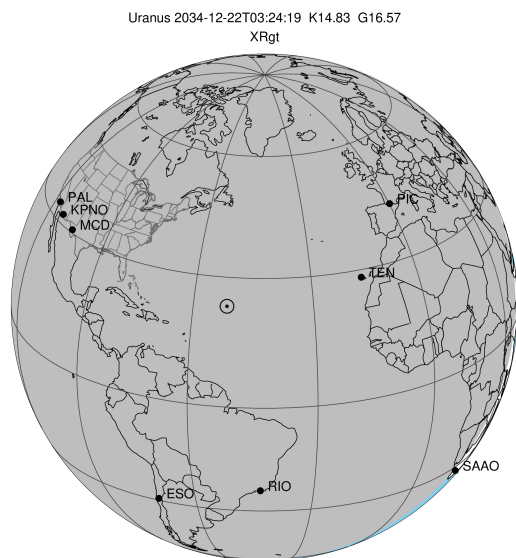


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:24:19.180  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096

ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s

RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 54.25  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92

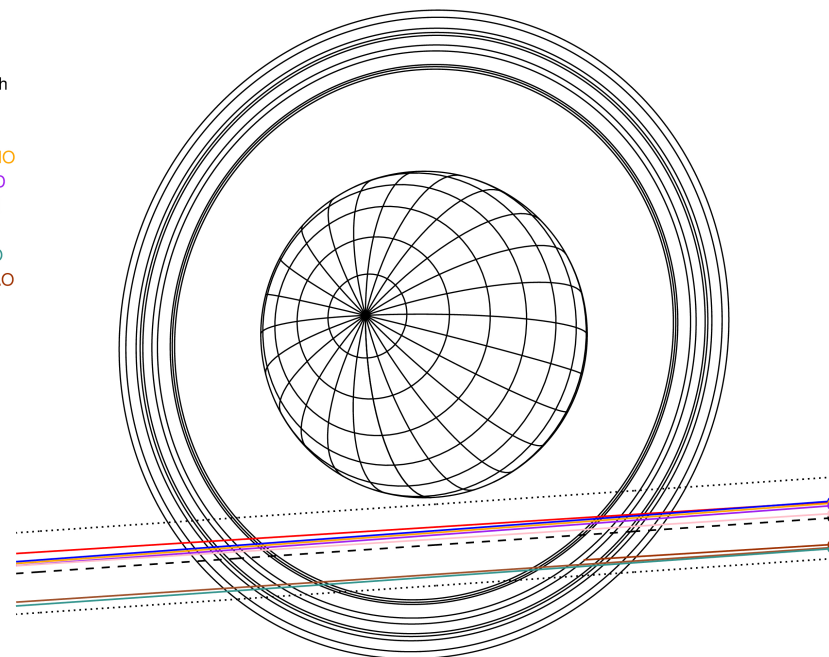
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2034-12-22T03:24:19.1800 α: 06 36 35.8122 δ: +23 30 10.059 C/A 2.532" PA 3.90 deg v\_sky -23.04 km/s D 17.92 AU  
 Credit: Styled after SORA/Lucky Star

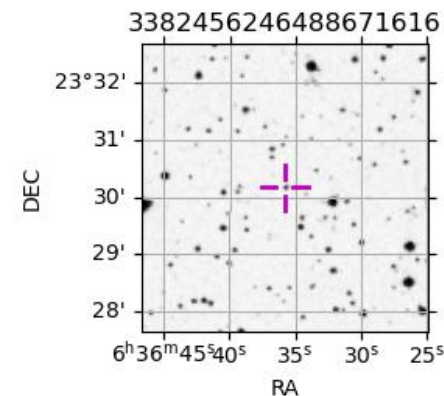
Uranus 2034-12-22T03:24:19 K14.83 G16.57 XRgt

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 RIO  
 ESO  
 SAAO

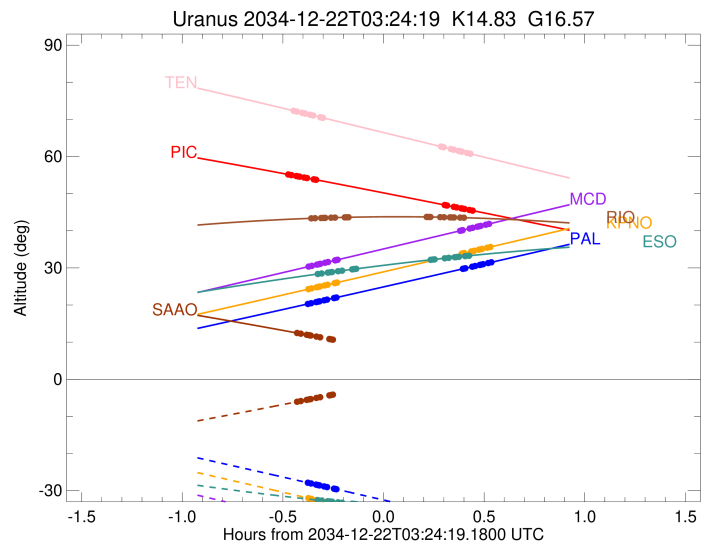
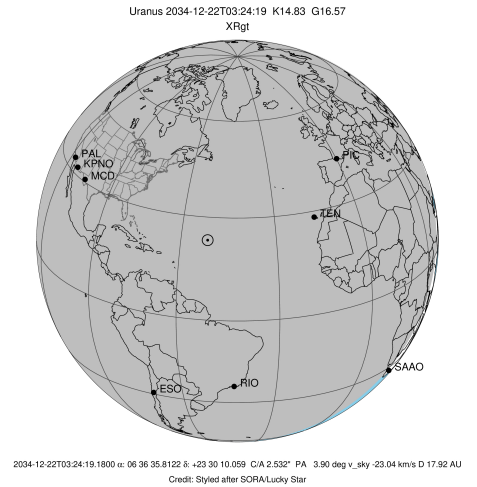


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 22 02:55 - DEC 22 03:50	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	DEC 22 03:01 - DEC 22 03:56	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 22 03:01 - DEC 22 03:55	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 22 03:01 - DEC 22 03:55	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 22 02:57 - DEC 22 03:49	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	DEC 22 03:02 - DEC 22 03:47	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	DEC 22 03:04 - DEC 22 03:49	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++			DEC 22 02:58 - DEC 22 03:04	PnnRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:22:18.240  
 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 : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096  
 ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 55.17  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.325  
 C/A sky separation (km) : 30212.1  
 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

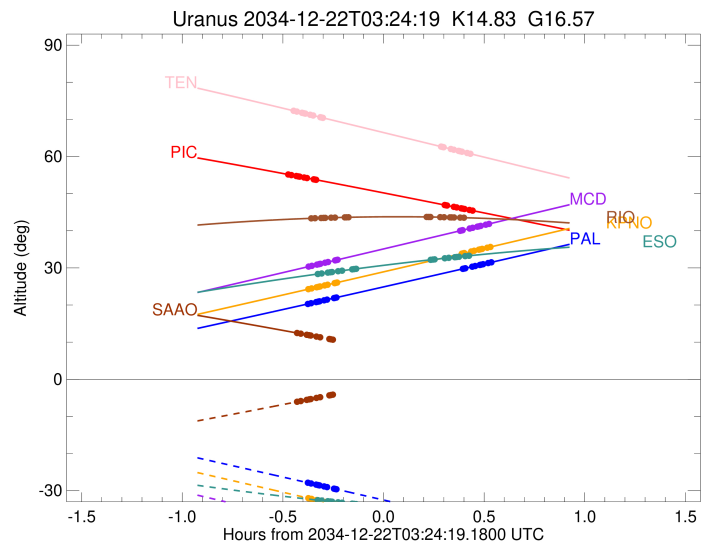
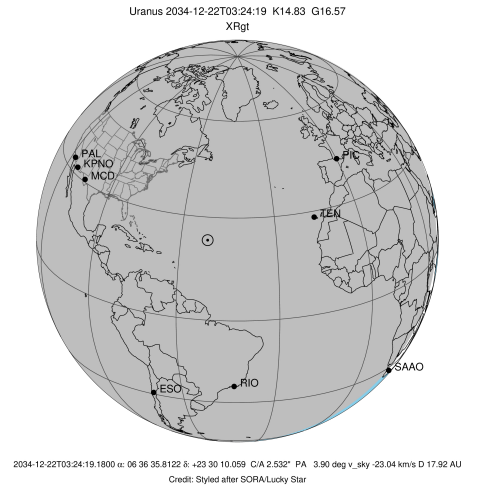


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-22T02:55:43.010		55.20	-48.65	51402.83	-19.95		
lambda	I	2034-12-22T02:56:52.183		55.00	-48.44	50026.71	-19.74		
delta	I	2034-12-22T02:58:20.599		54.75	-48.18	48300.35	-19.31		
gamma	I	2034-12-22T02:58:55.784		54.65	-48.07	47624.31	-19.12		
eta	I	2034-12-22T02:59:19.302		54.58	-48.00	47176.12	-18.99		
beta	I	2034-12-22T03:00:40.401		54.35	-47.76	45653.47	-18.51		
alpha	I	2034-12-22T03:01:32.132		54.20	-47.61	44702.69	-18.21		
4	I	2034-12-22T03:03:32.634		53.85	-47.25	42555.06	-17.33		
5	I	2034-12-22T03:03:52.497		53.80	-47.19	42228.57	-17.24		
6	I	2034-12-22T03:04:15.036		53.73	-47.12	41839.80	-17.01		

No planet occultations

6	E	2034-12-22T03:42:30.432		46.95	-40.17	41795.08	16.98		
5	E	2034-12-22T03:43:00.723		46.86	-40.07	42314.67	17.21		
4	E	2034-12-22T03:43:12.952		46.82	-40.04	42528.47	17.30		
alpha	E	2034-12-22T03:45:17.992		46.45	-39.66	44749.55	18.17		
beta	E	2034-12-22T03:46:06.613		46.30	-39.51	45643.50	18.48		
eta	E	2034-12-22T03:47:28.485		46.05	-39.26	47176.12	18.96		
gamma	E	2034-12-22T03:47:52.424		45.98	-39.18	47631.48	19.09		
delta	E	2034-12-22T03:48:27.302		45.87	-39.08	48300.35	19.27		
lambda	E	2034-12-22T03:49:55.897		45.61	-38.81	50026.71	19.70		
epsilon	E	2034-12-22T03:50:33.642		45.49	-38.69	50773.37	19.91		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:28:00.940  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096  
 ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 54.12  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.368  
 C/A sky separation (km) : 30774.9  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

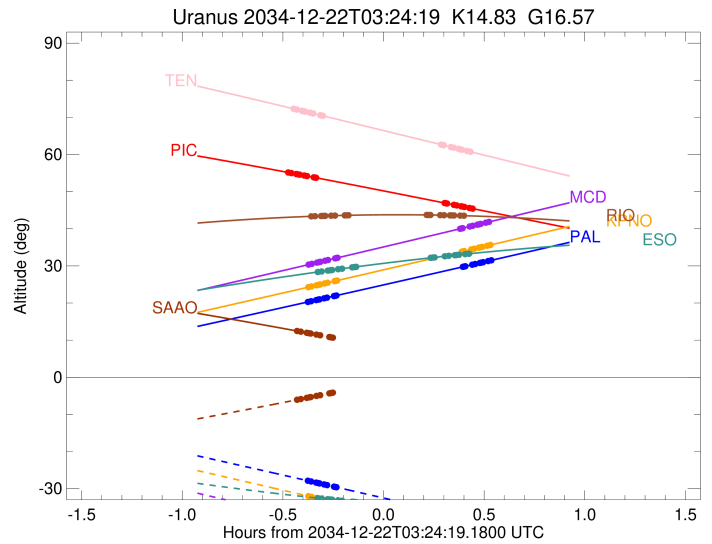
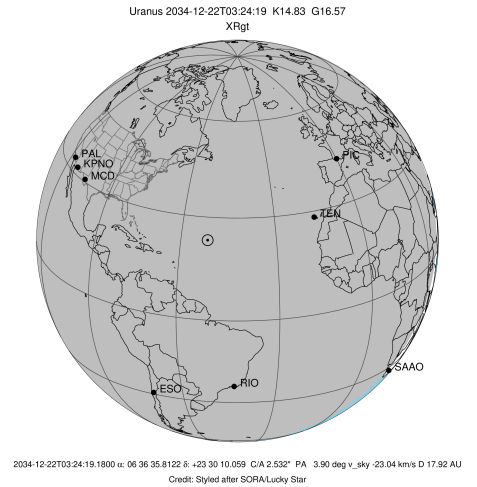


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-22T03:01:34.258		20.25	-27.83	51401.47	-19.56		
lambda	I	2034-12-22T03:02:44.760		20.49	-28.07	50026.71	-19.34		
delta	I	2034-12-22T03:04:15.056		20.79	-28.38	48300.35	-18.89		
gamma	I	2034-12-22T03:04:51.021		20.91	-28.51	47624.34	-18.70		
eta	I	2034-12-22T03:05:15.076		20.99	-28.59	47176.12	-18.57		
beta	I	2034-12-22T03:06:38.108		21.28	-28.87	45653.33	-18.07		
alpha	I	2034-12-22T03:07:31.123		21.45	-29.06	44702.94	-17.75		
4	I	2034-12-22T03:09:34.986		21.87	-29.48	42554.63	-16.83		
5	I	2034-12-22T03:09:55.364		21.94	-29.55	42229.40	-16.74		
6	I	2034-12-22T03:10:18.673		22.02	-29.63	41839.35	-16.49		

No planet occultations

6	E	2034-12-22T03:47:56.001		29.74	-37.42	41795.26	16.54		
5	E	2034-12-22T03:48:27.061		29.84	-37.53	42314.34	16.78		
4	E	2034-12-22T03:48:39.592		29.89	-37.57	42528.04	16.88		
alpha	E	2034-12-22T03:50:47.489		30.33	-38.02	44749.15	17.80		
beta	E	2034-12-22T03:51:37.104		30.50	-38.19	45643.25	18.13		
eta	E	2034-12-22T03:53:00.497		30.78	-38.48	47176.12	18.63		
gamma	E	2034-12-22T03:53:24.846		30.87	-38.56	47631.45	18.77		
delta	E	2034-12-22T03:54:00.304		30.99	-38.69	48300.35	18.96		
lambda	E	2034-12-22T03:55:30.264		31.30	-39.00	50026.71	19.41		
epsilon	E	2034-12-22T03:56:08.744		31.43	-39.13	50777.20	19.64		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:27:56.710  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096  
 ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 54.18  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.392  
 C/A sky separation (km) : 31083.7  
 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

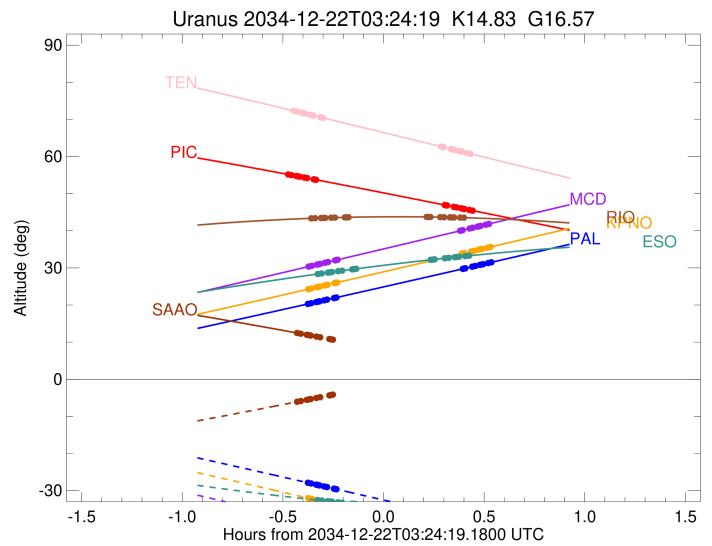
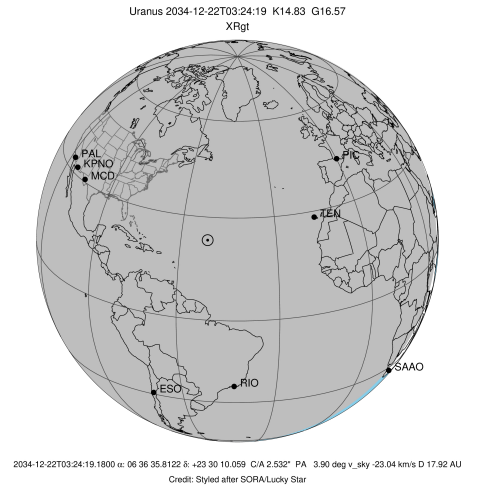


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-22T03:01:42.904		24.23	-31.98	51398.95	-19.48		
lambda	I	2034-12-22T03:02:53.599		24.47	-32.23	50026.71	-19.25		
delta	I	2034-12-22T03:04:24.367		24.79	-32.55	48300.35	-18.79		
gamma	I	2034-12-22T03:05:00.539		24.91	-32.68	47624.39	-18.59		
eta	I	2034-12-22T03:05:24.744		25.00	-32.76	47176.12	-18.45		
beta	I	2034-12-22T03:06:48.346		25.29	-33.05	45653.16	-17.94		
alpha	I	2034-12-22T03:07:41.743		25.47	-33.24	44703.24	-17.61		
4	I	2034-12-22T03:09:46.773		25.90	-33.68	42554.17	-16.66		
5	I	2034-12-22T03:10:07.279		25.98	-33.75	42230.30	-16.56		
6	I	2034-12-22T03:10:30.929		26.06	-33.83	41838.86	-16.31		

No planet occultations

6	E	2034-12-22T03:47:36.472		33.83	-41.66	41795.34	16.36		
5	E	2034-12-22T03:48:07.863		33.94	-41.77	42314.21	16.61		
4	E	2034-12-22T03:48:20.524		33.98	-41.81	42527.90	16.71		
alpha	E	2034-12-22T03:50:29.592		34.43	-42.27	44749.01	17.66		
beta	E	2034-12-22T03:51:19.595		34.61	-42.45	45643.17	18.00		
eta	E	2034-12-22T03:52:43.564		34.90	-42.74	47176.12	18.51		
gamma	E	2034-12-22T03:53:08.064		34.99	-42.83	47631.44	18.65		
delta	E	2034-12-22T03:53:43.733		35.12	-42.96	48300.35	18.85		
lambda	E	2034-12-22T03:55:14.171		35.43	-43.28	50026.71	19.32		
epsilon	E	2034-12-22T03:55:52.898		35.57	-43.41	50778.42	19.55		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:27:45.730  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096  
 ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 54.28  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.420  
 C/A sky separation (km) : 31448.6  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



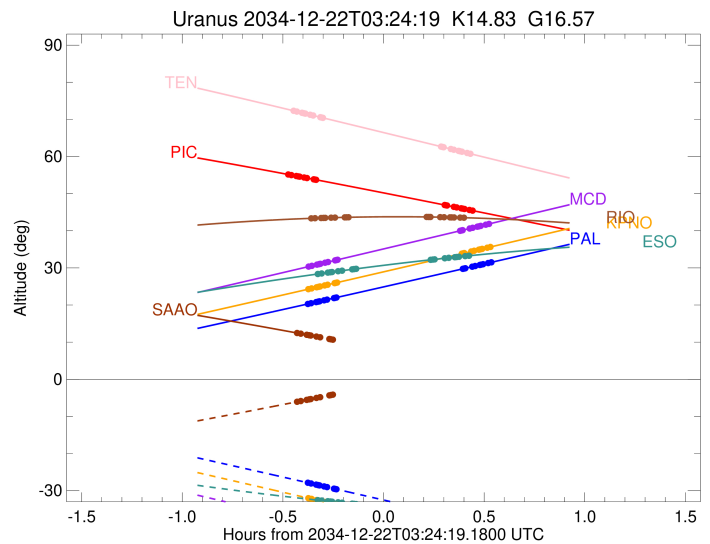
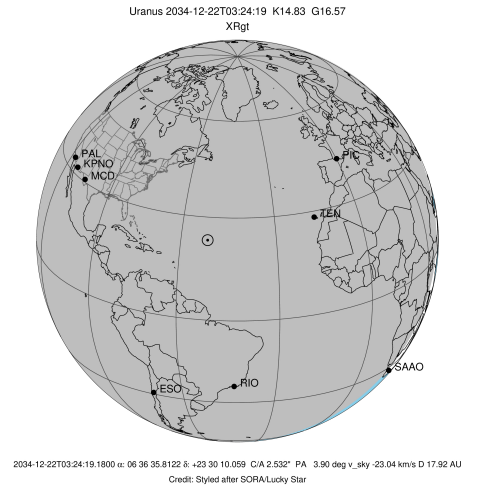
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-22T03:01:47.751		30.31	-38.24	51395.87	-19.38		
lambda	I	2034-12-22T03:02:58.657		30.56	-38.49	50026.71	-19.14		
delta	I	2034-12-22T03:04:29.974		30.88	-38.81	48300.35	-18.66		
gamma	I	2034-12-22T03:05:06.389		31.01	-38.94	47624.44	-18.46		
eta	I	2034-12-22T03:05:30.770		31.10	-39.03	47176.12	-18.32		
beta	I	2034-12-22T03:06:55.046		31.40	-39.33	45652.94	-17.79		
alpha	I	2034-12-22T03:07:48.896		31.59	-39.52	44703.60	-17.44		
4	I	2034-12-22T03:09:55.334		32.04	-39.97	42553.61	-16.46		
5	I	2034-12-22T03:10:15.993		32.11	-40.05	42231.38	-16.35		
6	I	2034-12-22T03:10:40.059		32.20	-40.13	41838.27	-16.10		

No planet occultations

6	E	2034-12-22T03:47:06.708		39.99	-47.96	41795.43	16.14		
5	E	2034-12-22T03:47:38.501		40.10	-48.07	42314.04	16.40		
4	E	2034-12-22T03:47:51.323		40.15	-48.12	42527.73	16.51		
alpha	E	2034-12-22T03:50:01.810		40.61	-48.59	44748.84	17.49		
beta	E	2034-12-22T03:50:52.281		40.79	-48.77	45643.07	17.84		
eta	E	2034-12-22T03:52:16.938		41.10	-49.07	47176.12	18.38		
gamma	E	2034-12-22T03:52:41.618		41.19	-49.16	47631.42	18.52		
delta	E	2034-12-22T03:53:17.536		41.31	-49.29	48300.35	18.73		
lambda	E	2034-12-22T03:54:48.541		41.64	-49.61	50026.71	19.21		
epsilon	E	2034-12-22T03:55:27.558		41.78	-49.75	50779.87	19.45		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:22:43.230  
 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 : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096  
 ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 55.23  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.471  
 C/A sky separation (km) : 32103.8  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

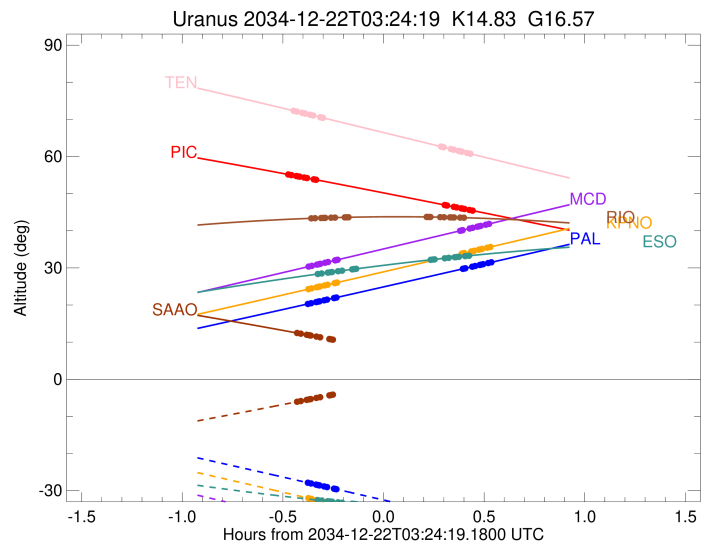
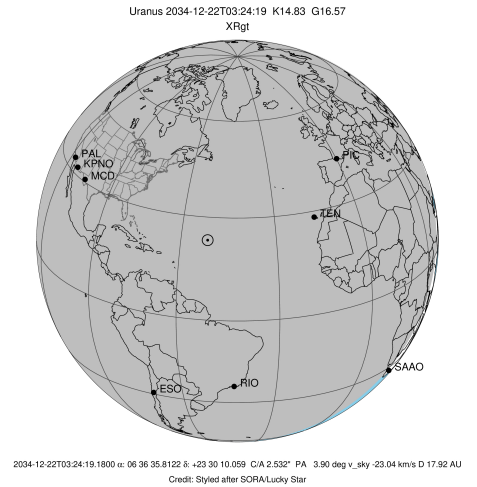


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-22T02:57:19.687		72.37	-64.20	51387.68	-19.31		
lambda	I	2034-12-22T02:58:30.438		72.11	-63.94	50026.71	-19.05		
delta	I	2034-12-22T03:00:02.248		71.78	-63.60	48300.35	-18.54		
gamma	I	2034-12-22T03:00:38.905		71.65	-63.47	47624.58	-18.33		
eta	I	2034-12-22T03:01:03.480		71.56	-63.38	47176.12	-18.17		
beta	I	2034-12-22T03:02:28.558		71.25	-63.07	45652.42	-17.60		
alpha	I	2034-12-22T03:03:22.946		71.05	-62.87	44704.51	-17.23		
4	I	2034-12-22T03:05:31.410		70.58	-62.39	42552.29	-16.17		
5	I	2034-12-22T03:05:52.194		70.51	-62.32	42233.97	-16.06		
6	I	2034-12-22T03:06:16.990		70.42	-62.23	41836.87	-15.78		

No planet occultations

6	E	2034-12-22T03:41:25.940		62.69	-54.48	41795.56	15.76		
5	E	2034-12-22T03:41:58.449		62.57	-54.36	42313.83	16.04		
4	E	2034-12-22T03:42:11.555		62.52	-54.32	42527.56	16.16		
alpha	E	2034-12-22T03:44:24.501		62.03	-53.83	44748.66	17.21		
beta	E	2034-12-22T03:45:15.766		61.84	-53.64	45642.97	17.58		
eta	E	2034-12-22T03:46:41.582		61.53	-53.32	47176.12	18.15		
gamma	E	2034-12-22T03:47:06.564		61.43	-53.23	47631.41	18.30		
delta	E	2034-12-22T03:47:42.899		61.30	-53.10	48300.35	18.52		
lambda	E	2034-12-22T03:49:14.843		60.96	-52.76	50026.71	19.03		
epsilon	E	2034-12-22T03:49:54.284		60.82	-52.62	50781.12	19.28		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:24:11.580  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096  
 ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 54.80  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.894  
 C/A sky separation (km) : 37605.3  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

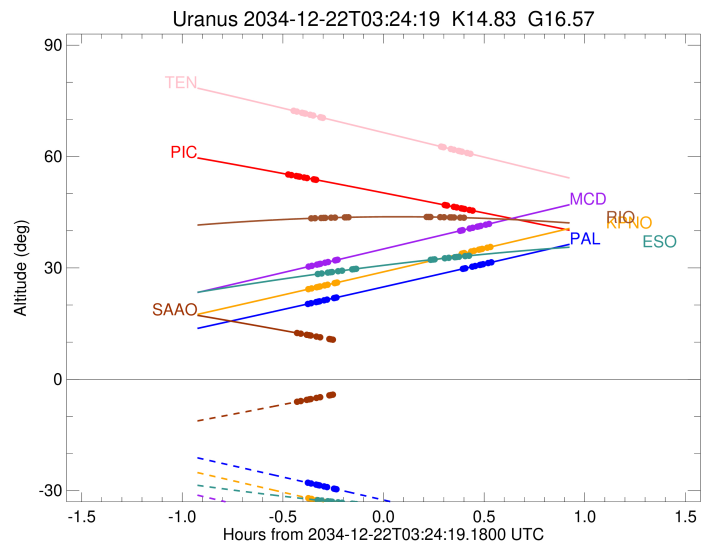
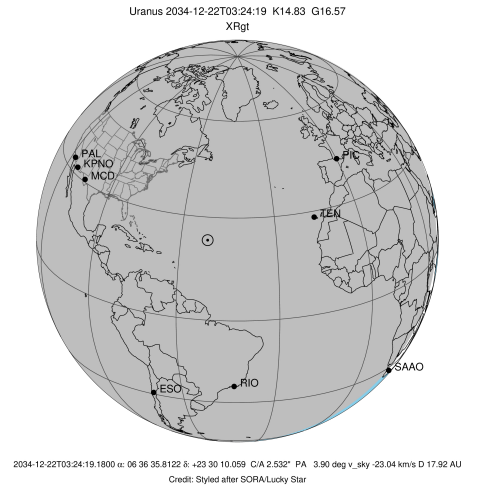


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-22T03:02:36.108		43.34	-43.73	51336.55	-16.73		
lambda	I	2034-12-22T03:03:55.085		43.39	-43.71	50026.71	-16.31		
delta	I	2034-12-22T03:05:43.673		43.44	-43.68	48300.35	-15.48		
gamma	I	2034-12-22T03:06:27.796		43.46	-43.67	47625.46	-15.11		
eta	I	2034-12-22T03:06:57.781		43.48	-43.66	47176.12	-14.86		
beta	I	2034-12-22T03:08:43.863		43.52	-43.62	45649.15	-13.88		
alpha	I	2034-12-22T03:09:53.099		43.55	-43.59	44710.97	-13.22		
4	I	2034-12-22T03:12:49.575		43.62	-43.52	42543.22	-11.25		
5	I	2034-12-22T03:13:16.961		43.63	-43.50	42253.08	-11.00		
6	I	2034-12-22T03:13:56.677		43.64	-43.48	41826.36	-10.44		

No planet occultations

6	E	2034-12-22T03:37:06.597		43.73	-42.49	41799.00	10.45		
5	E	2034-12-22T03:37:54.008		43.72	-42.44	42307.80	11.00		
4	E	2034-12-22T03:38:13.490		43.71	-42.42	42525.95	11.25		
alpha	E	2034-12-22T03:41:14.322		43.67	-42.24	44744.83	13.23		
beta	E	2034-12-22T03:42:20.347		43.65	-42.17	45641.65	13.89		
eta	E	2034-12-22T03:44:07.058		43.62	-42.06	47176.12	14.86		
gamma	E	2034-12-22T03:44:37.411		43.61	-42.03	47631.10	15.12		
delta	E	2034-12-22T03:45:21.154		43.59	-41.98	48300.35	15.48		
lambda	E	2034-12-22T03:47:09.724		43.55	-41.86	50026.71	16.31		
epsilon	E	2034-12-22T03:47:57.352		43.53	-41.80	50811.58	16.73		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-22T03:25:54.540  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 3382456246488671616  
 2Mass ID (if available) : 06363583+2330096  
 ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 14.829  
 G magnitude : 16.574  
 RP magnitude : 15.972  
 BP magnitude : 16.927  
 DUPflag : 0  
 Distance (au) : 17.917  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.04  
 Sun-Target sep (deg) : 171.46  
 Sun-Moon sep (deg) : 54.41  
 B (ring opening deg) : 67.81  
 PA of pole (deg) : 71.92  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.923  
 C/A sky separation (km) : 37982.2  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-22T03:04:33.638		28.34	-32.55	51333.55	-16.45		
lambda	I	2034-12-22T03:05:53.783		28.50	-32.68	50026.71	-16.02		
delta	I	2034-12-22T03:07:44.457		28.73	-32.86	48300.35	-15.16		
gamma	I	2034-12-22T03:08:29.517		28.83	-32.93	47625.52	-14.79		
eta	I	2034-12-22T03:09:00.180		28.89	-32.97	47176.12	-14.52		
beta	I	2034-12-22T03:10:48.942		29.11	-33.14	45648.95	-13.51		
alpha	I	2034-12-22T03:12:00.158		29.25	-33.25	44711.42	-12.82		
4	I	2034-12-22T03:15:03.442		29.62	-33.53	42542.60	-10.75		
5	I	2034-12-22T03:15:31.929		29.68	-33.57	42254.51	-10.48		
6	I	2034-12-22T03:16:13.967		29.76	-33.63	41825.55	-9.89		

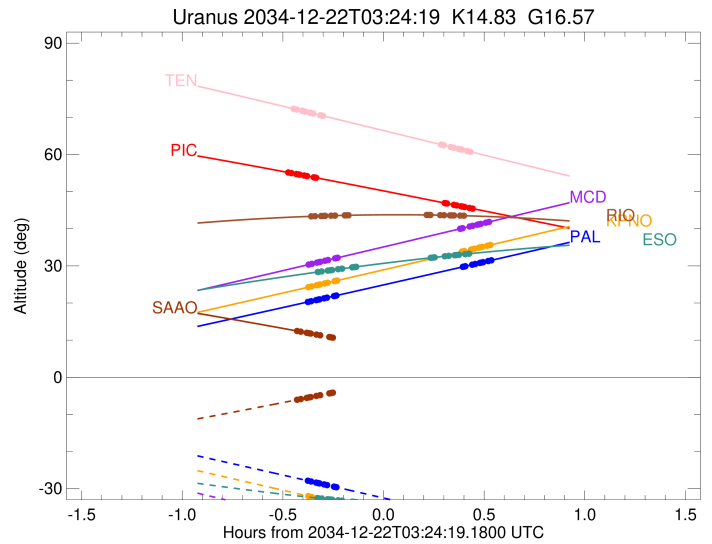
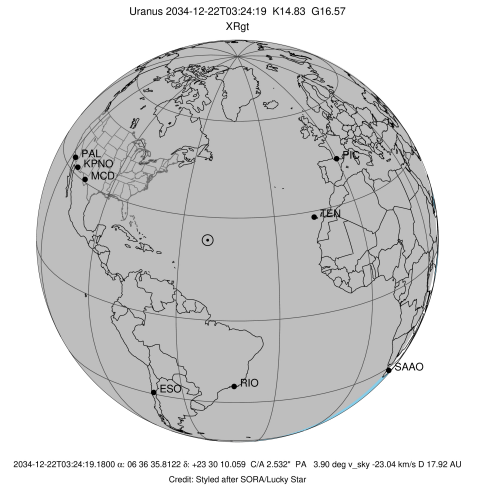
No planet occultations

6	E	2034-12-22T03:38:18.211		32.17	-35.33	41799.49	9.90		
5	E	2034-12-22T03:39:07.953		32.25	-35.39	42306.95	10.49		
4	E	2034-12-22T03:39:28.456		32.29	-35.41	42525.93	10.76		
alpha	E	2034-12-22T03:42:35.951		32.60	-35.61	44744.40	12.84		
beta	E	2034-12-22T03:43:43.867		32.70	-35.68	45641.57	13.53		
eta	E	2034-12-22T03:45:33.136		32.88	-35.79	47176.12	14.54		
gamma	E	2034-12-22T03:46:04.131		32.93	-35.82	47631.06	14.81		
delta	E	2034-12-22T03:46:48.750		33.00	-35.86	48300.35	15.19		
lambda	E	2034-12-22T03:48:39.253		33.17	-35.97	50026.71	16.05		
epsilon	E	2034-12-22T03:49:27.839		33.24	-36.01	50814.88	16.48		



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2034-12-22T03:20:50.370
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      : 3382456246488671616
2Mass ID (if available) : 06363583+2330096
ICRS Star Coord at Epoch: 06h 36m 35.81217s +23:30:10.05878s
RUWE (>1.4 is poor) : 0.96
K magnitude          : 14.829
G magnitude          : 16.574
RP magnitude         : 15.972
BP magnitude         : 16.927
DUPflag             : 0
Distance (au)       : 17.917
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.04
Sun-Target sep (deg) : 171.46
Sun-Moon sep (deg)  : 54.79
B (ring opening deg) : 67.81
PA of pole (deg)    : 71.92
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.830
C/A sky separation (km) : 36775.8
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.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	2034-12-22T02:58:22.610		12.49	-6.09	51343.46	-17.03		
lambda	I	2034-12-22T02:59:40.526		12.28	-5.86	50026.71	-16.64		
delta	I	2034-12-22T03:01:26.665		11.98	-5.55	48300.35	-15.88		
gamma	I	2034-12-22T03:02:09.628		11.86	-5.42	47625.34	-15.55		
eta	I	2034-12-22T03:02:38.746		11.78	-5.33	47176.12	-15.31		
beta	I	2034-12-22T03:04:21.258		11.49	-5.03	45649.60	-14.43		
alpha	I	2034-12-22T03:05:27.772		11.31	-4.83x	44709.98	-13.83		
4	I	2034-12-22T03:08:14.336		10.84	-4.33x	42544.58	-12.08		
5	I	2034-12-22T03:08:40.195		10.76	-4.25x	42250.03	-11.86		
6	I	2034-12-22T03:09:16.409		10.66	-4.14x	41828.07	-11.38		

No planet occultations

6	E	2034-12-22T03:35:01.281		6.17	0.61x	41798.10	11.36		
5	E	2034-12-22T03:35:45.302		6.04	0.74x	42309.35	11.84		
4	E	2034-12-22T03:36:03.284		5.99	0.80x	42526.06	12.06		
alpha	E	2034-12-22T03:38:54.557		5.48	1.34x	44745.66	13.80		
beta	E	2034-12-22T03:39:57.987		5.29	1.54x	45641.85	14.40		
eta	E	2034-12-22T03:41:41.376		4.98x	1.86x	47176.12	15.27		
gamma	E	2034-12-22T03:42:10.940		4.89x	1.95x	47631.17	15.51		
delta	E	2034-12-22T03:42:53.635		4.76x	2.09x	48300.35	15.84		
lambda	E	2034-12-22T03:44:40.056		4.44x	2.43x	50026.71	16.59		
epsilon	E	2034-12-22T03:45:26.533		4.30x	2.57x	50805.15	16.98		