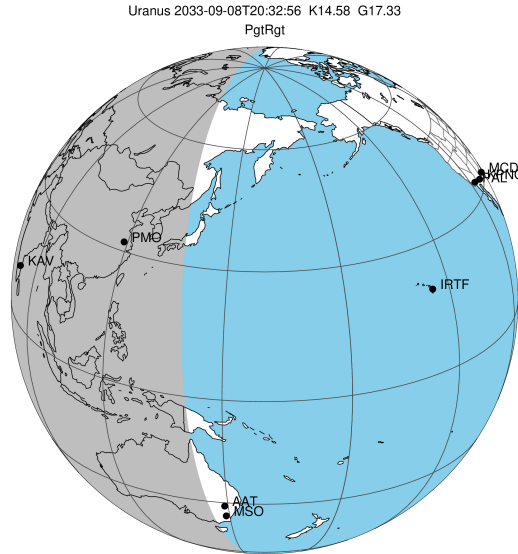


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-08T20:32:56.140
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377567263736584832
 2Mass ID (if available) : 06223301+2334333

Uranus 2033-09-08T20:32:56 K14.58 G17.33 PgtRgt

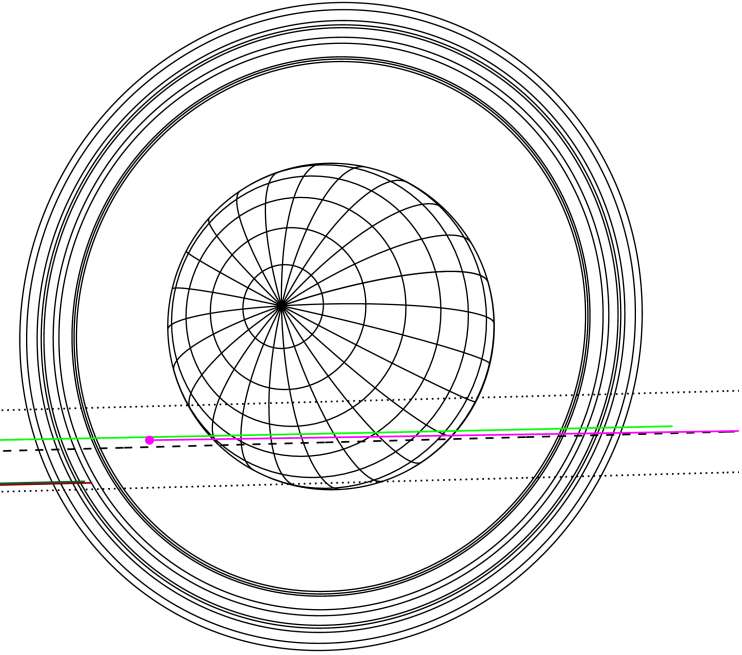
ICRS Star Coord at Epoch: 06h 22m 33.00326s +23:34:33.36014s

RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.579
 G magnitude : 17.328
 RP magnitude : 16.460
 BP magnitude : 18.119
 DUPflag : 0
 Distance (au) : 19.279
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 16.14
 Sun-Target sep (deg) : 70.87
 Sun-Moon sep (deg) : 112.50
 B (ring opening deg) : 70.80
 PA of pole (deg) : 67.37



2033-09-08T20:32:56.1400 α: 06 22 33.0033 δ: +23 34 33.360 C/A 1.292° PA 1.51 deg v_sky +16.14 km/s D 19.28 AU
 Credit: Styled after SORA/Lucky Star

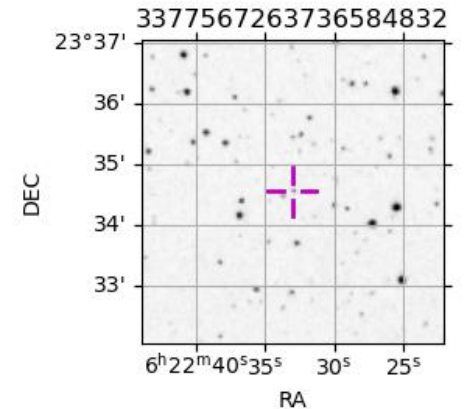
Earth
 PMO
 KAV
 AAT
 MSO



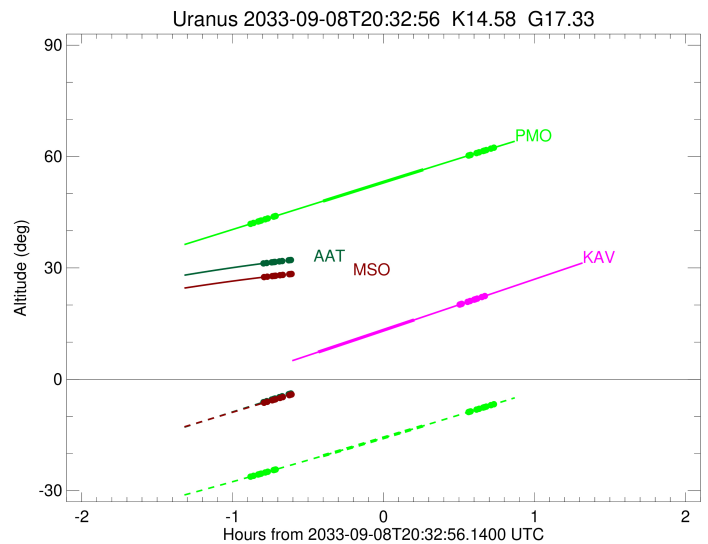
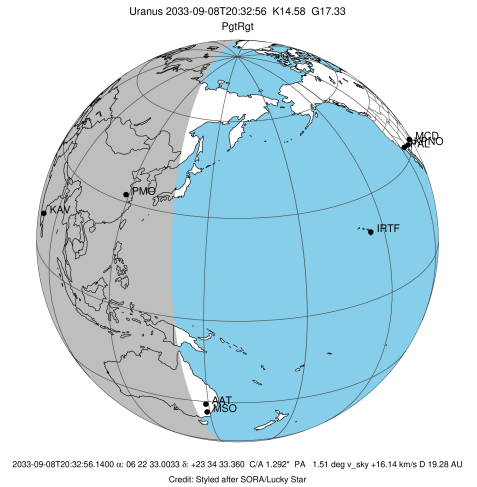
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	SEP 08 19:40 - SEP 08 21:16	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					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8		+ +	+++++	SEP 08 20:07 - SEP 08 21:13	PieRne
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 08 19:45 - SEP 08 19:49	PnnRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++			SEP 08 19:45 - SEP 08 19:51	PnnRin

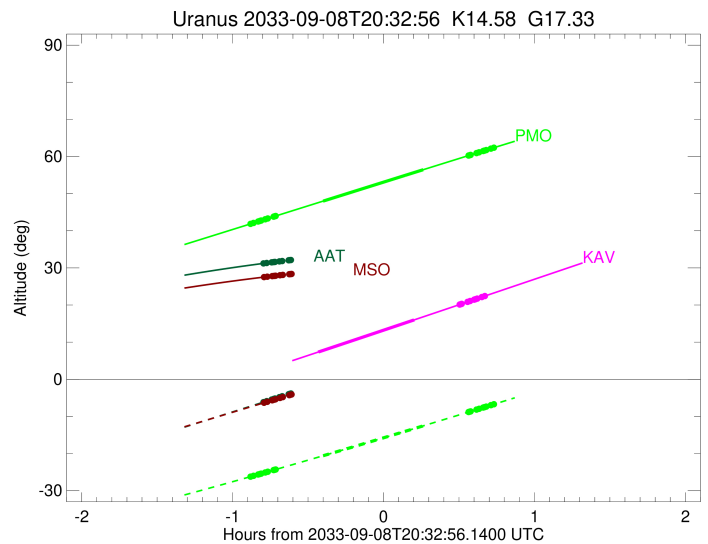
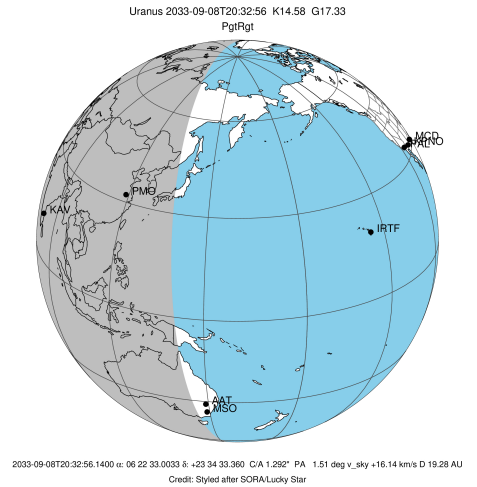


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-08T20:29:03.620
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3377567263736584832
 2Mass ID (if available) : 06223301+2334333
 ICRS Star Coord at Epoch: 06h 22m 33.00326s +23:34:33.36014s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.579
 G magnitude : 17.328
 RP magnitude : 16.460
 BP magnitude : 18.119
 DUPflag : 0
 Distance (au) : 19.279
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 16.14
 Sun-Target sep (deg) : 70.87
 Sun-Moon sep (deg) : 113.47
 B (ring opening deg) : 70.80
 PA of pole (deg) : 67.37
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.198
 C/A sky separation (km) : 16756.4
 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



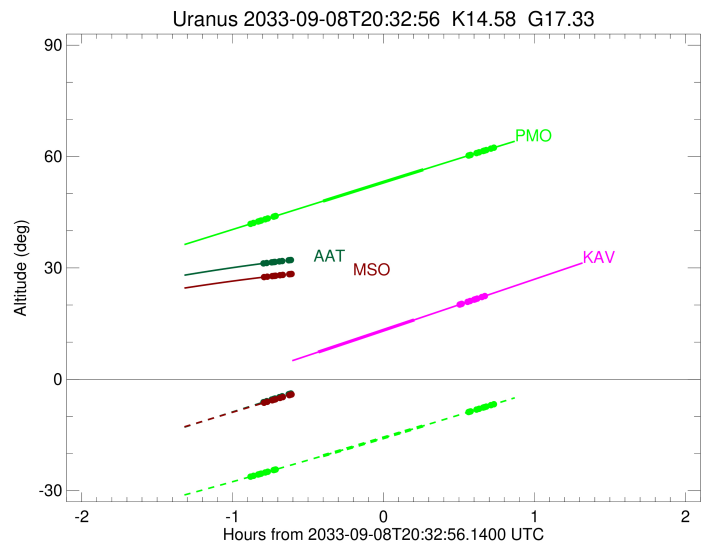
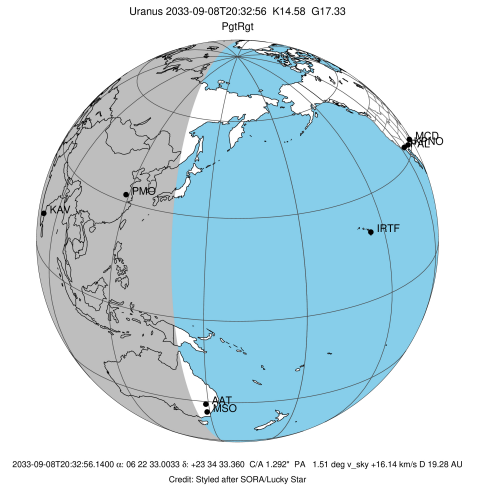
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-09-08T19:40:11.841		41.88	-26.21	51051.03	-15.72		
lambda	I	2033-09-08T19:41:16.909		42.11	-26.00	50026.71	-15.72		
delta	I	2033-09-08T19:43:06.987		42.50	-25.65	48300.35	-15.64		
gamma	I	2033-09-08T19:43:50.141		42.66	-25.51	47625.97	-15.61		
eta	I	2033-09-08T19:44:18.978		42.76	-25.42	47176.12	-15.59		
beta	I	2033-09-08T19:45:55.159		43.10	-25.11	45681.20	-15.51		
alpha	I	2033-09-08T19:46:55.862		43.31	-24.92	44739.20	-15.46		
4	I	2033-09-08T19:49:16.657		43.81	-24.46	42576.43	-15.32		
5	I	2033-09-08T19:49:44.042		43.91	-24.37	42161.06	-15.28		
6	I	2033-09-08T19:50:02.369		43.97	-24.31	41877.33	-15.26		
Uranus	I	2033-09-08T20:08:54.641		47.99	-20.60	25462.91		8.01	8.38
Uranus	E	2033-09-08T20:48:43.033		56.45	-12.55	25085.95		-18.21	-19.01
6	E	2033-09-08T21:06:42.831		60.26	-8.84	41799.84	15.15		
5	E	2033-09-08T21:07:12.897		60.36	-8.73	42262.23	15.17		
4	E	2033-09-08T21:07:34.465		60.44	-8.66	42600.50	15.21		
alpha	E	2033-09-08T21:09:54.205		60.93	-8.17	44722.55	15.34		
beta	E	2033-09-08T21:10:53.966		61.14	-7.97	45645.80	15.38		
eta	E	2033-09-08T21:12:33.291		61.48	-7.62	47176.12	15.46		
gamma	E	2033-09-08T21:13:02.178		61.59	-7.52	47622.96	15.48		
delta	E	2033-09-08T21:13:45.895		61.74	-7.37	48300.35	15.51		
lambda	E	2033-09-08T21:15:36.943		62.13	-6.98	50026.71	15.58		
epsilon	E	2033-09-08T21:16:37.691		62.34	-6.77	50974.35	15.58		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-08T20:26:20.240
 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 : 3377567263736584832
 2Mass ID (if available) : 06223301+2334333
 ICRS Star Coord at Epoch: 06h 22m 33.00326s +23:34:33.36014s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.579
 G magnitude : 17.328
 RP magnitude : 16.460
 BP magnitude : 18.119
 DUPflag : 0
 Distance (au) : 19.279
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 16.14
 Sun-Target sep (deg) : 70.87
 Sun-Moon sep (deg) : 113.10
 B (ring opening deg) : 70.80
 PA of pole (deg) : 67.37
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.242
 C/A sky separation (km) : 17368.9
 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



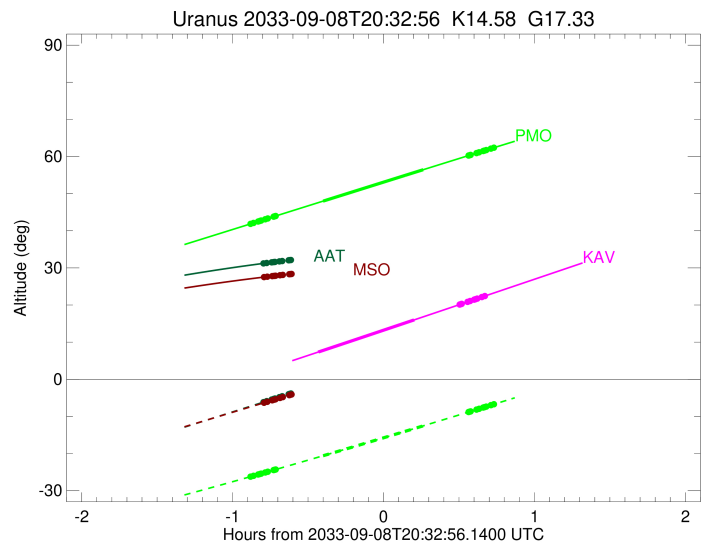
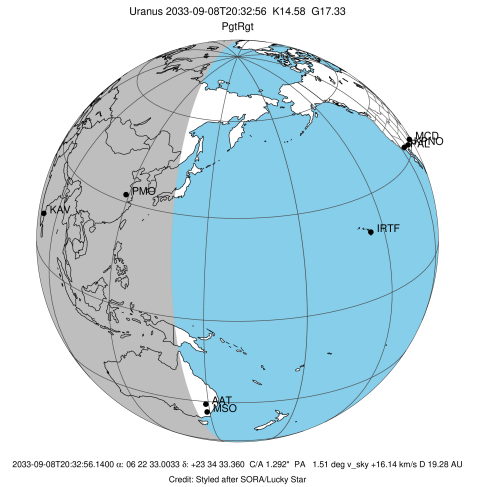
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-09-08T19:38:27.330		0.92x	-67.33	51047.62	-15.92		
lambda	I	2033-09-08T19:39:31.390		1.15x	-67.17	50026.71	-15.91		
delta	I	2033-09-08T19:41:20.165		1.56x	-66.88	48300.35	-15.83		
gamma	I	2033-09-08T19:42:02.825		1.72x	-66.77	47625.92	-15.79		
eta	I	2033-09-08T19:42:31.331		1.83x	-66.70	47176.12	-15.77		
beta	I	2033-09-08T19:44:06.449		2.18x	-66.44	45681.19	-15.68		
alpha	I	2033-09-08T19:45:06.489		2.41x	-66.28	44739.48	-15.62		
4	I	2033-09-08T19:47:25.843		2.93x	-65.89	42576.95	-15.47		
5	I	2033-09-08T19:47:53.030		3.03x	-65.82	42160.70	-15.43		
6	I	2033-09-08T19:48:11.177		3.10x	-65.77	41877.16	-15.41		
Uranus	I	2033-09-08T20:07:03.053		7.35	-62.38	25473.81		7.53	7.89
Uranus	E	2033-09-08T20:45:08.405		16.00	-54.62	25097.99		-17.96	-18.76
6	E	2033-09-08T21:03:10.191		20.12	-50.69	41800.28	15.24		
5	E	2033-09-08T21:03:39.949		20.23	-50.58	42260.63	15.26		
4	E	2033-09-08T21:04:01.516		20.31	-50.50	42601.21	15.30		
alpha	E	2033-09-08T21:06:20.366		20.84	-49.98	44723.23	15.44		
beta	E	2033-09-08T21:07:19.693		21.07	-49.76	45646.06	15.49		
eta	E	2033-09-08T21:08:58.298		21.44	-49.40	47176.12	15.57		
gamma	E	2033-09-08T21:09:26.969		21.55	-49.29	47622.89	15.59		
delta	E	2033-09-08T21:10:10.368		21.72	-49.13	48300.35	15.63		
lambda	E	2033-09-08T21:12:00.572		22.14	-48.72	50026.71	15.70		
epsilon	E	2033-09-08T21:13:00.427		22.37	-48.49	50967.75	15.70		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-08T20:32:00.410
 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 : 3377567263736584832
 2Mass ID (if available) : 06223301+2334333
 ICRS Star Coord at Epoch: 06h 22m 33.00326s +23:34:33.36014s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.579
 G magnitude : 17.328
 RP magnitude : 16.460
 BP magnitude : 18.119
 DUPflag : 0
 Distance (au) : 19.279
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 16.14
 Sun-Target sep (deg) : 70.87
 Sun-Moon sep (deg) : 113.05
 B (ring opening deg) : 70.80
 PA of pole (deg) : 67.37
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.667
 C/A sky separation (km) : 23311.5
 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	2033-09-08T19:45:25.222		31.23	-6.12	50994.78	-14.63		
lambda	I	2033-09-08T19:46:31.304		31.33	-5.89	50026.71	-14.61		
delta	I	2033-09-08T19:48:30.084		31.50	-5.46	48300.35	-14.46		
gamma	I	2033-09-08T19:49:16.898		31.56	-5.30	47625.14	-14.39		
eta	I	2033-09-08T19:49:48.150		31.61	-5.19	47176.12	-14.35		
beta	I	2033-09-08T19:51:32.998		31.75	-4.81x	45680.73	-14.18		
alpha	I	2033-09-08T19:52:39.236		31.85	-4.58x	44743.46	-14.08		
4	I	2033-09-08T19:55:14.290		32.05	-4.02x	42584.47	-13.80		
5	I	2033-09-08T19:55:45.734		32.10	-3.91x	42156.64	-13.72		
6	I	2033-09-08T19:56:06.167		32.12	-3.84x	41874.04	-13.68		
Uranus	I	2033-09-08T20:20:54.868		33.80	1.45x	25559.00		0.05	0.05
Uranus	E	2033-09-08T20:42:21.307		34.77	5.99x	25277.23		-13.88	-14.51
6	E	2033-09-08T21:05:52.087		35.29	10.93x	41803.97	13.64		
5	E	2033-09-08T21:06:24.196		35.30	11.04x	42248.73	13.68		
4	E	2033-09-08T21:06:49.269		35.30	11.13x	42606.00	13.76		
alpha	E	2033-09-08T21:09:22.894		35.32	11.66x	44727.91	14.03		
beta	E	2033-09-08T21:10:27.853		35.33	11.89x	45648.02	14.14		
eta	E	2033-09-08T21:12:15.453		35.33	12.26x	47176.12	14.29		
gamma	E	2033-09-08T21:12:46.625		35.34	12.37x	47622.38	14.34		
delta	E	2033-09-08T21:13:33.802		35.34	12.53x	48300.35	14.40		
lambda	E	2033-09-08T21:15:33.031		35.34	12.94x	50026.71	14.55		
epsilon	E	2033-09-08T21:16:34.672		35.34	13.16x	50926.05	14.58		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-08T20:32:03.550
 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 : 3377567263736584832
 2Mass ID (if available) : 06223301+2334333
 ICRS Star Coord at Epoch: 06h 22m 33.00326s +23:34:33.36014s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.579
 G magnitude : 17.328
 RP magnitude : 16.460
 BP magnitude : 18.119
 DUPflag : 0
 Distance (au) : 19.279
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 16.14
 Sun-Target sep (deg) : 70.87
 Sun-Moon sep (deg) : 113.00
 B (ring opening deg) : 70.80
 PA of pole (deg) : 67.37
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.685
 C/A sky separation (km) : 23556.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.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	2033-09-08T19:45:38.768		27.54	-6.29	50992.69	-14.61		
lambda	I	2033-09-08T19:46:44.830		27.63	-6.06	50026.71	-14.58		
delta	I	2033-09-08T19:48:43.859		27.79	-5.66	48300.35	-14.42		
gamma	I	2033-09-08T19:49:30.782		27.85	-5.50	47625.11	-14.36		
eta	I	2033-09-08T19:50:02.107		27.89	-5.39	47176.12	-14.31		
beta	I	2033-09-08T19:51:47.229		28.02	-5.03	45680.70	-14.14		
alpha	I	2033-09-08T19:52:53.646		28.11	-4.81x	44743.61	-14.04		
4	I	2033-09-08T19:55:29.192		28.30	-4.28x	42584.78	-13.75		
5	I	2033-09-08T19:56:00.784		28.34	-4.17x	42156.52	-13.67		
6	I	2033-09-08T19:56:21.299		28.36	-4.10x	41873.88	-13.63		
Uranus	I	2033-09-08T20:21:34.490		29.92	1.04x	25558.75		-0.41	-0.43
Uranus	E	2033-09-08T20:41:47.498		30.76	5.13x	25290.01		-13.55	-14.16
6	E	2033-09-08T21:05:41.990		31.26	9.91x	41804.16	13.59		
5	E	2033-09-08T21:06:14.164		31.26	10.02x	42248.17	13.63		
4	E	2033-09-08T21:06:39.376		31.27	10.10x	42606.20	13.71		
alpha	E	2033-09-08T21:09:13.492		31.29	10.61x	44728.13	13.99		
beta	E	2033-09-08T21:10:18.623		31.29	10.83x	45648.12	14.10		
eta	E	2033-09-08T21:12:06.486		31.30	11.18x	47176.12	14.26		
gamma	E	2033-09-08T21:12:37.728		31.30	11.28x	47622.36	14.31		
delta	E	2033-09-08T21:13:25.011		31.30	11.44x	48300.35	14.37		
lambda	E	2033-09-08T21:15:24.477		31.31	11.83x	50026.71	14.53		
epsilon	E	2033-09-08T21:16:26.101		31.31	12.04x	50924.19	14.55		