54:44.512	10.66	-34.47	25034.42	14.73		15.39	
6	E	2032-11-17T21:09:31.035	13.13	-35.69	41844.99	18.29			
5	E	2032-11-17T21:09:48.023	13.17	-35.71	42156.26	18.29			
4	E	2032-11-17T21:10:10.663	13.24	-35.74	42585.94	18.30			
alpha	E	2032-11-17T21:12:05.563	13.55	-35.88	44686.65	18.35			
beta	E	2032-11-17T21:12:57.779	13.69	-35.95	45643.89	18.37			
eta	E	2032-11-17T21:14:21.085	13.92	-36.05	47176.12	18.40			
gamma	E	2032-11-17T21:14:45.327	13.98	-36.08	47622.18	18.40			
delta	E	2032-11-17T21:15:22.164	14.08	-36.12	48300.35	18.42			
lambda	E	2032-11-17T21:16:55.840	14.33	-36.23	50026.71	18.44			
epsilon	E	2032-11-17T21:17:46.261	14.47	-36.29	50956.89	18.48			