

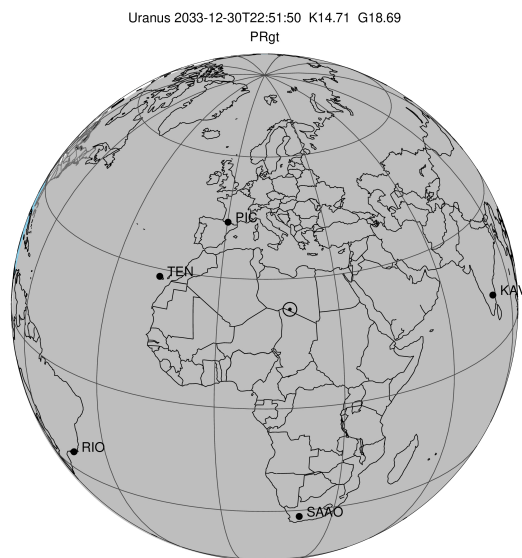
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-30T22:51:50.690  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3425247997793074304  
 2Mass ID (if available) : 06143793+2340107

ICRS Star Coord at Epoch: 06h 14m 37.95322s +23:40:10.77392s

RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.715  
 G magnitude : 18.692  
 RP magnitude : 17.542  
 BP magnitude : 20.120  
 DUPflag : 0  
 Distance (au) : 17.974  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.24  
 Sun-Target sep (deg) : 174.26  
 Sun-Moon sep (deg) : 58.86  
 B (ring opening deg) : 72.42  
 PA of pole (deg) : 64.07

# a(km) ring

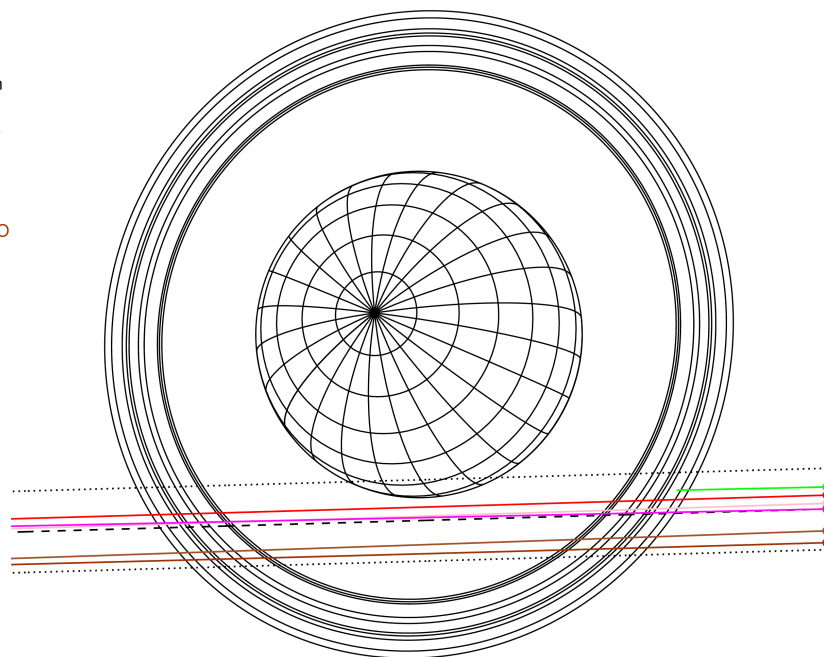
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2033-12-30T22:51:50.6900 α: 06 14 37.9532 δ: +23 40 10.774 C/A 2.227" PA 1.63 deg v\_sky -23.24 km/s D 17.97 AU  
 Credit: Styled after SORA/Lucky Star

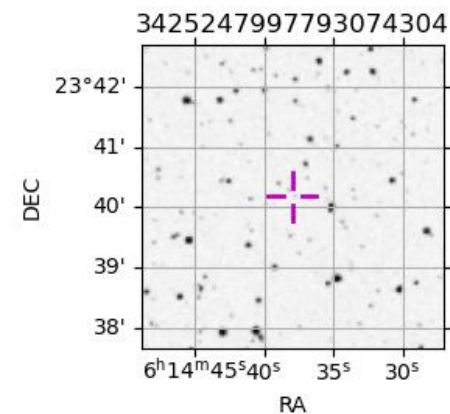
Uranus 2033-12-30T22:51:50 K14.71 G18.69 PRgt

Earth  
 PIC  
 PMO  
 TEN  
 KAV  
 RIO  
 SAAO

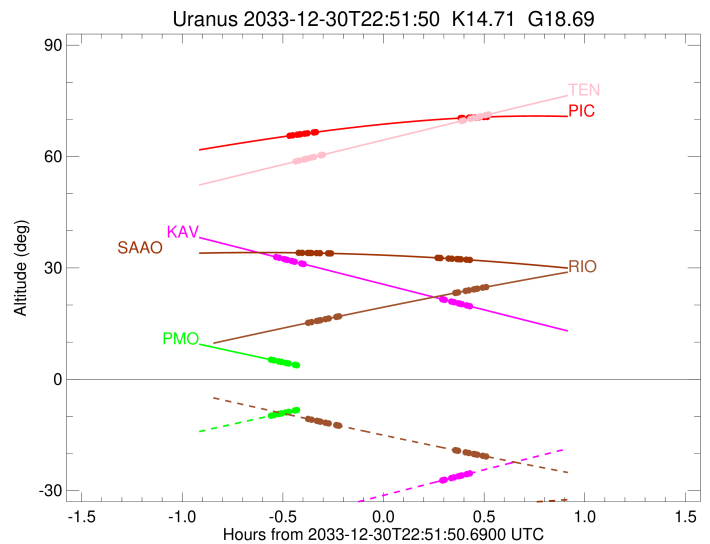
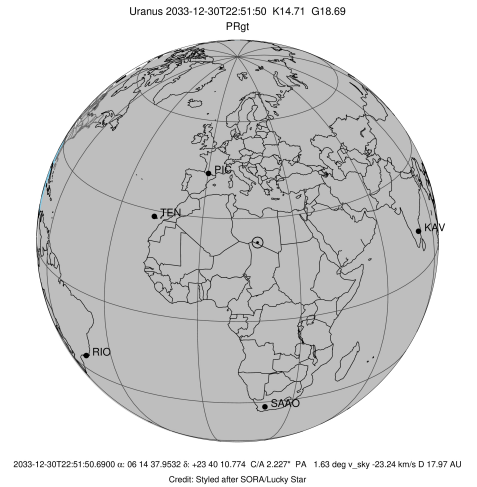


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 30 22:23 - DEC 30 23:22	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	++			DEC 30 22:18 - DEC 30 22:19	PnnRin
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	+++++		+++++	DEC 30 22:25 - DEC 30 23:23	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	DEC 30 22:19 - DEC 30 23:17	PnnRie
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	DEC 30 22:29 - DEC 30 23:22	PnnRie
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	+++++		+++++	DEC 30 22:26 - DEC 30 23:17	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-30T22:52:31.910  
 Event type : PRgt  
 : Uranus occs: not geocentric or 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 : 3425247997793074304  
 2Mass ID (if available) : 06143793+2340107  
 ICRS Star Coord at Epoch: 06h 14m 37.95322s +23:40:10.77392s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.715  
 G magnitude : 18.692  
 RP magnitude : 17.542  
 BP magnitude : 20.120  
 DUPflag : 0  
 Distance (au) : 17.974  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.24  
 Sun-Target sep (deg) : 174.26  
 Sun-Moon sep (deg) : 59.59  
 B (ring opening deg) : 72.42  
 PA of pole (deg) : 64.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.074  
 C/A sky separation (km) : 27040.6  
 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

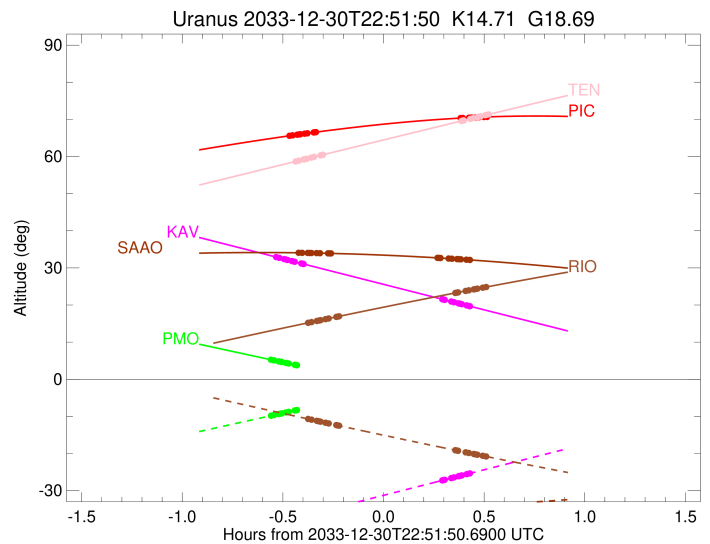
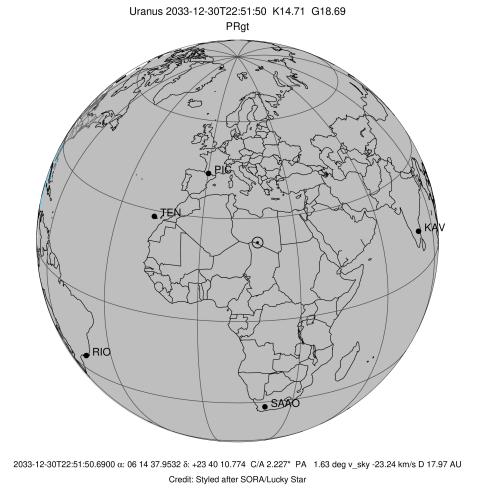


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-30T22:23:46.318		65.58	-61.68	51223.20	-20.80		
lambda	I	2033-12-30T22:24:44.399		65.71	-61.83	50026.71	-20.50		
delta	I	2033-12-30T22:26:09.266		65.89	-62.03	48300.35	-20.18		
gamma	I	2033-12-30T22:26:42.534		65.96	-62.12	47631.24	-20.05		
eta	I	2033-12-30T22:27:05.293		66.01	-62.17	47176.12	-19.95		
beta	I	2033-12-30T22:28:22.078		66.16	-62.36	45656.40	-19.60		
alpha	I	2033-12-30T22:29:12.074		66.27	-62.48	44684.63	-19.36		
4	I	2033-12-30T22:31:03.456		66.49	-62.74	42562.81	-18.78		
5	I	2033-12-30T22:31:16.293		66.52	-62.77	42306.12	-18.67		
6	I	2033-12-30T22:31:43.731		66.57	-62.84	41794.83	-18.51		

No planet occultations

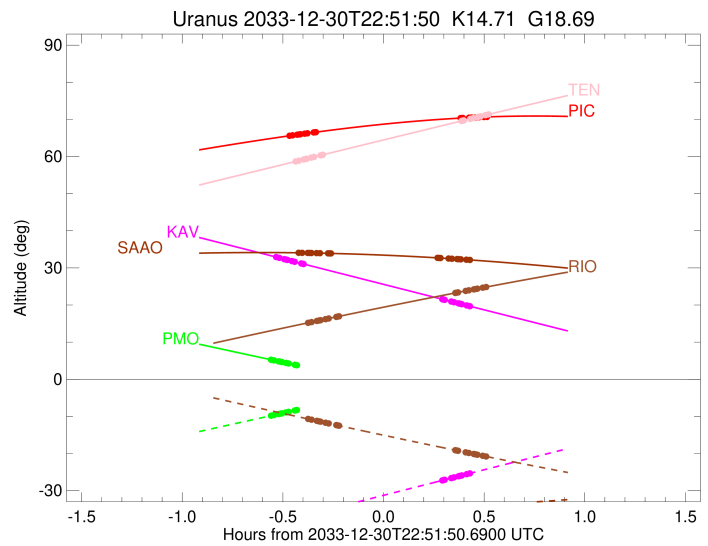
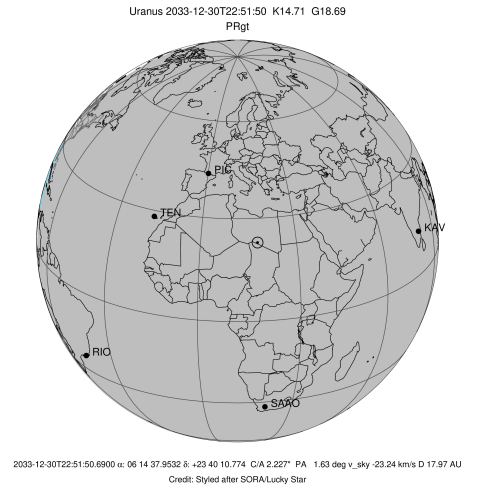
6	E	2033-12-30T23:14:49.390		70.35	-68.02	41840.86	18.52		
5	E	2033-12-30T23:15:07.903		70.37	-68.05	42186.56	18.68		
4	E	2033-12-30T23:15:30.693		70.39	-68.08	42616.57	18.79		
alpha	E	2033-12-30T23:17:21.389		70.47	-68.25	44726.11	19.37		
beta	E	2033-12-30T23:18:08.367		70.50	-68.32	45643.78	19.61		
eta	E	2033-12-30T23:19:25.810		70.56	-68.43	47176.12	19.96		
gamma	E	2033-12-30T23:19:48.309		70.57	-68.46	47626.31	20.06		
delta	E	2033-12-30T23:20:21.803		70.59	-68.51	48300.35	20.19		
lambda	E	2033-12-30T23:21:46.617		70.64	-68.62	50026.71	20.51		
epsilon	E	2033-12-30T23:22:56.734		70.68	-68.72	51473.51	20.82		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-30T22:48:19.590  
 Event type : PRgt  
 : Uranus occs: not geocentric or 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 : 3425247997793074304  
 2Mass ID (if available) : 06143793+2340107  
 ICRS Star Coord at Epoch: 06h 14m 37.95322s +23:40:10.77392s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.715  
 G magnitude : 18.692  
 RP magnitude : 17.542  
 BP magnitude : 20.120  
 DUPflag : 0  
 Distance (au) : 17.974  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.24  
 Sun-Target sep (deg) : 174.26  
 Sun-Moon sep (deg) : 59.26  
 B (ring opening deg) : 72.42  
 PA of pole (deg) : 64.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.938  
 C/A sky separation (km) : 25268.4  
 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	2033-12-30T22:18:15.966		5.27	-9.83	51209.76	-20.97		
lambda	I	2033-12-30T22:19:12.863		5.09	-9.64	50026.71	-20.71		
delta	I	2033-12-30T22:20:36.766		4.82x	-9.36	48300.35	-20.44		
gamma	I	2033-12-30T22:21:09.598		4.71x	-9.25	47631.17	-20.33		
eta	I	2033-12-30T22:21:32.030		4.64x	-9.18	47176.12	-20.24		
beta	I	2033-12-30T22:22:47.542		4.40x	-8.93	45657.21	-19.95		
alpha	I	2033-12-30T22:23:36.631		4.24x	-8.77	44684.71	-19.75		
4	I	2033-12-30T22:25:25.630		3.89x	-8.41	42560.73	-19.27		
5	I	2033-12-30T22:25:37.917		3.85x	-8.37	42307.80	-19.18		
6	I	2033-12-30T22:26:04.676		3.76x	-8.28	41795.01	-19.05		
Uranus	I	2033-12-30T22:46:28.870		-0.11x	-4.31x	25397.87		-9.46	-9.90
Uranus	E	2033-12-30T22:50:47.235		-0.91x	-3.48x	25498.08		-5.78	-6.06
6	E	2033-12-30T23:12:01.421		-4.81x	0.55x	41843.47	18.99		
5	E	2033-12-30T23:12:19.148		-4.87x	0.61x	42182.76	19.11		
4	E	2033-12-30T23:12:41.580		-4.94x	0.68x	42616.50	19.21		
alpha	E	2033-12-30T23:14:30.351		-5.26x	1.02x	44727.95	19.68		
beta	E	2033-12-30T23:15:16.581		-5.40x	1.16x	45644.36	19.88		
eta	E	2033-12-30T23:16:33.087		-5.63x	1.40x	47176.12	20.17		
gamma	E	2033-12-30T23:16:55.355		-5.70x	1.47x	47626.03	20.24		
delta	E	2033-12-30T23:17:28.573		-5.80x	1.57x	48300.35	20.36		
lambda	E	2033-12-30T23:18:52.828		-6.05x	1.83x	50026.71	20.62		
epsilon	E	2033-12-30T23:20:02.083		-6.25x	2.05x	51461.64	20.88		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-30T22:53:40.230  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : 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 : 3425247997793074304  
 2Mass ID (if available) : 06143793+2340107  
 ICRS Star Coord at Epoch: 06h 14m 37.95322s +23:40:10.77392s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.715  
 G magnitude : 18.692  
 RP magnitude : 17.542  
 BP magnitude : 20.120  
 DUPflag : 0  
 Distance (au) : 17.974  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.24  
 Sun-Target sep (deg) : 174.26  
 Sun-Moon sep (deg) : 59.43  
 B (ring opening deg) : 72.42  
 PA of pole (deg) : 64.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.183  
 C/A sky separation (km) : 28460.1  
 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

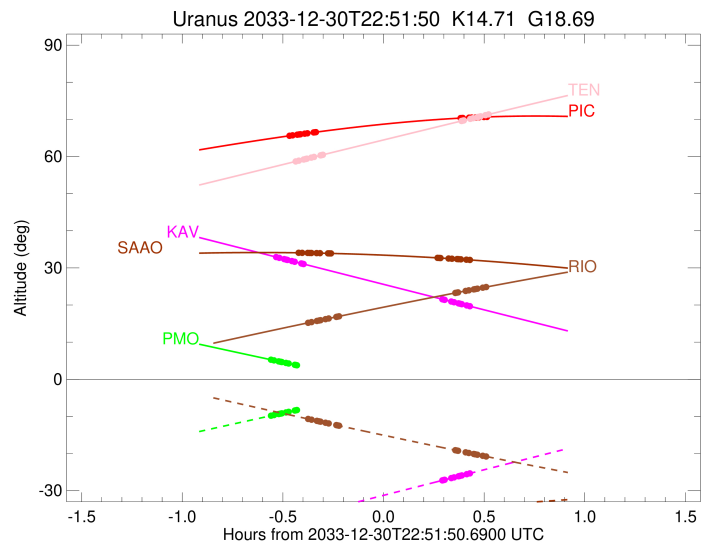
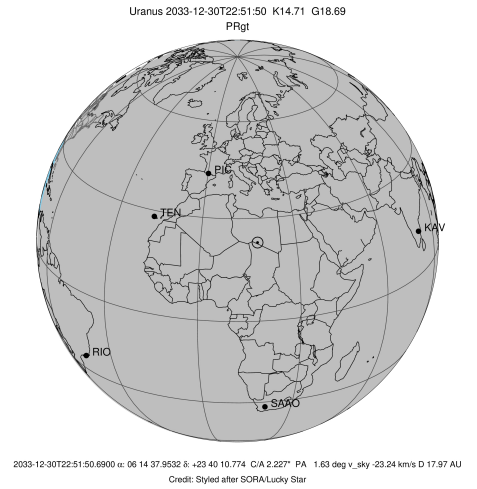


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-30T22:25:36.266		58.67	-53.04	51235.68	-20.37		
lambda	I	2033-12-30T22:26:36.262		58.89	-53.26	50026.71	-20.03		
delta	I	2033-12-30T22:28:03.201		59.21	-53.58	48300.35	-19.67		
gamma	I	2033-12-30T22:28:37.341		59.33	-53.70	47631.30	-19.52		
eta	I	2033-12-30T22:29:00.725		59.42	-53.79	47176.12	-19.41		
beta	I	2033-12-30T22:30:19.792		59.71	-54.08	45655.67	-19.01		
alpha	I	2033-12-30T22:31:11.355		59.90	-54.27	44684.61	-18.74		
4	I	2033-12-30T22:33:06.628		60.33	-54.69	42564.72	-18.07		
5	I	2033-12-30T22:33:20.199		60.38	-54.74	42304.44	-17.94		
6	I	2033-12-30T22:33:48.684		60.48	-54.85	41794.75	-17.77		

No planet occultations

6	E	2033-12-30T23:15:05.331		69.58	-63.93	41838.81	17.79		
5	E	2033-12-30T23:15:24.886		69.65	-64.01	42189.64	17.97		
4	E	2033-12-30T23:15:48.423		69.74	-64.09	42616.50	18.10		
alpha	E	2033-12-30T23:17:42.889		70.15	-64.51	44724.68	18.77		
beta	E	2033-12-30T23:18:31.375		70.33	-64.69	45643.37	19.04		
eta	E	2033-12-30T23:19:51.016		70.62	-64.98	47176.12	19.44		
gamma	E	2033-12-30T23:20:14.114		70.70	-65.06	47626.51	19.55		
delta	E	2033-12-30T23:20:48.439		70.83	-65.19	48300.35	19.71		
lambda	E	2033-12-30T23:22:15.219		71.15	-65.51	50026.71	20.07		
epsilon	E	2033-12-30T23:23:27.215		71.41	-65.77	51481.94	20.41		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-30T22:47:54.920  
 Event type : PRgt  
 : Uranus occs: not geocentric or 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 : 3425247997793074304  
 2Mass ID (if available) : 06143793+2340107  
 ICRS Star Coord at Epoch: 06h 14m 37.95322s +23:40:10.77392s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.715  
 G magnitude : 18.692  
 RP magnitude : 17.542  
 BP magnitude : 20.120  
 DUPflag : 0  
 Distance (au) : 17.974  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.24  
 Sun-Target sep (deg) : 174.26  
 Sun-Moon sep (deg) : 59.68  
 B (ring opening deg) : 72.42  
 PA of pole (deg) : 64.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.201  
 C/A sky separation (km) : 28687.3  
 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

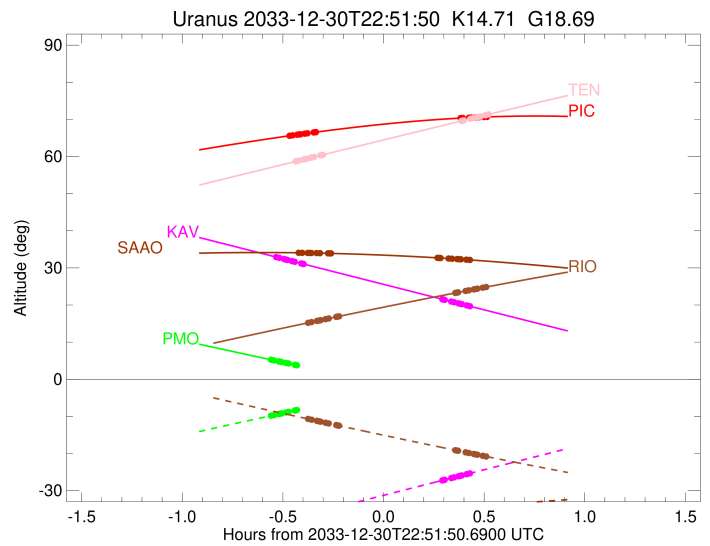
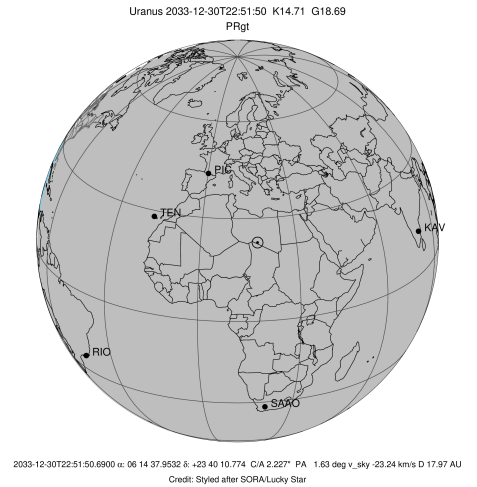


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-30T22:19:46.530		32.94	-38.64	51241.64	-20.21		
lambda	I	2033-12-30T22:20:47.304		32.70	-38.41	50026.71	-19.87		
delta	I	2033-12-30T22:22:14.982		32.37	-38.07	48300.35	-19.50		
gamma	I	2033-12-30T22:22:49.427		32.24	-37.94	47631.33	-19.34		
eta	I	2033-12-30T22:23:13.026		32.15	-37.85	47176.12	-19.23		
beta	I	2033-12-30T22:24:32.867		31.84	-37.54	45655.36	-18.83		
alpha	I	2033-12-30T22:25:24.941		31.64	-37.35	44684.62	-18.55		
4	I	2033-12-30T22:27:21.433		31.20	-36.90	42565.47	-17.87		
5	I	2033-12-30T22:27:35.255		31.14	-36.85	42303.74	-17.73		
6	I	2033-12-30T22:28:04.048		31.03	-36.74	41794.75	-17.55		

No planet occultations

6	E	2033-12-30T23:09:22.220		21.56	-27.24	41838.91	17.50		
5	E	2033-12-30T23:09:42.089		21.48	-27.17	42189.49	17.67		
4	E	2033-12-30T23:10:06.023		21.39	-27.08	42616.51	17.81		
alpha	E	2033-12-30T23:12:02.332		20.95	-26.63	44724.78	18.48		
beta	E	2033-12-30T23:12:51.566		20.76	-26.44	45643.41	18.76		
eta	E	2033-12-30T23:14:12.414		20.45	-26.13	47176.12	19.16		
gamma	E	2033-12-30T23:14:35.857		20.36	-26.04	47626.50	19.27		
delta	E	2033-12-30T23:15:10.692		20.23	-25.91	48300.35	19.42		
lambda	E	2033-12-30T23:16:38.741		19.89	-25.57	50026.71	19.79		
epsilon	E	2033-12-30T23:17:51.724		19.62	-25.29	51480.93	20.12		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-30T22:55:02.120  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 3425247997793074304  
 2Mass ID (if available) : 06143793+2340107  
 ICRS Star Coord at Epoch: 06h 14m 37.95322s +23:40:10.77392s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.715  
 G magnitude : 18.692  
 RP magnitude : 17.542  
 BP magnitude : 20.120  
 DUPflag : 0  
 Distance (au) : 17.974  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.24  
 Sun-Target sep (deg) : 174.26  
 Sun-Moon sep (deg) : 58.75  
 B (ring opening deg) : 72.42  
 PA of pole (deg) : 64.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.526  
 C/A sky separation (km) : 32928.0  
 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

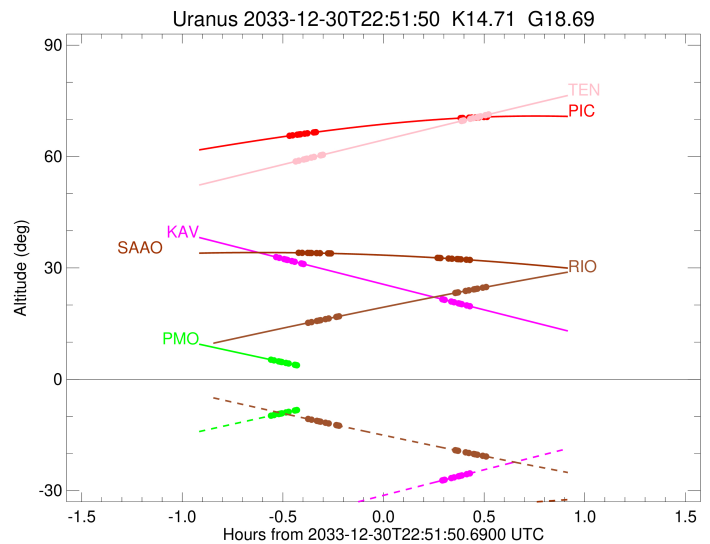
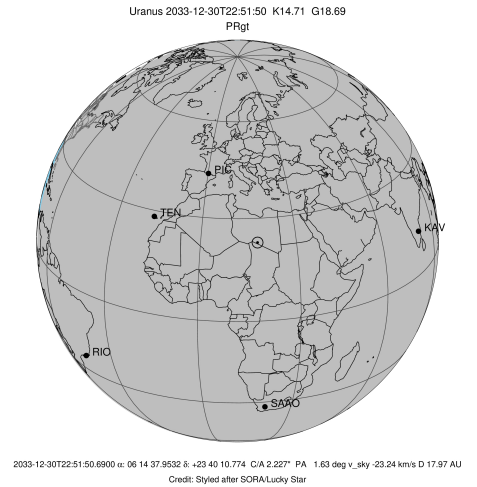


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-30T22:29:16.113		15.19	-10.67	51277.89	-18.65		
lambda	I	2033-12-30T22:30:24.255		15.41	-10.89	50026.71	-18.19		
delta	I	2033-12-30T22:32:00.559		15.71	-11.21	48300.35	-17.66		
gamma	I	2033-12-30T22:32:38.686		15.83	-11.34	47631.47	-17.43		
eta	I	2033-12-30T22:33:04.932		15.92	-11.42	47176.12	-17.27		
beta	I	2033-12-30T22:34:34.574		16.20	-11.72	45653.16	-16.67		
alpha	I	2033-12-30T22:35:33.533		16.38	-11.91	44684.98	-16.26		
4	I	2033-12-30T22:37:47.813		16.81	-12.35	42571.63	-15.22		
5	I	2033-12-30T22:38:05.029		16.86	-12.40	42297.35	-15.02		
6	I	2033-12-30T22:38:38.732		16.97	-12.51	41795.17	-14.74		

No planet occultations

6	E	2033-12-30T23:13:14.048		23.25	-19.11	41831.82	14.78		
5	E	2033-12-30T23:13:38.757		23.32	-19.19	42200.84	15.05		
4	E	2033-12-30T23:14:06.085		23.40	-19.27	42615.56	15.26		
alpha	E	2033-12-30T23:16:19.405		23.79	-19.68	44719.84	16.30		
beta	E	2033-12-30T23:17:15.171		23.95	-19.85	45642.25	16.72		
eta	E	2033-12-30T23:18:45.286		24.21	-20.13	47176.12	17.32		
gamma	E	2033-12-30T23:19:11.212		24.28	-20.21	47627.19	17.48		
delta	E	2033-12-30T23:19:49.471		24.39	-20.32	48300.35	17.71		
lambda	E	2033-12-30T23:21:25.476		24.67	-20.61	50026.71	18.25		
epsilon	E	2033-12-30T23:22:45.653		24.90	-20.86	51506.13	18.71		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-30T22:51:09.040  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : 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 : 3425247997793074304  
 2Mass ID (if available) : 06143793+2340107  
 ICRS Star Coord at Epoch: 06h 14m 37.95322s +23:40:10.77392s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.715  
 G magnitude : 18.692  
 RP magnitude : 17.542  
 BP magnitude : 20.120  
 DUPflag : 0  
 Distance (au) : 17.974  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.24  
 Sun-Target sep (deg) : 174.26  
 Sun-Moon sep (deg) : 59.40  
 B (ring opening deg) : 72.42  
 PA of pole (deg) : 64.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.635  
 C/A sky separation (km) : 34347.9  
 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	2033-12-30T22:26:25.525		34.07	-34.62	51294.61	-18.20		
lambda	I	2033-12-30T22:27:36.446		34.05	-34.63	50026.71	-17.68		
delta	I	2033-12-30T22:29:15.782		34.03	-34.65	48300.35	-17.07		
gamma	I	2033-12-30T22:29:55.262		34.02	-34.66	47631.52	-16.81		
eta	I	2033-12-30T22:30:22.502		34.01	-34.66	47176.12	-16.62		
beta	I	2033-12-30T22:31:55.987		33.99	-34.68	45652.18	-15.94		
alpha	I	2033-12-30T22:32:57.752		33.97	-34.69	44685.31	-15.46		
4	I	2033-12-30T22:35:19.863		33.92	-34.70	42574.45	-14.24		
5	I	2033-12-30T22:35:38.799		33.92	-34.70	42294.01	-14.00		
6	I	2033-12-30T22:36:14.774		33.90	-34.70	41795.65	-13.68		

No planet occultations

6	E	2033-12-30T23:07:56.037		32.71	-34.30	41829.65	13.67		
5	E	2033-12-30T23:08:23.112		32.68	-34.28	42204.51	14.00		
4	E	2033-12-30T23:08:52.183		32.66	-34.27	42615.04	14.23		
alpha	E	2033-12-30T23:11:13.766		32.53	-34.19	44718.41	15.46		
beta	E	2033-12-30T23:12:12.517		32.47	-34.16	45642.00	15.93		
eta	E	2033-12-30T23:13:46.763		32.38	-34.11	47176.12	16.62		
gamma	E	2033-12-30T23:14:13.771		32.35	-34.09	47627.38	16.80		
delta	E	2033-12-30T23:14:53.519		32.31	-34.07	48300.35	17.06		
lambda	E	2033-12-30T23:16:32.912		32.21	-34.01	50026.71	17.67		
epsilon	E	2033-12-30T23:17:55.877		32.13	-33.96	51511.78	18.19		