

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-09-23T21:19:13.570
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3426133108951510272
 2Mass ID (if available) : 06045683+2337218

Uranus 2032-09-23T21:19:13 K13.99 G16.24 PgtRgt

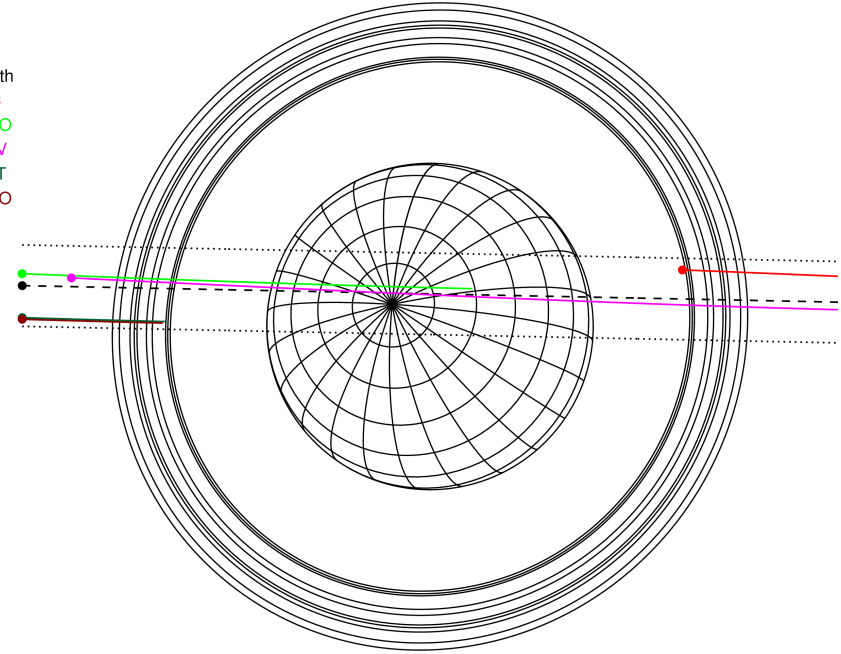
ICRS Star Coord at Epoch: 06h 04m 56.84469s +23:37:21.71141s

RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.990
 G magnitude : 16.238
 RP magnitude : 15.501
 BP magnitude : 16.819
 DUPflag : 0
 Distance (au) : 19.012
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.48
 Sun-Target sep (deg) : 89.80
 Sun-Moon sep (deg) : 30.12
 B (ring opening deg) : 74.40
 PA of pole (deg) : 59.74



2032-09-23T21:19:13.5700 ra: 06 04 56.8447 s: +23 37 21.7111 C/A 0.372° PA 178.84 deg v_sky + 6.48 km/s D 19.01 AU
 Credit: Styled after SORA/Lucky Star

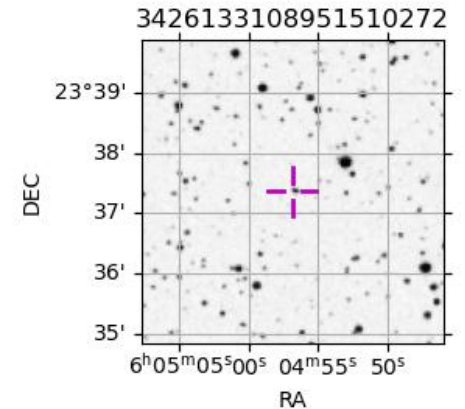
Earth
 PIC
 PMO
 KAV
 AAT
 MSO



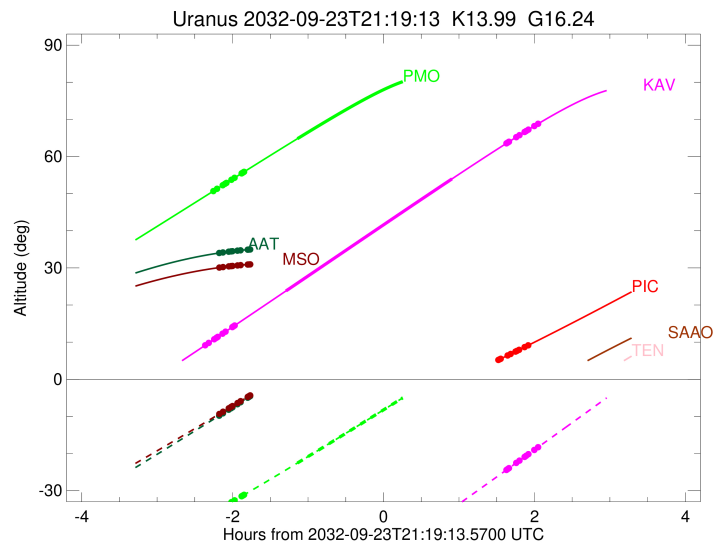
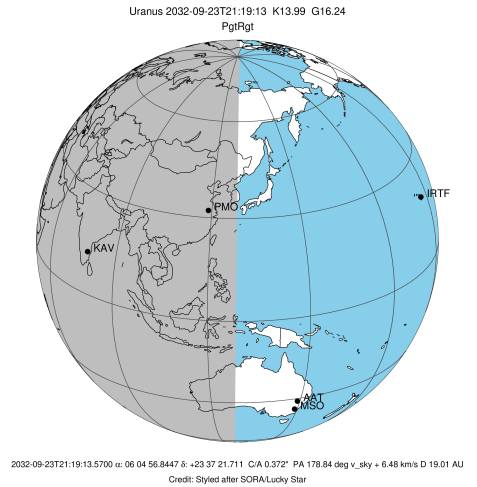
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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			+++++++	SEP 23 22:50 - SEP 23 23:15	PnnRne
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++++	+		SEP 23 19:05 - SEP 23 20:10	PinRin
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					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++++	+ +	+++++++	SEP 23 18:58 - SEP 23 23:23	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	+++++++			SEP 23 19:09 - SEP 23 19:25	PnnRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++++			SEP 23 19:09 - SEP 23 19:25	PnnRin

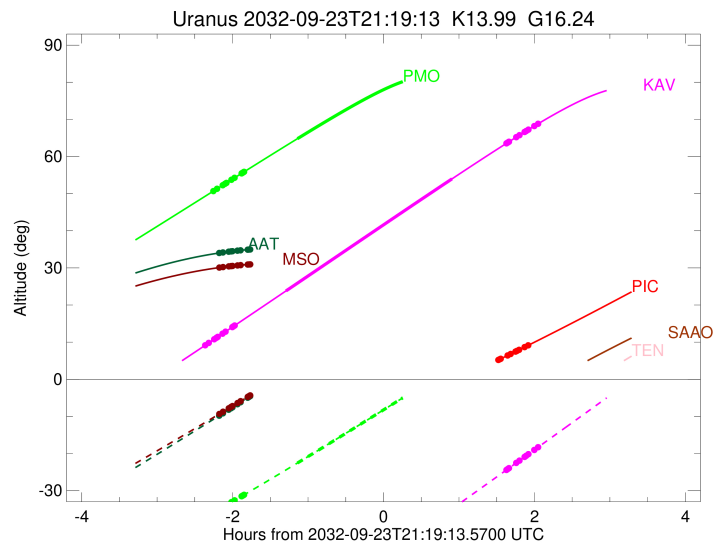
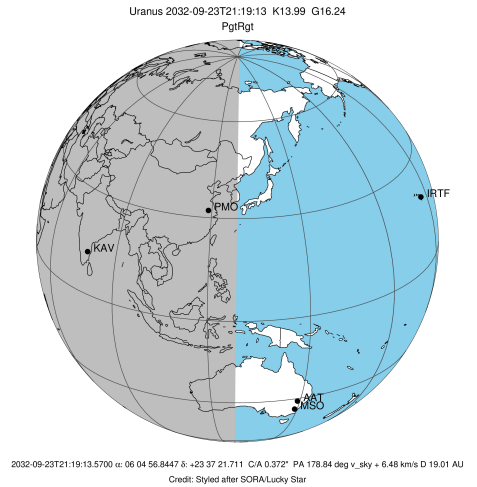


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-09-23T21:10:42.840
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3426133108951510272
 2Mass ID (if available) : 06045683+2337218
 ICRS Star Coord at Epoch: 06h 04m 56.84469s +23:37:21.71141s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.990
 G magnitude : 16.238
 RP magnitude : 15.501
 BP magnitude : 16.819
 DUPflag : 0
 Distance (au) : 19.012
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.48
 Sun-Target sep (deg) : 89.80
 Sun-Moon sep (deg) : 29.64
 B (ring opening deg) : 74.40
 PA of pole (deg) : 59.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.751
 C/A sky separation (km) : 10355.2
 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



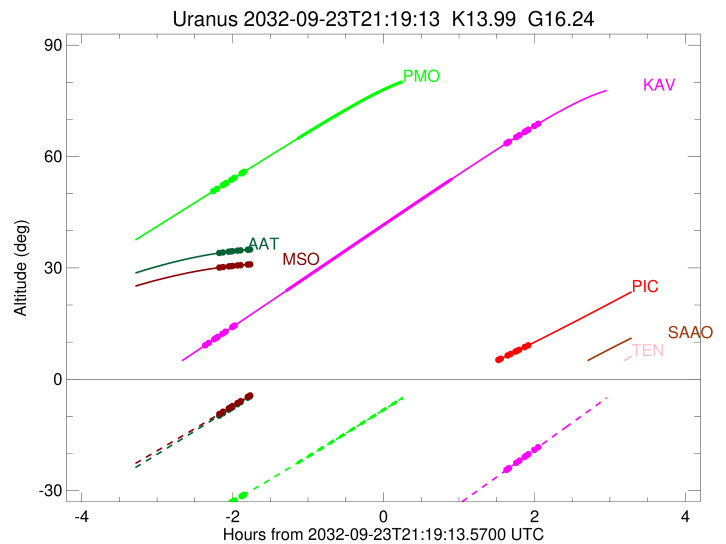
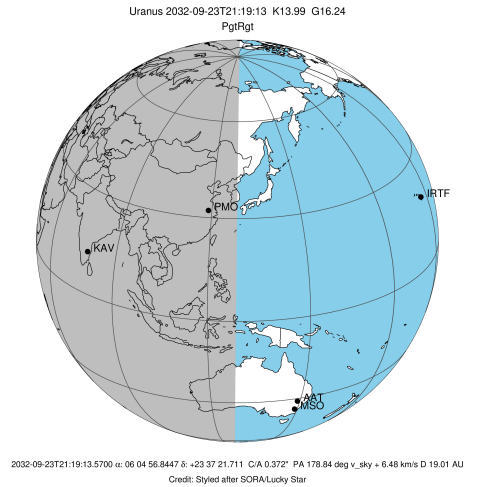
Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-09-23T19:12:51.965	-21.17x	-15.17	50747.88	-6.88		
lambda	I	2032-09-23T19:14:36.746	-21.06x	-15.48	50026.71	-6.88		
delta	I	2032-09-23T19:18:47.956	-20.79x	-16.22	48300.35	-6.86		
gamma	I	2032-09-23T19:20:25.684	-20.69x	-16.51	47629.79	-6.86		
eta	I	2032-09-23T19:21:31.855	-20.61x	-16.71	47176.12	-6.85		
beta	I	2032-09-23T19:25:11.096	-20.36x	-17.35	45676.07	-6.84		
alpha	I	2032-09-23T19:27:27.088	-20.20x	-17.75	44742.75	-6.83		
4	I	2032-09-23T19:32:42.689	-19.81x	-18.68	42588.75	-6.80		
5	I	2032-09-23T19:33:26.041	-19.76x	-18.81	42306.60	-6.80		
6	I	2032-09-23T19:34:40.178	-19.67x	-19.02	41808.05	-6.79		
Uranus	I	2032-09-23T20:14:22.641	-16.12x	-25.80	25018.30		15.56	16.26
Uranus	E	2032-09-23T22:08:40.169	-1.39x	-41.95	25351.39		-9.47	-9.92
6	E	2032-09-23T22:50:30.349	5.20	-45.68	41848.32	6.52		
5	E	2032-09-23T22:51:18.478	5.33	-45.74	42154.84	6.52		
4	E	2032-09-23T22:52:23.613	5.51	-45.81	42575.07	6.52		
alpha	E	2032-09-23T22:57:47.055	6.39	-46.16	44686.28	6.53		
beta	E	2032-09-23T23:00:12.869	6.80	-46.31	45641.86	6.53		
eta	E	2032-09-23T23:04:07.667	7.44	-46.53	47176.12	6.54		
gamma	E	2032-09-23T23:05:15.760	7.63	-46.59	47621.41	6.54		
delta	E	2032-09-23T23:06:59.561	7.92	-46.68	48300.35	6.54		
lambda	E	2032-09-23T23:11:23.401	8.66	-46.90	50026.71	6.54		
epsilon	E	2032-09-23T23:15:07.719	9.29	-47.07	51495.01	6.54		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-09-23T21:16:50.250
 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 : 3426133108951510272
 2Mass ID (if available) : 06045683+2337218
 ICRS Star Coord at Epoch: 06h 04m 56.84469s +23:37:21.71141s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.990
 G magnitude : 16.238
 RP magnitude : 15.501
 BP magnitude : 16.819
 DUPflag : 0
 Distance (au) : 19.012
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.48
 Sun-Target sep (deg) : 89.80
 Sun-Moon sep (deg) : 30.49
 B (ring opening deg) : 74.40
 PA of pole (deg) : 59.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.441
 C/A sky separation (km) : 6082.0
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



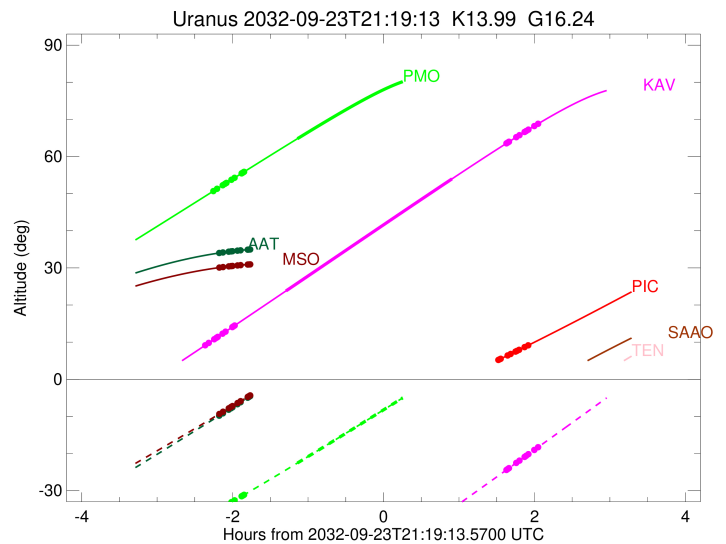
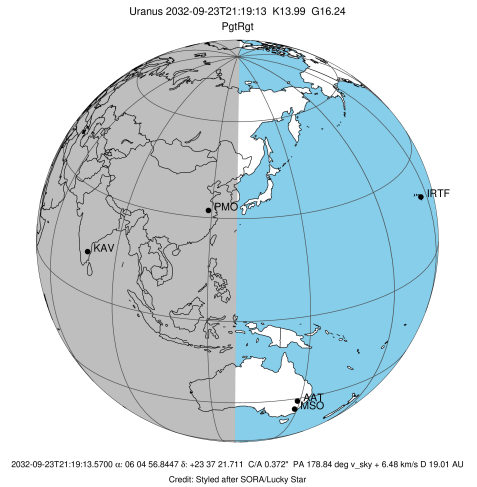
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-09-23T19:05:01.421		50.92	-35.67	50754.26	-6.38		
lambda	I	2032-09-23T19:06:55.450		51.32	-35.30	50026.71	-6.38		
delta	I	2032-09-23T19:11:26.347		52.28	-34.44	48300.35	-6.37		
gamma	I	2032-09-23T19:13:11.640		52.65	-34.10	47630.14	-6.36		
eta	I	2032-09-23T19:14:23.009		52.91	-33.87	47176.12	-6.36		
beta	I	2032-09-23T19:18:18.990		53.74	-33.10	45677.28	-6.35		
alpha	I	2032-09-23T19:20:45.257		54.26	-32.62	44744.95	-6.34		
4	I	2032-09-23T19:26:25.855		55.47	-31.51	42584.34	-6.33		
5	I	2032-09-23T19:27:10.966		55.63	-31.36	42309.99	-6.33		
6	I	2032-09-23T19:28:30.743		55.91	-31.10	41811.46	-6.32		
Uranus	I	2032-09-23T20:10:42.075		64.79	-22.58	25048.99		15.09	15.77
Uranus	E	2032-09-23T22:24:03.953		79.96	5.50x	25263.36		-11.36	-11.88
6	E	2032-09-23T23:07:38.996		72.59	14.67x	41851.88	6.17		
5	E	2032-09-23T23:08:29.265		72.43	14.84x	42155.01	6.17		
4	E	2032-09-23T23:09:37.605		72.20	15.08x	42571.19	6.18		
alpha	E	2032-09-23T23:15:19.882		71.08	16.27x	44687.23	6.18		
beta	E	2032-09-23T23:17:53.774		70.57	16.80x	45642.35	6.19		
eta	E	2032-09-23T23:22:01.703		69.74	17.66x	47176.12	6.19		
gamma	E	2032-09-23T23:23:13.647		69.50	17.91x	47621.58	6.19		
delta	E	2032-09-23T23:25:03.243		69.13	18.29x	48300.35	6.19		
lambda	E	2032-09-23T23:29:41.831		68.19	19.25x	50026.71	6.20		
epsilon	E	2032-09-23T23:33:40.743		67.37	20.07x	51508.27	6.20		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-09-23T21:06:44.460
 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 : 3426133108951510272
 2Mass ID (if available) : 06045683+2337218
 ICRS Star Coord at Epoch: 06h 04m 56.84469s +23:37:21.71141s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.990
 G magnitude : 16.238
 RP magnitude : 15.501
 BP magnitude : 16.819
 DUPflag : 0
 Distance (au) : 19.012
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.48
 Sun-Target sep (deg) : 89.80
 Sun-Moon sep (deg) : 29.81
 B (ring opening deg) : 74.40
 PA of pole (deg) : 59.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.360
 C/A sky separation (km) : 4958.3
 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	2032-09-23T18:58:29.687		9.39	-76.86	50755.06	-6.65		
lambda	I	2032-09-23T19:00:19.164		9.80	-76.67	50026.71	-6.65		
delta	I	2032-09-23T19:04:39.007		10.78	-76.17	48300.35	-6.64		
gamma	I	2032-09-23T19:06:20.015		11.17	-75.95	47630.17	-6.63		
eta	I	2032-09-23T19:07:28.494		11.42	-75.80	47176.12	-6.63		
beta	I	2032-09-23T19:11:14.912		12.28	-75.28	45677.41	-6.62		
alpha	I	2032-09-23T19:13:35.273		12.81	-74.94	44745.18	-6.61		
4	I	2032-09-23T19:19:02.343		14.05	-74.08	42583.80	-6.59		
5	I	2032-09-23T19:19:45.489		14.22	-73.96	42310.34	-6.59		
6	I	2032-09-23T19:21:02.083		14.51	-73.75	41811.89	-6.59		
Uranus	I	2032-09-23T20:01:34.164		23.77	-65.80	25056.95		14.97	15.64
Uranus	E	2032-09-23T22:13:44.165		53.99	-34.91	25228.65		-12.03	-12.58
6	E	2032-09-23T22:56:57.405		63.54	-24.43	41853.73	6.17		
5	E	2032-09-23T22:57:47.454		63.72	-24.23	42155.34	6.17		
4	E	2032-09-23T22:58:55.592		63.97	-23.96	42569.10	6.17		
alpha	E	2032-09-23T23:04:38.912		65.19	-22.56	44687.85	6.17		
beta	E	2032-09-23T23:07:13.204		65.73	-21.94	45642.69	6.17		
eta	E	2032-09-23T23:11:22.071		66.60	-20.93	47176.12	6.16		
gamma	E	2032-09-23T23:12:34.372		66.86	-20.64	47621.69	6.16		
delta	E	2032-09-23T23:14:24.509		67.24	-20.19	48300.35	6.16		
lambda	E	2032-09-23T23:19:04.764		68.20	-19.05	50026.71	6.16		
epsilon	E	2032-09-23T23:23:06.622		69.02	-18.07	51515.92	6.15		

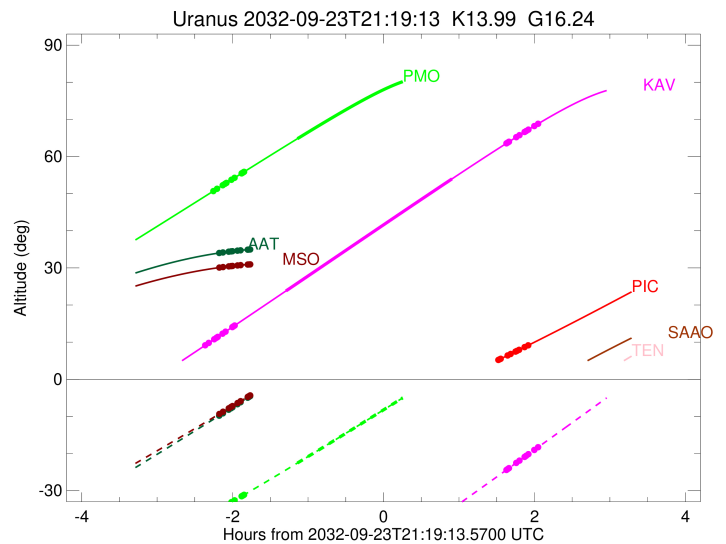
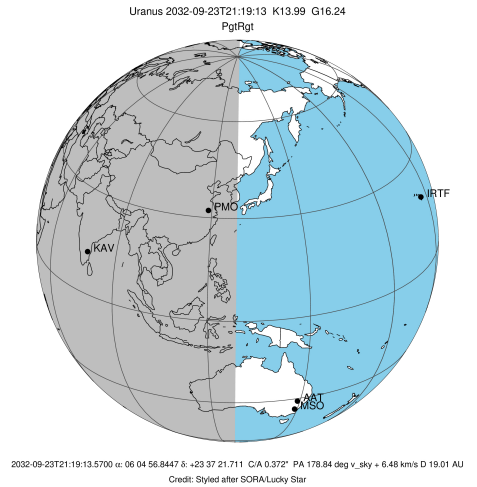
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-09-23T21:24:11.440
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 3426133108951510272
 2Mass ID (if available) : 06045683+2337218
 ICRS Star Coord at Epoch: 06h 04m 56.84469s +23:37:21.71141s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.990
 G magnitude : 16.238
 RP magnitude : 15.501
 BP magnitude : 16.819
 DUPflag : 0
 Distance (au) : 19.012
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.48
 Sun-Target sep (deg) : 89.80
 Sun-Moon sep (deg) : 30.58
 B (ring opening deg) : 74.40
 PA of pole (deg) : 59.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.002
 C/A sky separation (km) : 31.0
 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_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	2032-09-23T19:09:38.493	34.07	-9.58	50770.01	-6.31		
lambda	I	2032-09-23T19:11:36.242	34.17	-9.17	50026.71	-6.31		
delta	I	2032-09-23T19:16:09.832	34.37	-8.20	48300.35	-6.31		
gamma	I	2032-09-23T19:17:56.012	34.45	-7.82	47630.61	-6.31		
eta	I	2032-09-23T19:19:08.079	34.50	-7.56	47176.12	-6.31		
beta	I	2032-09-23T19:23:05.683	34.65	-6.72	45678.86	-6.30		
alpha	I	2032-09-23T19:25:32.824	34.73	-6.19	44747.83	-6.30		
4	I	2032-09-23T19:31:17.113	34.91	-4.97x	42577.39	-6.30		
5	I	2032-09-23T19:32:00.349	34.93	-4.81x	42313.56	-6.30		
6	I	2032-09-23T19:33:20.279	34.96	-4.53x	41817.16	-6.30		
Uranus	I	2032-09-23T20:15:30.120	35.11	4.50x	25142.88		13.56	14.18
Uranus	E	2032-09-23T22:32:40.574	23.84	33.14x	25147.30		-13.49	-14.10
6	E	2032-09-23T23:14:39.100	17.70	41.19x	41857.06	6.35		
5	E	2032-09-23T23:15:27.340	17.58	41.34x	42156.42	6.35		
4	E	2032-09-23T23:16:32.983	17.41	41.54x	42565.28	6.35		
alpha	E	2032-09-23T23:22:06.913	16.52	42.55x	44689.08	6.36		
beta	E	2032-09-23T23:24:36.383	16.12	43.00x	45643.35	6.36		
eta	E	2032-09-23T23:28:37.373	15.47	43.72x	47176.12	6.37		
gamma	E	2032-09-23T23:29:47.396	15.28	43.93x	47621.90	6.37		
delta	E	2032-09-23T23:31:33.942	14.99	44.24x	48300.35	6.37		
lambda	E	2032-09-23T23:36:04.904	14.25	45.03x	50026.71	6.37		
epsilon	E	2032-09-23T23:40:00.120	13.60	45.70x	51526.43	6.38		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-09-23T21:23:55.430
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 3426133108951510272
 2Mass ID (if available) : 06045683+2337218
 ICRS Star Coord at Epoch: 06h 04m 56.84469s +23:37:21.71141s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.990
 G magnitude : 16.238
 RP magnitude : 15.501
 BP magnitude : 16.819
 DUPflag : 0
 Distance (au) : 19.012
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.48
 Sun-Target sep (deg) : 89.80
 Sun-Moon sep (deg) : 30.54
 B (ring opening deg) : 74.40
 PA of pole (deg) : 59.74
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.016
 C/A sky separation (km) : 221.2
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-09-23T19:09:44.116		30.14	-9.14	50770.72	-6.33		
lambda	I	2032-09-23T19:11:41.646		30.22	-8.74	50026.71	-6.33		
delta	I	2032-09-23T19:16:14.466		30.41	-7.81	48300.35	-6.33		
gamma	I	2032-09-23T19:18:00.343		30.48	-7.45	47630.63	-6.32		
eta	I	2032-09-23T19:19:12.209		30.53	-7.21	47176.12	-6.32		
beta	I	2032-09-23T19:23:09.130		30.66	-6.41	45678.92	-6.32		
alpha	I	2032-09-23T19:25:35.848		30.74	-5.91	44747.92	-6.32		
4	I	2032-09-23T19:31:19.216		30.90	-4.74x	42577.13	-6.31		
5	I	2032-09-23T19:32:02.256		30.92	-4.59x	42313.65	-6.32		
6	I	2032-09-23T19:33:21.940		30.95	-4.32x	41817.39	-6.32		
Uranus	I	2032-09-23T20:15:25.089		31.10	4.28x	25147.34		13.49	14.10
Uranus	E	2032-09-23T22:32:13.623		20.76	31.41x	25142.43		-13.57	-14.19
6	E	2032-09-23T23:14:06.664		15.04	38.91x	41857.32	6.36		
5	E	2032-09-23T23:14:54.793		14.92	39.04x	42156.52	6.36		
4	E	2032-09-23T23:16:00.277		14.76	39.23x	42564.98	6.36		
alpha	E	2032-09-23T23:21:33.695		13.93	40.17x	44689.19	6.37		
beta	E	2032-09-23T23:24:02.907		13.55	40.58x	45643.41	6.37		
eta	E	2032-09-23T23:28:03.497		12.94	41.24x	47176.12	6.38		
gamma	E	2032-09-23T23:29:13.411		12.76	41.43x	47621.91	6.38		
delta	E	2032-09-23T23:30:59.784		12.49	41.72x	48300.35	6.38		
lambda	E	2032-09-23T23:35:30.327		11.79	42.44x	50026.71	6.38		
epsilon	E	2032-09-23T23:39:25.323		11.17	43.07x	51527.29	6.39		