

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2044-02-10T17:17:19.270  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 619056970930668416  
 2Mass ID (if available) : 09282083+1541549

ICRS Star Coord at Epoch: 09h 28m 20.80056s +15:41:54.90017s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 13.678  
 G magnitude : 17.228  
 RP magnitude : 16.087  
 BP magnitude : 18.592  
 DUPflag : 0  
 Distance (au) : 17.413  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.09  
 Sun-Target sep (deg) : 178.26  
 Sun-Moon sep (deg) : 33.06  
 B (ring opening deg) : 27.83  
 PA of pole (deg) : 99.16  
 # a(km) ring

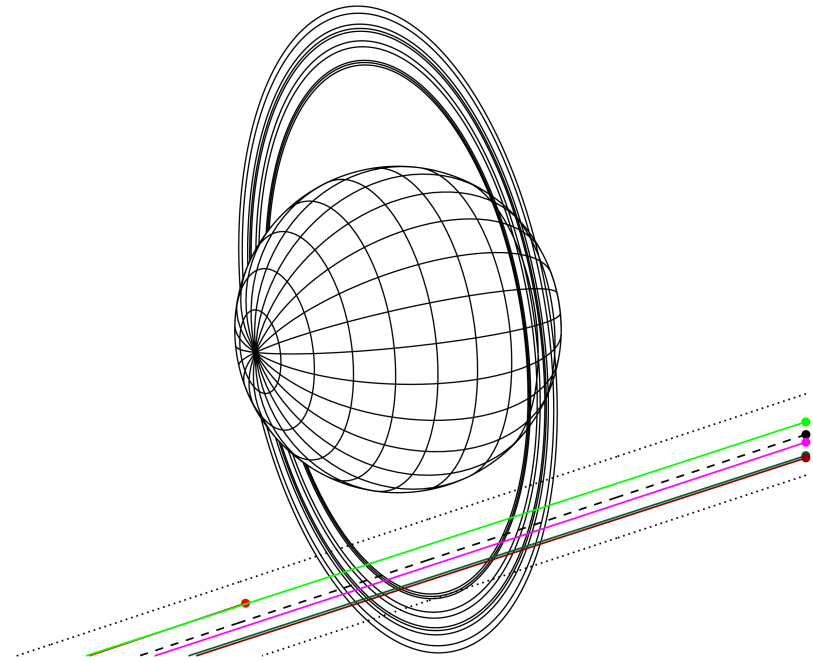
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2044-02-10T17:17:19.2700 α: 09 28 20.8006 δ: +15 41 54.900 C/A 2.823° PA 18.37 deg v\_sky -23.09 km/s D 17.41 AU  
 Credit: Styled after SORA/Lucky Star

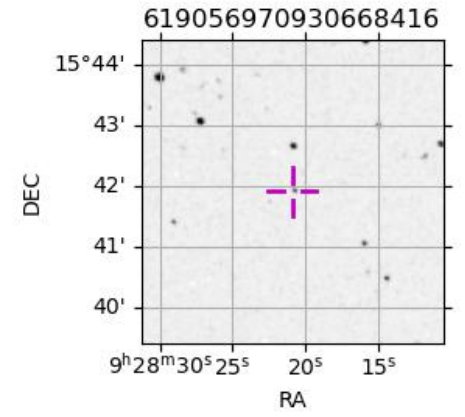
Uranus 2044-02-10T17:17:19 K13.68 G17.23 XRgt

- Earth
- PIC
- PMO
- KAV
- AAT
- MSO

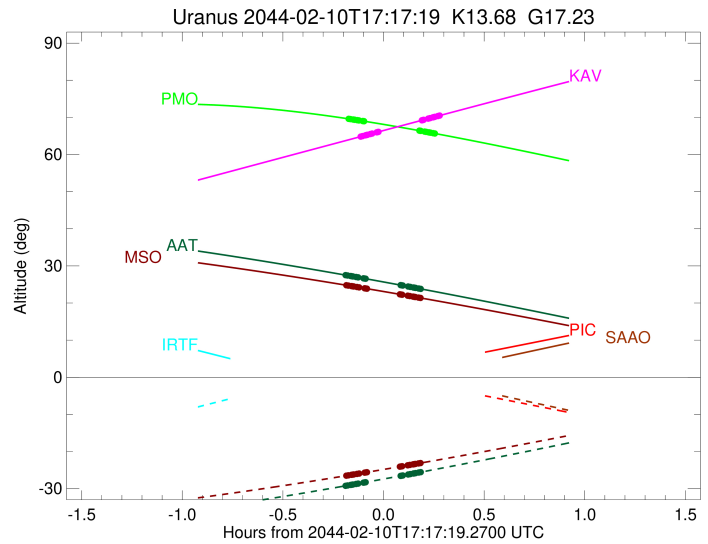
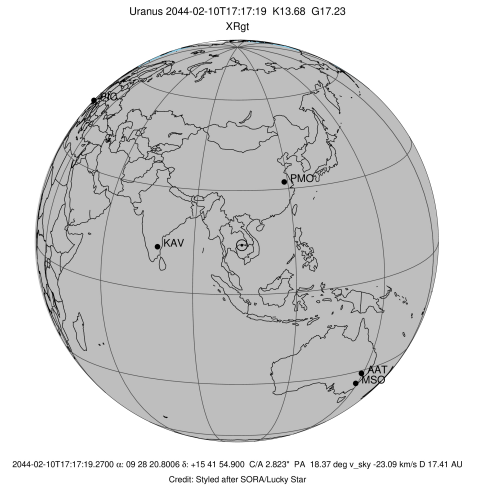


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	FEB 10 17:06 - FEB 10 17:32	PnnRie
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	+++++		+++++	FEB 10 17:10 - FEB 10 17:34	PnnRie
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	+++++		+++++	FEB 10 17:05 - FEB 10 17:28	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	FEB 10 17:06 - FEB 10 17:28	PnnRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2044-02-10T17:16:53.370  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 619056970930668416  
 2Mass ID (if available) : 09282083+1541549  
 ICRS Star Coord at Epoch: 09h 28m 20.80056s +15:41:54.90017s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 13.678  
 G magnitude : 17.228  
 RP magnitude : 16.087  
 BP magnitude : 18.592  
 DUPflag : 0  
 Distance (au) : 17.413  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.09  
 Sun-Target sep (deg) : 178.26  
 Sun-Moon sep (deg) : 33.64  
 B (ring opening deg) : 27.83  
 PA of pole (deg) : 99.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.654  
 C/A sky separation (km) : 33518.8  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



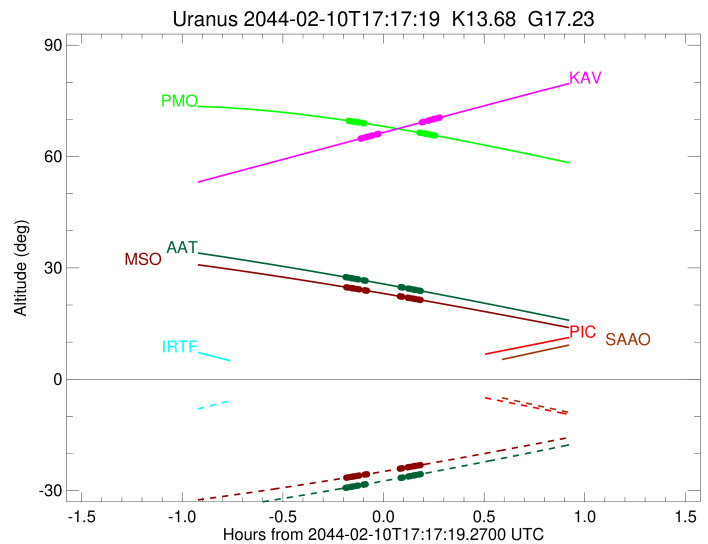
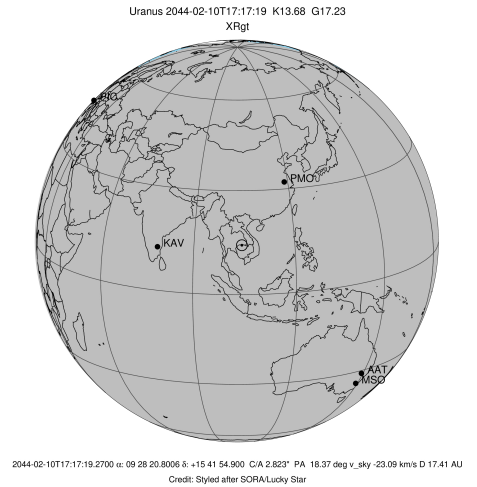
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2044-02-10T17:06:53.224		69.62	-69.26	51266.25	-37.63		
lambda	I	2044-02-10T17:07:26.706		69.54	-69.19	50026.71	-36.65		
delta	I	2044-02-10T17:08:14.543		69.43	-69.09	48300.35	-35.51		
gamma	I	2044-02-10T17:08:33.517		69.39	-69.05	47631.25	-35.02		
eta	I	2044-02-10T17:08:46.579		69.36	-69.03	47176.12	-34.67		
beta	I	2044-02-10T17:09:30.620		69.26	-68.93	45672.09	-33.40		
alpha	I	2044-02-10T17:09:58.181		69.19	-68.88	44750.88	-32.56		
4	I	2044-02-10T17:11:08.576		69.03	-68.73	42532.05	-30.08		
5	I	2044-02-10T17:11:22.771		68.99	-68.70	42156.03	-29.73		
6	I	2044-02-10T17:11:31.345		68.97	-68.68	41866.04	-29.36		

No planet occultations

6	E	2044-02-10T17:28:00.343		66.44	-66.35	41875.80	29.35		
5	E	2044-02-10T17:28:12.731		66.40	-66.31	42225.50	29.72		
4	E	2044-02-10T17:28:24.445		66.37	-66.28	42538.86	30.07		
alpha	E	2044-02-10T17:29:34.026		66.18	-66.11	44733.21	32.54		
beta	E	2044-02-10T17:30:01.930		66.10	-66.03	45645.46	33.38		
eta	E	2044-02-10T17:30:46.844		65.98	-65.92	47176.12	34.65		
gamma	E	2044-02-10T17:30:59.825		65.94	-65.88	47628.14	35.00		
delta	E	2044-02-10T17:31:18.899		65.89	-65.83	48300.35	35.49		
lambda	E	2044-02-10T17:32:06.766		65.76	-65.71	50026.71	36.63		
epsilon	E	2044-02-10T17:32:46.978		65.64	-65.60	51517.29	37.61		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2044-02-10T17:19:04.870  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 619056970930668416  
 2Mass ID (if available) : 09282083+1541549  
 ICRS Star Coord at Epoch: 09h 28m 20.80056s +15:41:54.90017s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 13.678  
 G magnitude : 17.228  
 RP magnitude : 16.087  
 BP magnitude : 18.592  
 DUPflag : 0  
 Distance (au) : 17.413  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.09  
 Sun-Target sep (deg) : 178.26  
 Sun-Moon sep (deg) : 33.27  
 B (ring opening deg) : 27.83  
 PA of pole (deg) : 99.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.908  
 C/A sky separation (km) : 36721.7  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

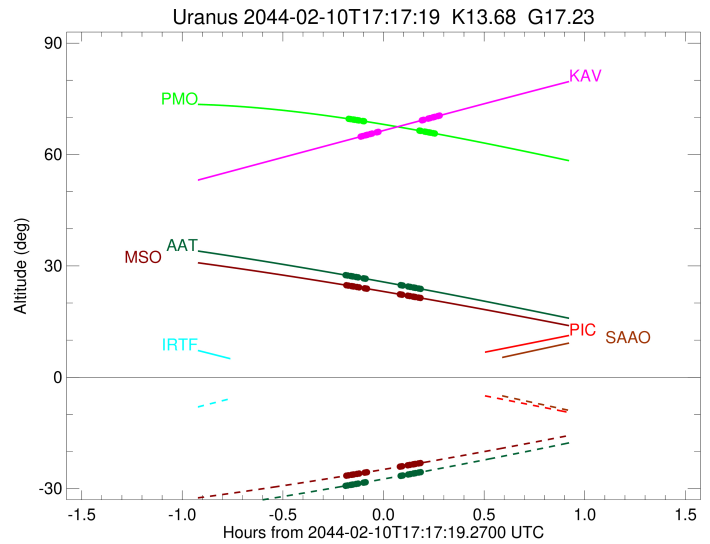
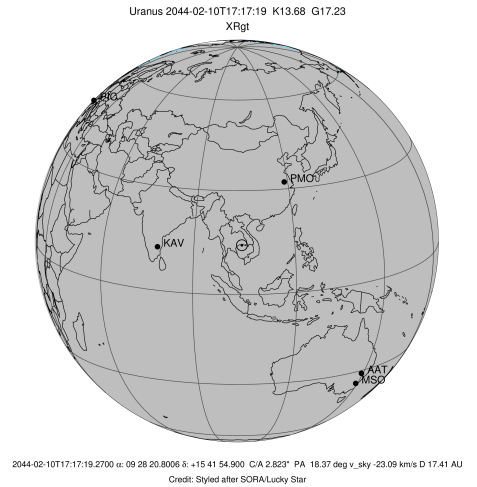


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2044-02-10T17:10:27.020		64.81	-63.61	51299.24	-34.70		
lambda	I	2044-02-10T17:11:04.499		64.96	-63.76	50026.71	-33.45		
delta	I	2044-02-10T17:11:57.281		65.18	-63.98	48300.35	-31.93		
gamma	I	2044-02-10T17:12:18.444		65.26	-64.06	47631.41	-31.28		
eta	I	2044-02-10T17:12:33.110		65.32	-64.12	47176.12	-30.81		
beta	I	2044-02-10T17:13:23.256		65.52	-64.32	45670.13	-29.07		
alpha	I	2044-02-10T17:13:55.089		65.65	-64.45	44751.85	-27.89		
4	I	2044-02-10T17:15:19.718		65.99	-64.79	42529.30	-24.35		
5	I	2044-02-10T17:15:36.486		66.06	-64.86	42158.78	-23.76		
6	I	2044-02-10T17:15:47.462		66.10	-64.91	41870.28	-23.19		

No planet occultations

6	E	2044-02-10T17:28:45.532		69.22	-68.05	41878.02	23.21		
5	E	2044-02-10T17:29:00.473		69.28	-68.11	42214.15	23.78		
4	E	2044-02-10T17:29:14.709		69.34	-68.16	42534.74	24.36		
alpha	E	2044-02-10T17:30:38.457		69.67	-68.50	44736.77	27.91		
beta	E	2044-02-10T17:31:10.657		69.80	-68.63	45646.99	29.08		
eta	E	2044-02-10T17:32:01.630		70.01	-68.84	47176.12	30.82		
gamma	E	2044-02-10T17:32:16.200		70.07	-68.90	47628.65	31.30		
delta	E	2044-02-10T17:32:37.441		70.15	-68.98	48300.35	31.95		
lambda	E	2044-02-10T17:33:30.193		70.36	-69.20	50026.71	33.48		
epsilon	E	2044-02-10T17:34:14.359		70.54	-69.37	51531.00	34.73		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2044-02-10T17:13:53.690  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 619056970930668416  
 2Mass ID (if available) : 09282083+1541549  
 ICRS Star Coord at Epoch: 09h 28m 20.80056s +15:41:54.90017s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 13.678  
 G magnitude : 17.228  
 RP magnitude : 16.087  
 BP magnitude : 18.592  
 DUPflag : 0  
 Distance (au) : 17.413  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.09  
 Sun-Target sep (deg) : 178.26  
 Sun-Moon sep (deg) : 34.00  
 B (ring opening deg) : 27.83  
 PA of pole (deg) : 99.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.048  
 C/A sky separation (km) : 38493.1  
 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

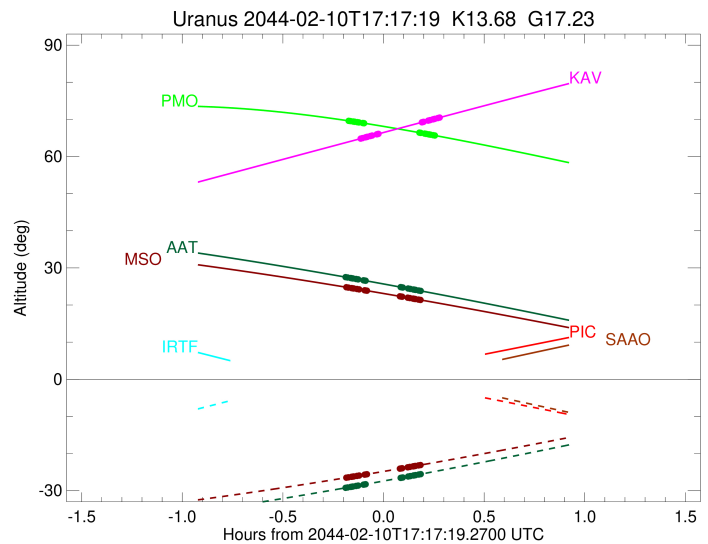
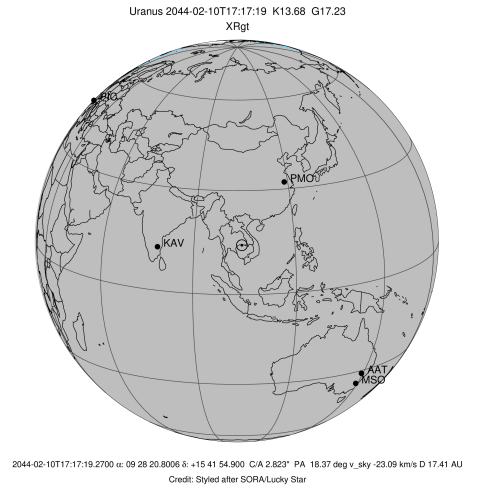


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2044-02-10T17:05:56.569		27.53	-29.26	51318.89	-32.63		
lambda	I	2044-02-10T17:06:37.216		27.42	-29.15	50026.71	-31.20		
delta	I	2044-02-10T17:07:34.141		27.27	-29.00	48300.35	-29.42		
gamma	I	2044-02-10T17:07:57.177		27.20	-28.93	47631.48	-28.65		
eta	I	2044-02-10T17:08:13.229		27.16	-28.89	47176.12	-28.08		
beta	I	2044-02-10T17:09:08.803		27.01	-28.74	45668.83	-25.99		
alpha	I	2044-02-10T17:09:44.626		26.91	-28.65	44752.23	-24.56		
4	I	2044-02-10T17:11:23.782		26.65	-28.38	42527.87	-20.07		
5	I	2044-02-10T17:11:43.582		26.59	-28.33	42161.59	-19.27		
6	I	2044-02-10T17:11:57.515		26.56	-28.29	41872.84	-18.49		

No planet occultations

6	E	2044-02-10T17:22:26.217		24.82	-26.56	41879.01	18.48		
5	E	2044-02-10T17:22:44.254		24.77	-26.51	42206.83	19.26		
4	E	2044-02-10T17:23:01.516		24.72	-26.47	42532.43	20.07		
alpha	E	2044-02-10T17:24:39.882		24.45	-26.19	44738.83	24.54		
beta	E	2044-02-10T17:25:16.154		24.34	-26.09	45648.01	25.97		
eta	E	2044-02-10T17:26:12.642		24.18	-25.93	47176.12	28.06		
gamma	E	2044-02-10T17:26:28.623		24.14	-25.89	47628.93	28.62		
delta	E	2044-02-10T17:26:51.773		24.07	-25.82	48300.35	29.39		
lambda	E	2044-02-10T17:27:48.765		23.91	-25.66	50026.71	31.16		
epsilon	E	2044-02-10T17:28:36.207		23.78	-25.53	51537.42	32.59		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2044-02-10T17:13:56.250  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 619056970930668416  
 2Mass ID (if available) : 09282083+1541549  
 ICRS Star Coord at Epoch: 09h 28m 20.80056s +15:41:54.90017s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 13.678  
 G magnitude : 17.228  
 RP magnitude : 16.087  
 BP magnitude : 18.592  
 DUPflag : 0  
 Distance (au) : 17.413  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.09  
 Sun-Target sep (deg) : 178.26  
 Sun-Moon sep (deg) : 33.97  
 B (ring opening deg) : 27.83  
 PA of pole (deg) : 99.16  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.076  
 C/A sky separation (km) : 38848.7  
 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	2044-02-10T17:06:09.532		24.80	-26.52	51322.80	-32.21		
lambda	I	2044-02-10T17:06:50.877		24.70	-26.42	50026.71	-30.74		
delta	I	2044-02-10T17:07:48.740		24.55	-26.27	48300.35	-28.90		
gamma	I	2044-02-10T17:08:12.209		24.50	-26.22	47631.50	-28.09		
eta	I	2044-02-10T17:08:28.586		24.45	-26.18	47176.12	-27.51		
beta	I	2044-02-10T17:09:25.466		24.31	-26.03	45668.54	-25.34		
alpha	I	2044-02-10T17:10:02.289		24.22	-25.94	44752.29	-23.83		
4	I	2044-02-10T17:11:45.398		23.96	-25.68	42527.60	-19.09		
5	I	2044-02-10T17:12:06.115		23.91	-25.63	42162.34	-18.22		
6	I	2044-02-10T17:12:20.973		23.87	-25.59	41873.38	-17.38		

No planet occultations

6	E	2044-02-10T17:22:12.528		22.34	-24.08	41879.19	17.37		
5	E	2044-02-10T17:22:31.512		22.29	-24.03	42205.13	18.21		
4	E	2044-02-10T17:22:49.683		22.25	-23.98	42531.94	19.09		
alpha	E	2044-02-10T17:24:31.999		21.98	-23.71	44739.28	23.82		
beta	E	2044-02-10T17:25:09.275		21.88	-23.62	45648.24	25.32		
eta	E	2044-02-10T17:26:07.068		21.72	-23.47	47176.12	27.49		
gamma	E	2044-02-10T17:26:23.373		21.68	-23.42	47628.99	28.07		
delta	E	2044-02-10T17:26:46.956		21.62	-23.36	48300.35	28.87		
lambda	E	2044-02-10T17:27:44.883		21.47	-23.21	50026.71	30.71		
epsilon	E	2044-02-10T17:28:33.026		21.34	-23.08	51538.70	32.17		