

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2044-01-06T16:51:33.190
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 618790957835883648
 2Mass ID (if available) : 09335414+1514290

Uranus 2044-01-06T16:51:33 K9.84 G11.73 PgtRgt

ICRS Star Coord at Epoch: 09h 33m 54.11947s +15:14:29.11050s

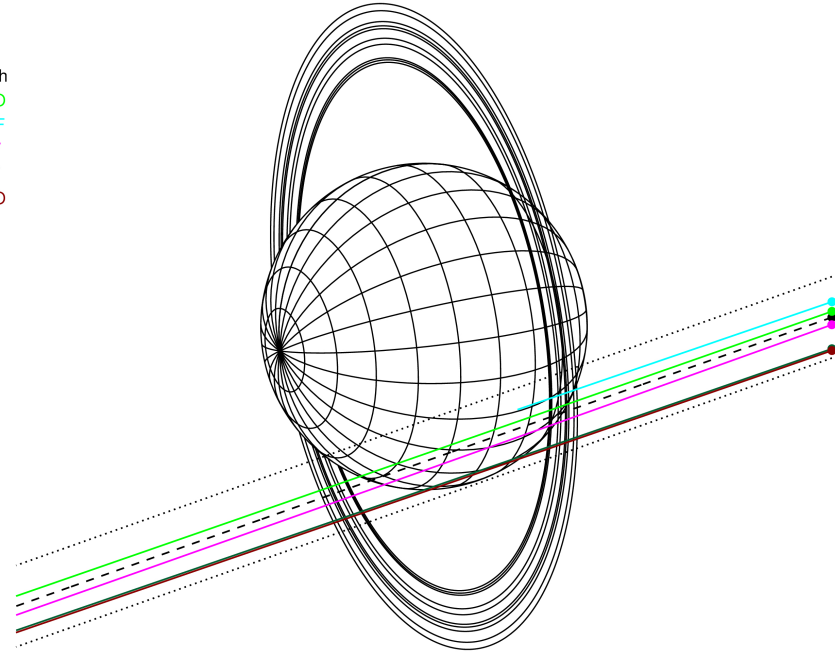
RUWE (>1.4 is poor) : 1.69
 K magnitude : 9.838
 G magnitude : 11.732
 RP magnitude : 11.121
 BP magnitude : 12.174
 DUPflag : 0
 Distance (au) : 17.593
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.60
 Sun-Target sep (deg) : 144.55
 Sun-Moon sep (deg) : 143.49
 B (ring opening deg) : 26.43
 PA of pole (deg) : 99.64

#	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



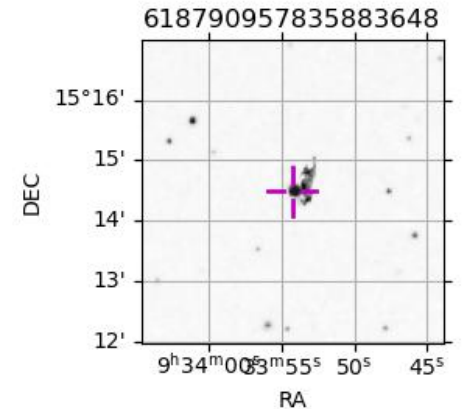
2044-01-06T16:51:33.1900 α: 09 33 54.1195 δ: +15 14 29.111 C/A 1.553° PA 19.50 deg v_sky -17.59 km/s D 17.59 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PMO
 IRTF
 KAV
 AAT
 MSO

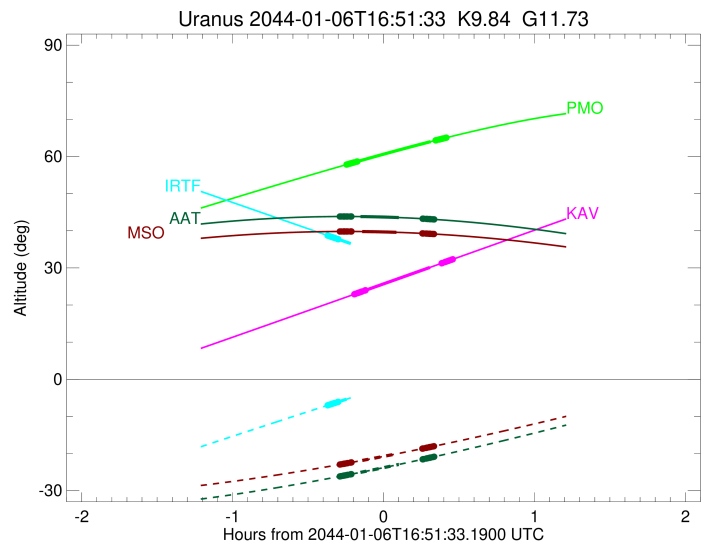
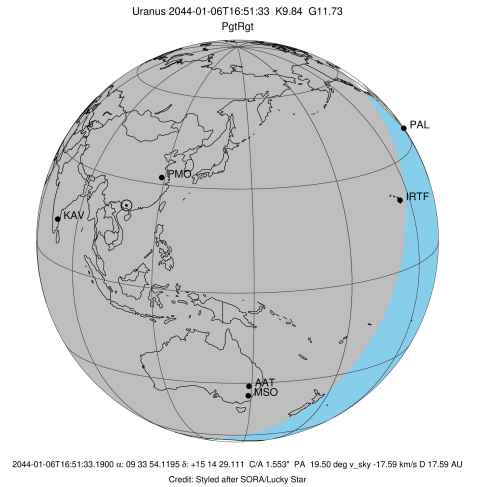


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++	+ +	+++++++	JAN 06 16:37 - JAN 06 17:16	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	+	+		JAN 06 16:29 - JAN 06 16:29	PinRin
KAV	Kavalur Observatory	12.6	78.8	+++++++	+ +	+++++++	JAN 06 16:40 - JAN 06 17:19	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	+++++++	+ +	+++++++	JAN 06 16:34 - JAN 06 17:11	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++++	+ +	+++++++	JAN 06 16:34 - JAN 06 17:11	PieRie

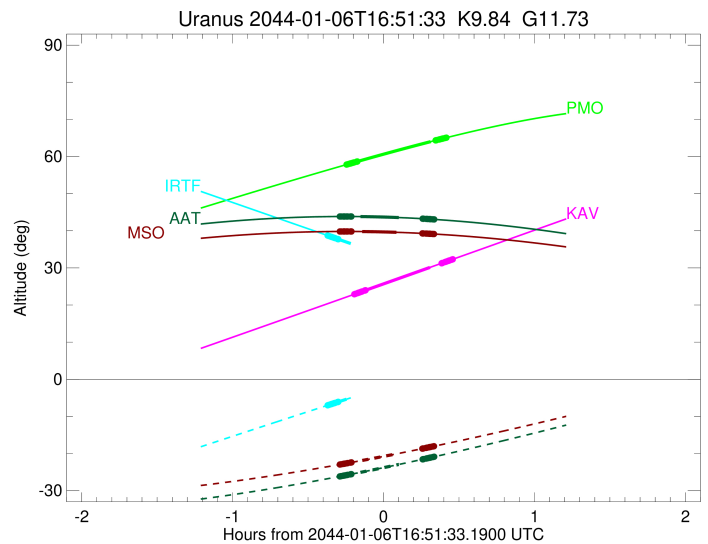
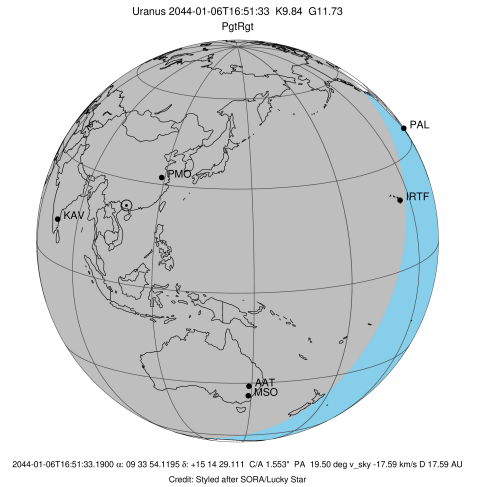


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2044-01-06T16:54:21.450
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 618790957835883648
 2Mass ID (if available) : 09335414+1514290
 ICRS Star Coord at Epoch: 09h 33m 54.11947s +15:14:29.11050s
 RUWE (>1.4 is poor) : 1.69
 K magnitude : 9.838
 G magnitude : 11.732
 RP magnitude : 11.121
 BP magnitude : 12.174
 DUPflag : 0
 Distance (au) : 17.593
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.60
 Sun-Target sep (deg) : 144.55
 Sun-Moon sep (deg) : 144.33
 B (ring opening deg) : 26.43
 PA of pole (deg) : 99.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.480
 C/A sky separation (km) : 18889.6
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



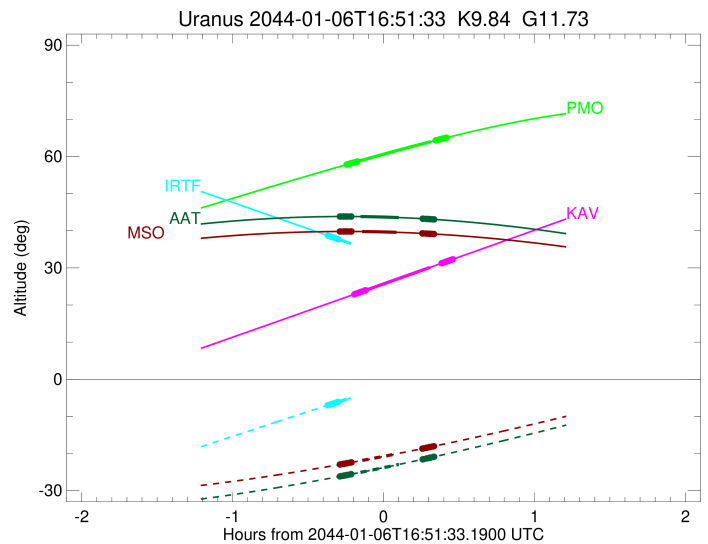
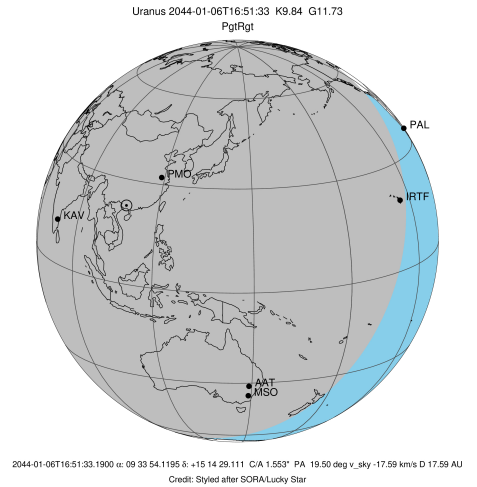
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2044-01-06T16:37:02.686		57.87	-78.88	50836.01	-36.97		
lambda	I	2044-01-06T16:37:24.648		57.94	-78.83	50026.71	-36.80		
delta	I	2044-01-06T16:38:11.702		58.09	-78.74	48300.35	-36.57		
gamma	I	2044-01-06T16:38:30.191	b	58.15	-78.70	47625.02	-36.48		
eta	I	2044-01-06T16:38:42.509	b	58.19	-78.68	47176.12	-36.41		
beta	I	2044-01-06T16:39:23.799	b	58.32	-78.59	45677.04	-36.18		
alpha	I	2044-01-06T16:39:50.335	b	58.41	-78.54	44702.47	-36.00		
4	I	2044-01-06T16:40:49.441	b	58.60	-78.41	42609.52	-35.58		
5	I	2044-01-06T16:40:57.684	b	58.62	-78.39	42263.11	-35.48		
6	I	2044-01-06T16:41:09.868	b	58.66	-78.37	41795.24	-35.37		
Uranus	I	2044-01-06T16:38:27.277		58.14	-78.71	25487.79		-44.72	-46.03
Uranus	E	2044-01-06T17:10:18.054		64.01	-73.71	25525.31		28.91	30.05
6	E	2044-01-06T17:12:18.135		64.36	-73.35	41867.02	35.42		
5	E	2044-01-06T17:12:24.730		64.38	-73.33	42157.80	35.54		
4	E	2044-01-06T17:12:36.497		64.41	-73.29	42528.91	35.64		
alpha	E	2044-01-06T17:13:38.253		64.58	-73.10	44751.77	36.06		
beta	E	2044-01-06T17:14:02.951		64.66	-73.03	45660.10	36.24		
eta	E	2044-01-06T17:14:44.493		64.77	-72.90	47176.12	36.48		
gamma	E	2044-01-06T17:14:56.949		64.81	-72.86	47630.90	36.55		
delta	E	2044-01-06T17:15:15.242		64.86	-72.80	48300.35	36.64		
lambda	E	2044-01-06T17:16:02.206		64.99	-72.66	50026.71	36.87		
epsilon	E	2044-01-06T17:16:43.529		65.11	-72.53	51554.29	37.05		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2044-01-06T16:47:32.940
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 618790957835883648
 2Mass ID (if available) : 09335414+1514290
 ICRS Star Coord at Epoch: 09h 33m 54.11947s +15:14:29.11050s
 RUWE (>1.4 is poor) : 1.69
 K magnitude : 9.838
 G magnitude : 11.732
 RP magnitude : 11.121
 BP magnitude : 12.174
 DUPflag : 0
 Distance (au) : 17.593
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.60
 Sun-Target sep (deg) : 144.55
 Sun-Moon sep (deg) : 143.27
 B (ring opening deg) : 26.43
 PA of pole (deg) : 99.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.338
 C/A sky separation (km) : 17068.8
 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



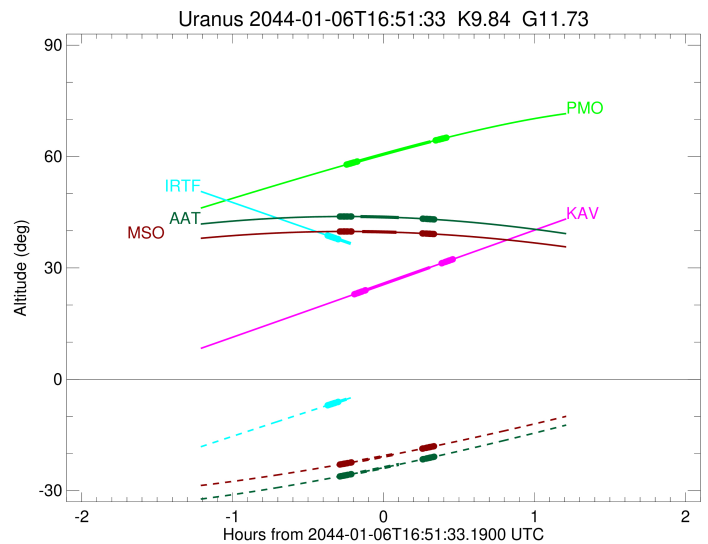
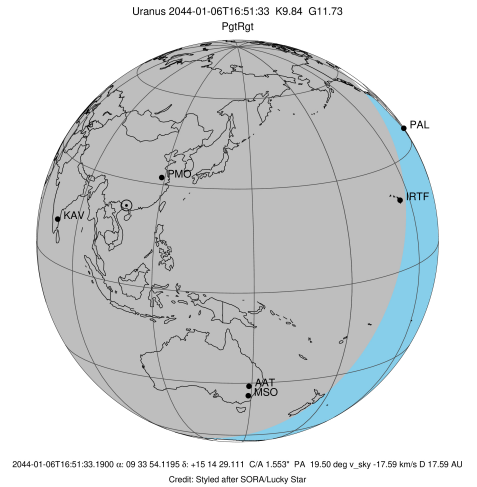
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2044-01-06T16:29:31.162		38.68	-6.97	50826.84	-37.28		
lambda	I	2044-01-06T16:29:52.683	b	38.59	-6.90	50026.71	-37.14		
delta	I	2044-01-06T16:30:39.282	b	38.41	-6.73	48300.35	-36.95		
gamma	I	2044-01-06T16:30:57.582	b	38.34	-6.66	47624.82	-36.88		
eta	I	2044-01-06T16:31:09.758	b	38.29	-6.61	47176.12	-36.82		
beta	I	2044-01-06T16:31:50.568	b	38.13	-6.47	45676.51	-36.63		
alpha	I	2044-01-06T16:32:16.766	b	38.03	-6.37	44701.20	-36.49		
4	I	2044-01-06T16:33:14.922	b	37.80	-6.16	42610.60	-36.15		
5	I	2044-01-06T16:33:23.075	b	37.77	-6.13	42266.57	-36.07		
6	I	2044-01-06T16:33:35.079	b	37.72	-6.08	41794.99	-35.97		
Uranus	I	2044-01-06T16:29:49.970		38.60	-6.91	25477.50		-48.85	-50.15
Uranus	E	2044-01-06T17:05:20.139		30.26	0.79x	25513.86		34.04	35.28
6	E	2044-01-06T17:05:45.028		30.16	0.88x	41868.53	35.88		
5	E	2044-01-06T17:05:51.486		30.14	0.91x	42158.99	35.98		
4	E	2044-01-06T17:06:02.955		30.09	0.95x	42528.15	36.06		
alpha	E	2044-01-06T17:07:04.125		29.85	1.17x	44751.42	36.39		
beta	E	2044-01-06T17:07:28.576		29.76	1.25x	45659.18	36.53		
eta	E	2044-01-06T17:08:09.845		29.59	1.40x	47176.12	36.72		
gamma	E	2044-01-06T17:08:22.219		29.55	1.44x	47630.78	36.77		
delta	E	2044-01-06T17:08:40.410		29.47	1.51x	48300.35	36.85		
lambda	E	2044-01-06T17:09:27.149		29.29	1.68x	50026.71	37.02		
epsilon	E	2044-01-06T17:10:08.348		29.13	1.82x	51555.12	37.16		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2044-01-06T16:56:45.480
 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 : 618790957835883648
 2Mass ID (if available) : 09335414+1514290
 ICRS Star Coord at Epoch: 09h 33m 54.11947s +15:14:29.11050s
 RUWE (>1.4 is poor) : 1.69
 K magnitude : 9.838
 G magnitude : 11.732
 RP magnitude : 11.121
 BP magnitude : 12.174
 DUPflag : 0
 Distance (au) : 17.593
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.60
 Sun-Target sep (deg) : 144.55
 Sun-Moon sep (deg) : 144.40
 B (ring opening deg) : 26.43
 PA of pole (deg) : 99.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.666
 C/A sky separation (km) : 21255.7
 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



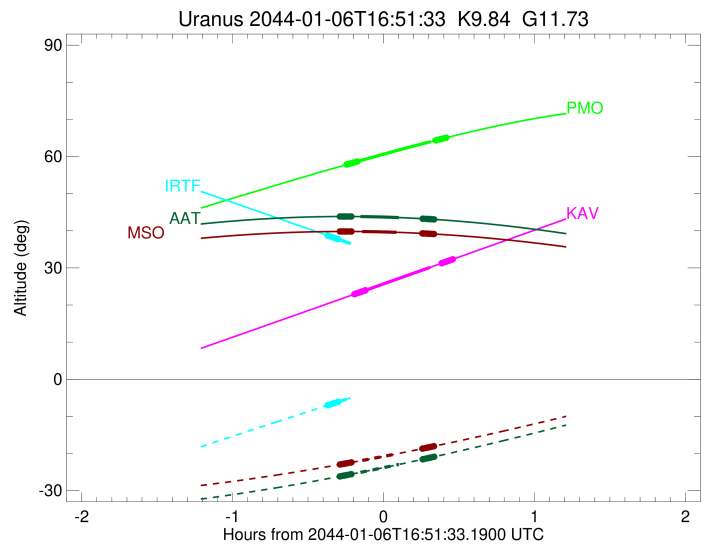
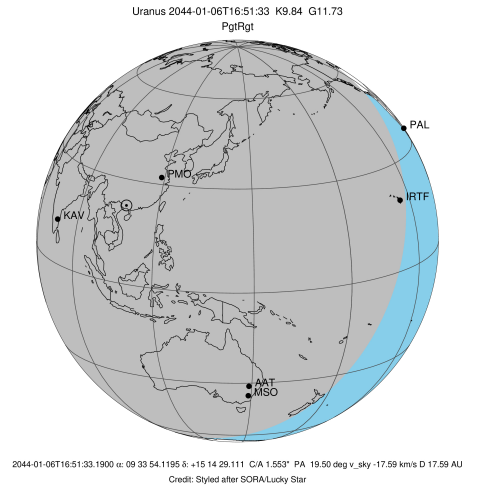
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2044-01-06T16:40:07.638		22.95	-57.48	50848.88	-35.84		
lambda	I	2044-01-06T16:40:30.678		23.04	-57.56	50026.71	-35.62		
delta	I	2044-01-06T16:41:19.339		23.23	-57.75	48300.35	-35.33		
gamma	I	2044-01-06T16:41:38.480		23.31	-57.82	47625.30	-35.21		
eta	I	2044-01-06T16:41:51.255		23.36	-57.87	47176.12	-35.12		
beta	I	2044-01-06T16:42:34.102		23.53	-58.03	45677.70	-34.82		
alpha	I	2044-01-06T16:43:01.689		23.64	-58.13	44704.23	-34.59		
4	I	2044-01-06T16:44:03.449	b	23.89	-58.36	42607.95	-34.05		
5	I	2044-01-06T16:44:12.022	b	23.92	-58.39	42258.37	-33.93		
6	I	2044-01-06T16:44:24.734	b	23.97	-58.44	41795.74	-33.79		
Uranus	I	2044-01-06T16:43:33.291		23.77	-58.25	25504.24		-38.08	-39.37
Uranus	E	2044-01-06T17:10:00.255		30.13	-64.13	25540.28		21.11	22.02
6	E	2044-01-06T17:14:40.659		31.26	-65.15	41864.87	33.90		
5	E	2044-01-06T17:14:47.649		31.28	-65.18	42156.50	34.04		
4	E	2044-01-06T17:15:00.122		31.33	-65.22	42530.09	34.16		
alpha	E	2044-01-06T17:16:04.324		31.59	-65.45	44752.13	34.72		
beta	E	2044-01-06T17:16:30.013		31.70	-65.55	45661.34	34.95		
eta	E	2044-01-06T17:17:13.005		31.87	-65.70	47176.12	35.26		
gamma	E	2044-01-06T17:17:25.892		31.92	-65.75	47631.04	35.35		
delta	E	2044-01-06T17:17:44.794		32.00	-65.82	48300.35	35.47		
lambda	E	2044-01-06T17:18:33.256		32.19	-65.99	50026.71	35.77		
epsilon	E	2044-01-06T17:19:15.758		32.36	-66.15	51552.15	35.99		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2044-01-06T16:49:58.580
 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 : 618790957835883648
 2Mass ID (if available) : 09335414+1514290
 ICRS Star Coord at Epoch: 09h 33m 54.11947s +15:14:29.11050s
 RUWE (>1.4 is poor) : 1.69
 K magnitude : 9.838
 G magnitude : 11.732
 RP magnitude : 11.121
 BP magnitude : 12.174
 DUPflag : 0
 Distance (au) : 17.593
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.60
 Sun-Target sep (deg) : 144.55
 Sun-Moon sep (deg) : 143.64
 B (ring opening deg) : 26.43
 PA of pole (deg) : 99.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.896
 C/A sky separation (km) : 24187.8
 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_itrff93_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	2044-01-06T16:34:20.536		43.85	-26.14	50868.28	-35.12		
lambda	I	2044-01-06T16:34:44.633		43.85	-26.09	50026.71	-34.83		
delta	I	2044-01-06T16:35:34.472		43.85	-25.98	48300.35	-34.44		
gamma	I	2044-01-06T16:35:54.111		43.85	-25.94	47625.69	-34.27		
eta	I	2044-01-06T16:36:07.253		43.85	-25.91	47176.12	-34.15		
beta	I	2044-01-06T16:36:51.389		43.85	-25.82	45678.55	-33.73		
alpha	I	2044-01-06T16:37:19.889		43.85	-25.75	44706.75	-33.43		
4	I	2044-01-06T16:38:24.197		43.85	-25.61	42605.52	-32.68		
5	I	2044-01-06T16:38:33.109		43.84	-25.59	42251.59	-32.52		
6	I	2044-01-06T16:38:46.323		43.84	-25.56	41796.70	-32.34		
Uranus	I	2044-01-06T16:42:23.244		43.82	-25.08	25533.36		-24.94	-25.97
Uranus	E	2044-01-06T16:57:37.824		43.56	-22.95	25555.90		8.44	8.83
6	E	2044-01-06T17:07:07.963		43.25	-21.56	41862.20	32.34		
5	E	2044-01-06T17:07:15.449		43.25	-21.54	42155.46	32.52		
4	E	2044-01-06T17:07:28.685		43.24	-21.51	42531.69	32.68		
alpha	E	2044-01-06T17:08:35.492		43.20	-21.34	44752.37	33.43		
beta	E	2044-01-06T17:09:02.212		43.18	-21.28	45662.75	33.73		
eta	E	2044-01-06T17:09:46.634		43.15	-21.17	47176.12	34.15		
gamma	E	2044-01-06T17:09:59.937		43.14	-21.13	47631.19	34.27		
delta	E	2044-01-06T17:10:19.416		43.12	-21.08	48300.35	34.44		
lambda	E	2044-01-06T17:11:09.254		43.09	-20.96	50026.71	34.84		
epsilon	E	2044-01-06T17:11:52.736		43.06	-20.85	51548.40	35.12		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2044-01-06T16:49:53.700
 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 : 618790957835883648
 2Mass ID (if available) : 09335414+1514290
 ICRS Star Coord at Epoch: 09h 33m 54.11947s +15:14:29.11050s
 RUWE (>1.4 is poor) : 1.69
 K magnitude : 9.838
 G magnitude : 11.732
 RP magnitude : 11.121
 BP magnitude : 12.174
 DUPflag : 0
 Distance (au) : 17.593
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.60
 Sun-Target sep (deg) : 144.55
 Sun-Moon sep (deg) : 143.60
 B (ring opening deg) : 26.43
 PA of pole (deg) : 99.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.918
 C/A sky separation (km) : 24475.7
 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_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	2044-01-06T16:34:21.206		39.81	-22.95	50870.15	-34.96		
lambda	I	2044-01-06T16:34:45.469		39.81	-22.90	50026.71	-34.67		
delta	I	2044-01-06T16:35:35.554		39.82	-22.80	48300.35	-34.26		
gamma	I	2044-01-06T16:35:55.295		39.82	-22.76	47625.73	-34.09		
eta	I	2044-01-06T16:36:08.509		39.82	-22.73	47176.12	-33.96		
beta	I	2044-01-06T16:36:52.892		39.82	-22.64	45678.62	-33.54		
alpha	I	2044-01-06T16:37:21.562		39.82	-22.58	44707.00	-33.23		
4	I	2044-01-06T16:38:26.307		39.81	-22.45	42605.28	-32.45		
5	I	2044-01-06T16:38:35.282		39.81	-22.43	42250.94	-32.29		
6	I	2044-01-06T16:38:48.585		39.81	-22.40	41796.81	-32.11		
Uranus	I	2044-01-06T16:43:07.793		39.79	-21.86	25536.75		-23.12	-24.09
Uranus	E	2044-01-06T16:56:43.563		39.59	-20.09	25557.13		6.54	6.84
6	E	2044-01-06T17:07:01.246		39.29	-18.69	41861.90	32.11		
5	E	2044-01-06T17:07:08.806		39.29	-18.67	42155.38	32.29		
4	E	2044-01-06T17:07:22.153		39.28	-18.64	42531.88	32.45		
alpha	E	2044-01-06T17:08:29.385		39.24	-18.48	44752.38	33.23		
beta	E	2044-01-06T17:08:56.273		39.23	-18.42	45662.91	33.54		
eta	E	2044-01-06T17:09:40.940		39.20	-18.31	47176.12	33.97		
gamma	E	2044-01-06T17:09:54.314		39.19	-18.28	47631.20	34.09		
delta	E	2044-01-06T17:10:13.895		39.18	-18.24	48300.35	34.26		
lambda	E	2044-01-06T17:11:03.979		39.15	-18.12	50026.71	34.67		
epsilon	E	2044-01-06T17:11:47.647		39.12	-18.02	51547.90	34.97		