

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-01-29T19:33:06.450  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3425481266056419712  
 2Mass ID (if available) : 06093694+2341495

ICRS Star Coord at Epoch: 06h 09m 36.94186s +23:41:49.35820s

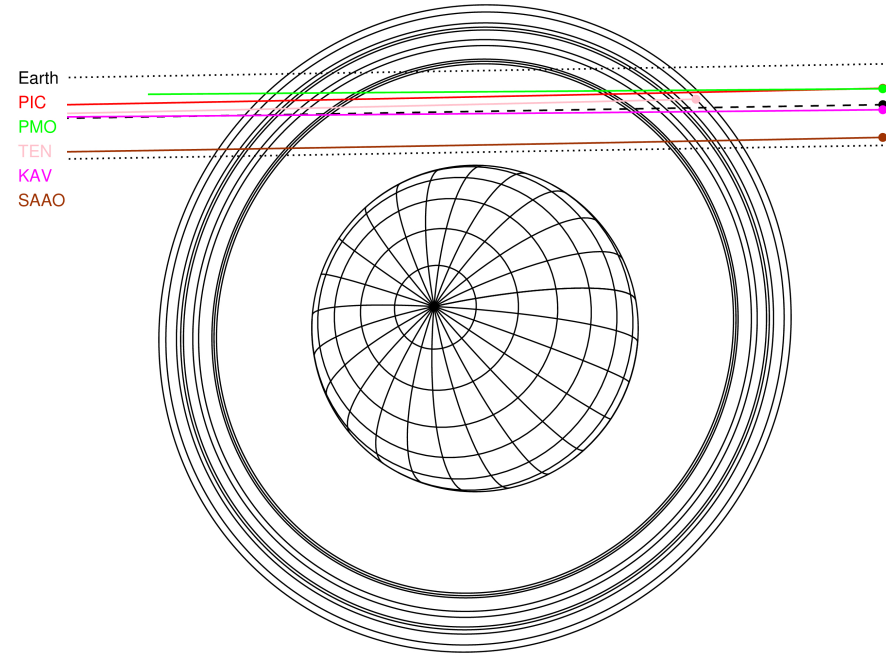
RUWE (>1.4 is poor) : 1.20  
 K magnitude : 14.367  
 G magnitude : 15.760  
 RP magnitude : 15.251  
 BP magnitude : 16.064  
 DUPflag : 0  
 Distance (au) : 18.154  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.31  
 Sun-Target sep (deg) : 142.71  
 Sun-Moon sep (deg) : 21.26  
 B (ring opening deg) : 73.43  
 PA of pole (deg) : 61.79

#	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



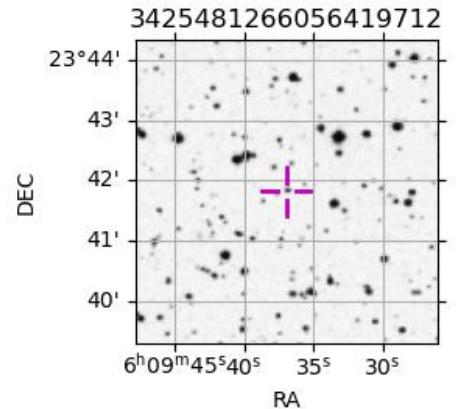
2034-01-29T19:33:06.4500 α: 06 09 36.9419 s: +23 41 49.358 C/A 2.588" PA 180.95 deg v\_sky -17.31 km/s D 18.15 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2034-01-29T19:33:06 K14.37 G15.76 XRgt

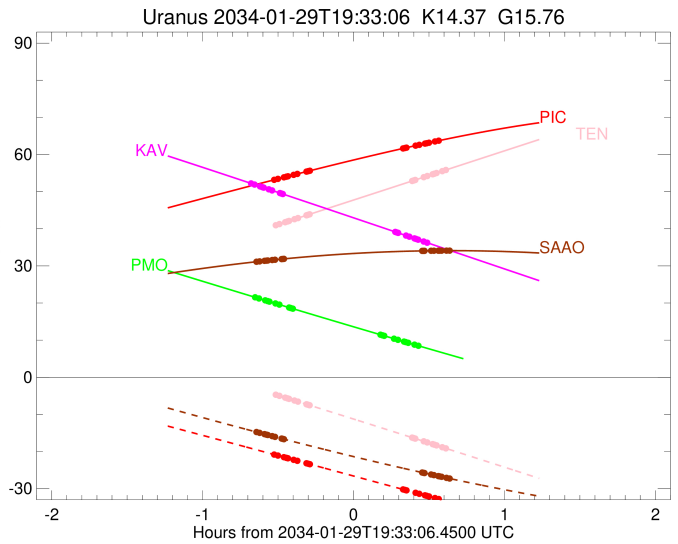
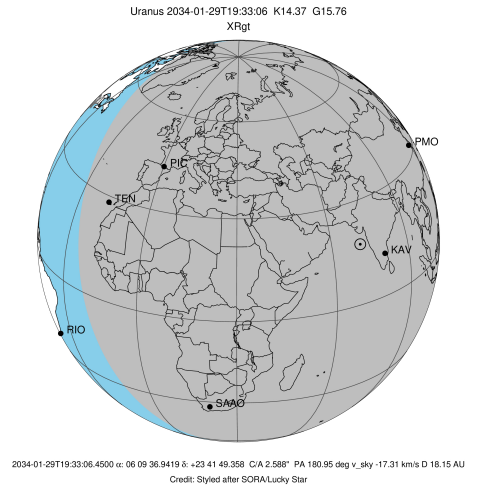


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	JAN 29 19:01 - JAN 29 20:06	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	JAN 29 18:54 - JAN 29 19:58	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	+++++		+++++	JAN 29 19:03 - JAN 29 20:09	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	JAN 29 18:52 - JAN 29 20:01	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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++		+++++	JAN 29 18:54 - JAN 29 20:10	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-01-29T19:35:30.770  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3425481266056419712  
 2Mass ID (if available) : 06093694+2341495  
 ICRS Star Coord at Epoch: 06h 09m 36.94186s +23:41:49.35820s  
 RUWE (>1.4 is poor) : 1.20  
 K magnitude : 14.367  
 G magnitude : 15.760  
 RP magnitude : 15.251  
 BP magnitude : 16.064  
 DUPflag : 0  
 Distance (au) : 18.154  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.31  
 Sun-Target sep (deg) : 142.71  
 Sun-Moon sep (deg) : 21.31  
 B (ring opening deg) : 73.43  
 PA of pole (deg) : 61.79  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.754  
 C/A sky separation (km) : 36266.0  
 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

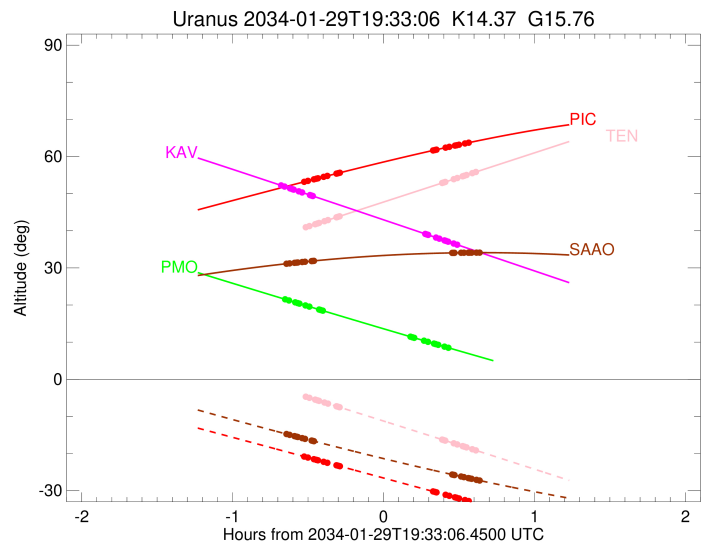
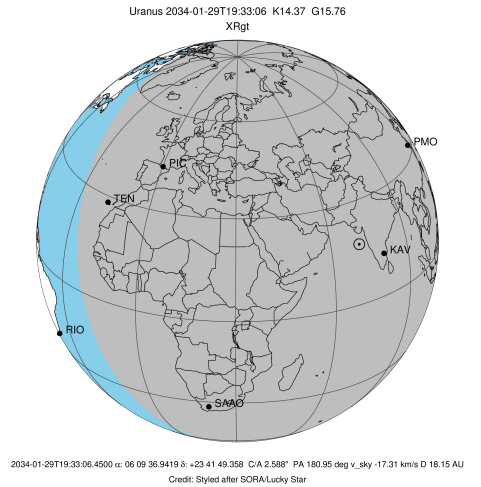


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-01-29T19:01:49.992		53.23	-20.87	50965.38	-12.54		
lambda	I	2034-01-29T19:03:05.069		53.45	-21.10	50026.71	-12.37		
delta	I	2034-01-29T19:05:27.609		53.86	-21.53	48300.35	-11.84		
gamma	I	2034-01-29T19:06:24.821		54.03	-21.71	47629.42	-11.61		
eta	I	2034-01-29T19:07:04.136		54.14	-21.83	47176.12	-11.45		
beta	I	2034-01-29T19:09:19.499		54.53	-22.24	45666.62	-10.85		
alpha	I	2034-01-29T19:10:51.435		54.79	-22.52	44688.95	-10.41		
4	I	2034-01-29T19:14:29.213		55.41	-23.18	42546.88	-9.22		
5	I	2034-01-29T19:14:54.608		55.49	-23.26	42314.62	-9.10		
6	I	2034-01-29T19:15:52.479		55.65	-23.44	41798.16	-8.76		

No planet occultations

6	E	2034-01-29T19:52:46.886		61.64	-30.21	41830.32	8.77		
5	E	2034-01-29T19:53:37.328		61.77	-30.36	42283.54	9.11		
4	E	2034-01-29T19:54:02.641		61.83	-30.44	42526.01	9.23		
alpha	E	2034-01-29T19:57:46.501		62.39	-31.12	44723.86	10.43		
beta	E	2034-01-29T19:59:16.224		62.61	-31.39	45681.23	10.87		
eta	E	2034-01-29T20:01:30.011		62.94	-31.80	47176.12	11.47		
gamma	E	2034-01-29T20:02:08.679		63.04	-31.92	47622.66	11.63		
delta	E	2034-01-29T20:03:06.376		63.18	-32.09	48300.35	11.86		
lambda	E	2034-01-29T20:05:28.658		63.52	-32.53	50026.71	12.40		
epsilon	E	2034-01-29T20:06:28.829		63.66	-32.71	50778.94	12.56		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-01-29T19:27:38.220  
 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 : 3425481266056419712  
 2Mass ID (if available) : 06093694+2341495  
 ICRS Star Coord at Epoch: 06h 09m 36.94186s +23:41:49.35820s  
 RUWE (>1.4 is poor) : 1.20  
 K magnitude : 14.367  
 G magnitude : 15.760  
 RP magnitude : 15.251  
 BP magnitude : 16.064  
 DUPflag : 0  
 Distance (au) : 18.154  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.31  
 Sun-Target sep (deg) : 142.71  
 Sun-Moon sep (deg) : 22.19  
 B (ring opening deg) : 73.43  
 PA of pole (deg) : 61.79  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.815  
 C/A sky separation (km) : 37062.1  
 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

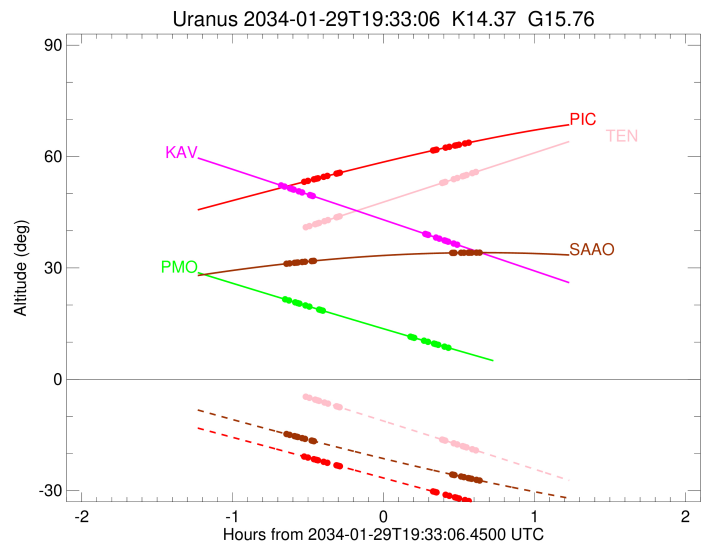
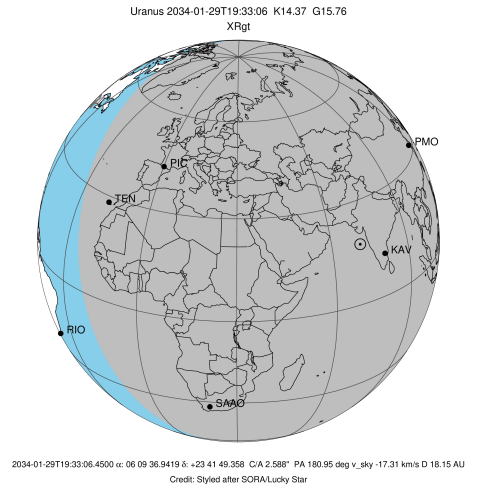


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-01-29T18:54:16.367		21.49	-52.05	50961.84	-12.11		
lambda	I	2034-01-29T18:55:33.889		21.22	-51.78	50026.71	-11.92		
delta	I	2034-01-29T18:58:02.138		20.72	-51.27	48300.35	-11.36		
gamma	I	2034-01-29T18:59:01.867		20.51	-51.06	47629.37	-11.11		
eta	I	2034-01-29T18:59:42.987		20.37	-50.92	47176.12	-10.93		
beta	I	2034-01-29T19:02:05.154		19.89	-50.42	45666.94	-10.29		
alpha	I	2034-01-29T19:03:42.381		19.56	-50.08	44689.26	-9.81		
4	I	2034-01-29T19:07:35.716		18.76	-49.27	42545.93	-8.52		
5	I	2034-01-29T19:08:03.070		18.67	-49.18	42314.86	-8.38		
6	I	2034-01-29T19:09:06.144		18.46	-48.96	41798.65	-8.00		

No planet occultations

6	E	2034-01-29T19:43:47.692		11.47	-41.65	41828.13	7.97		
5	E	2034-01-29T19:44:43.655		11.28	-41.45	42286.70	8.34		
4	E	2034-01-29T19:45:10.865		11.19	-41.35	42525.93	8.48		
alpha	E	2034-01-29T19:49:11.846		10.40	-40.50	44722.41	9.76		
beta	E	2034-01-29T19:50:47.531		10.08	-40.16	45681.20	10.24		
eta	E	2034-01-29T19:53:09.119		9.62	-39.66	47176.12	10.87		
gamma	E	2034-01-29T19:53:49.901		9.48	-39.52	47622.81	11.04		
delta	E	2034-01-29T19:54:50.608		9.28	-39.30	48300.35	11.28		
lambda	E	2034-01-29T19:57:19.867		8.79	-38.78	50026.71	11.84		
epsilon	E	2034-01-29T19:58:22.360		8.59	-38.56	50773.46	12.02		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-01-29T19:37:14.370  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3425481266056419712  
 2Mass ID (if available) : 06093694+2341495  
 ICRS Star Coord at Epoch: 06h 09m 36.94186s +23:41:49.35820s  
 RUWE (>1.4 is poor) : 1.20  
 K magnitude : 14.367  
 G magnitude : 15.760  
 RP magnitude : 15.251  
 BP magnitude : 16.064  
 DUPflag : 0  
 Distance (au) : 18.154  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.31  
 Sun-Target sep (deg) : 142.71  
 Sun-Moon sep (deg) : 20.98  
 B (ring opening deg) : 73.43  
 PA of pole (deg) : 61.79  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.665  
 C/A sky separation (km) : 35086.6  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

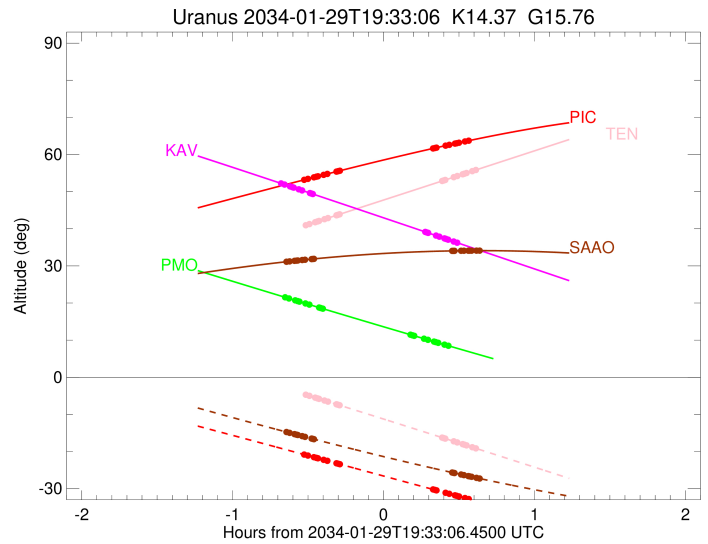
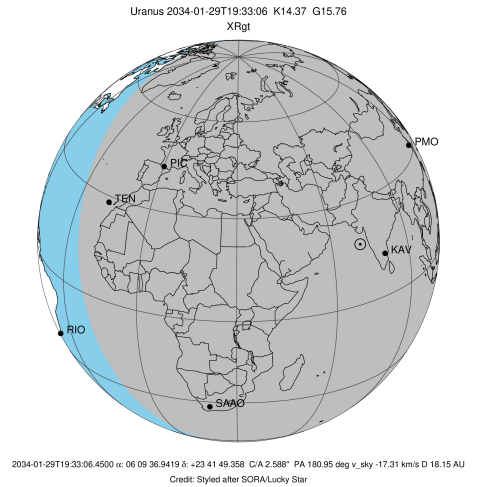


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-01-29T19:02:26.977		41.00	-4.75x	50976.40	-12.94		
lambda	I	2034-01-29T19:03:40.507		41.27	-5.01	50026.71	-12.80		
delta	I	2034-01-29T19:05:57.926		41.77	-5.49	48300.35	-12.32		
gamma	I	2034-01-29T19:06:52.825		41.97	-5.68	47629.57	-12.11		
eta	I	2034-01-29T19:07:30.481		42.11	-5.82	47176.12	-11.97		
beta	I	2034-01-29T19:09:39.505		42.58	-6.27	45665.85	-11.44		
alpha	I	2034-01-29T19:11:06.393		42.90	-6.57	44688.27	-11.05		
4	I	2034-01-29T19:14:29.140		43.64	-7.29	42548.81	-10.02		
5	I	2034-01-29T19:14:52.814		43.73	-7.37	42314.01	-9.92		
6	I	2034-01-29T19:15:45.735		43.92	-7.56	41797.33	-9.62		

No planet occultations

6	E	2034-01-29T19:56:24.117		52.87	-16.25	41832.79	9.65		
5	E	2034-01-29T19:57:09.517		53.04	-16.41	42279.87	9.94		
4	E	2034-01-29T19:57:33.156		53.13	-16.50	42526.23	10.05		
alpha	E	2034-01-29T20:01:01.657		53.90	-17.25	44725.45	11.08		
beta	E	2034-01-29T20:02:26.182		54.21	-17.55	45681.22	11.48		
eta	E	2034-01-29T20:04:33.413		54.68	-18.01	47176.12	12.01		
gamma	E	2034-01-29T20:05:10.353		54.81	-18.14	47622.50	12.16		
delta	E	2034-01-29T20:06:05.635		55.02	-18.34	48300.35	12.37		
lambda	E	2034-01-29T20:08:22.525		55.52	-18.84	50026.71	12.85		
epsilon	E	2034-01-29T20:09:21.112		55.74	-19.05	50785.11	13.00		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-01-29T19:28:26.800  
 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 : 3425481266056419712  
 2Mass ID (if available) : 06093694+2341495  
 ICRS Star Coord at Epoch: 06h 09m 36.94186s +23:41:49.35820s  
 RUWE (>1.4 is poor) : 1.20  
 K magnitude : 14.367  
 G magnitude : 15.760  
 RP magnitude : 15.251  
 BP magnitude : 16.064  
 DUPflag : 0  
 Distance (au) : 18.154  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.31  
 Sun-Target sep (deg) : 142.71  
 Sun-Moon sep (deg) : 22.14  
 B (ring opening deg) : 73.43  
 PA of pole (deg) : 61.79  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.555  
 C/A sky separation (km) : 33640.6  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



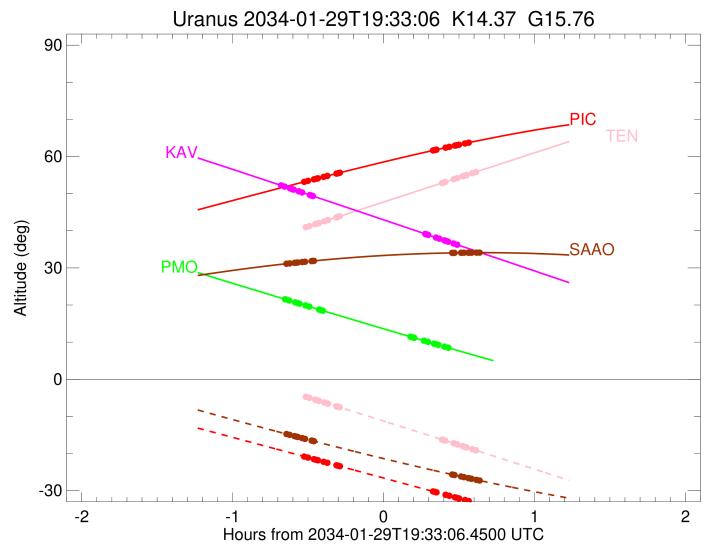
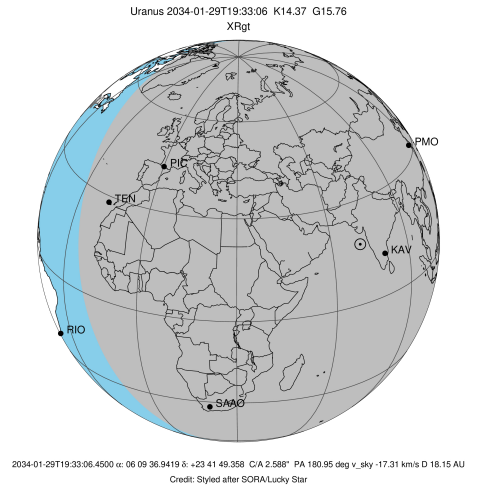
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-01-29T18:52:35.925		52.18	-84.60	50996.33	-13.53		
lambda	I	2034-01-29T18:53:47.658		51.91	-84.66	50026.71	-13.41		
delta	I	2034-01-29T18:55:58.459		51.41	-84.72	48300.35	-12.98		
gamma	I	2034-01-29T18:56:50.477		51.22	-84.74	47629.81	-12.80		
eta	I	2034-01-29T18:57:26.105		51.08	-84.74	47176.12	-12.67		
beta	I	2034-01-29T18:59:27.656		50.62	-84.73	45664.60	-12.20		
alpha	I	2034-01-29T19:00:48.815		50.32	-84.69	44687.33	-11.86		
4	I	2034-01-29T19:03:55.621		49.61	-84.54	42551.78	-10.97		
5	I	2034-01-29T19:04:17.699		49.53	-84.51	42312.74	-10.89		
6	I	2034-01-29T19:05:05.721		49.35	-84.46	41796.32	-10.63		

No planet occultations

6	E	2034-01-29T19:49:41.792		39.16	-76.42	41834.89	10.59		
5	E	2034-01-29T19:50:22.791		39.00	-76.27	42276.66	10.84		
4	E	2034-01-29T19:50:44.845		38.92	-76.19	42526.52	10.92		
alpha	E	2034-01-29T19:53:58.898		38.18	-75.47	44726.73	11.80		
beta	E	2034-01-29T19:55:18.450		37.87	-75.17	45681.19	12.14		
eta	E	2034-01-29T19:57:19.294		37.41	-74.71	47176.12	12.60		
gamma	E	2034-01-29T19:57:54.546		37.28	-74.58	47622.39	12.72		
delta	E	2034-01-29T19:58:47.458		37.07	-74.38	48300.35	12.90		
lambda	E	2034-01-29T20:00:59.079		36.57	-73.88	50026.71	13.32		
epsilon	E	2034-01-29T20:01:56.004		36.35	-73.66	50789.87	13.45		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-01-29T19:33:53.490  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3425481266056419712  
 2Mass ID (if available) : 06093694+2341495  
 ICRS Star Coord at Epoch: 06h 09m 36.94186s +23:41:49.35820s  
 RUWE (>1.4 is poor) : 1.20  
 K magnitude : 14.367  
 G magnitude : 15.760  
 RP magnitude : 15.251  
 BP magnitude : 16.064  
 DUPflag : 0  
 Distance (au) : 18.154  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.31  
 Sun-Target sep (deg) : 142.71  
 Sun-Moon sep (deg) : 21.17  
 B (ring opening deg) : 73.43  
 PA of pole (deg) : 61.79  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.181  
 C/A sky separation (km) : 28720.2  
 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



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	2034-01-29T18:54:40.515		31.13	-14.77	51040.57	-14.96		
lambda	I	2034-01-29T18:55:48.263		31.22	-14.98	50026.71	-14.89		
delta	I	2034-01-29T18:57:45.268		31.36	-15.32	48300.35	-14.61		
gamma	I	2034-01-29T18:58:31.302		31.42	-15.46	47630.30	-14.50		
eta	I	2034-01-29T18:59:02.722		31.45	-15.55	47176.12	-14.41		
beta	I	2034-01-29T19:00:48.900		31.58	-15.86	45661.77	-14.12		
alpha	I	2034-01-29T19:01:58.457		31.66	-16.07	44685.71	-13.90		
4	I	2034-01-29T19:04:34.394		31.84	-16.52	42558.79	-13.36		
5	I	2034-01-29T19:04:53.489		31.86	-16.58	42308.32	-13.32		
6	I	2034-01-29T19:05:32.287		31.90	-16.69	41794.96	-13.16		

No planet occultations

6	E	2034-01-29T20:00:24.105		34.04	-25.66	41842.94	13.16		
5	E	2034-01-29T20:00:55.650		34.05	-25.74	42263.33	13.32		
4	E	2034-01-29T20:01:14.906		34.05	-25.79	42528.58	13.36		
alpha	E	2034-01-29T20:03:56.992		34.08	-26.19	44732.03	13.91		
beta	E	2034-01-29T20:05:04.486		34.09	-26.36	45680.73	14.12		
eta	E	2034-01-29T20:06:49.280		34.10	-26.62	47176.12	14.42		
gamma	E	2034-01-29T20:07:20.112		34.10	-26.70	47621.89	14.50		
delta	E	2034-01-29T20:08:06.713		34.10	-26.81	48300.35	14.62		
lambda	E	2034-01-29T20:10:03.684		34.11	-27.09	50026.71	14.90		
epsilon	E	2034-01-29T20:10:56.595		34.11	-27.22	50817.92	14.96		