

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-20T21:36:57.090  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427506085439463552  
 2Mass ID (if available) : 05512911+2338238

ICRS Star Coord at Epoch: 05h 51m 29.12884s +23:38:23.83245s

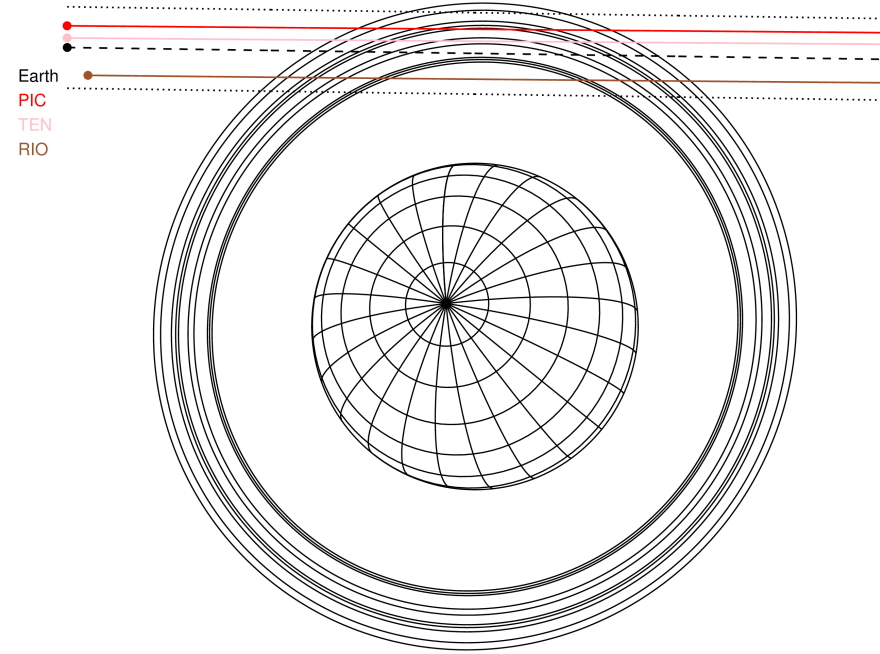
RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.592  
 G magnitude : 16.982  
 RP magnitude : 16.232  
 BP magnitude : 17.612  
 DUPflag : 0  
 Distance (au) : 19.520  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 22.40  
 Sun-Target sep (deg) : 57.40  
 Sun-Moon sep (deg) : 166.13  
 B (ring opening deg) : 76.94  
 PA of pole (deg) : 51.51

#	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



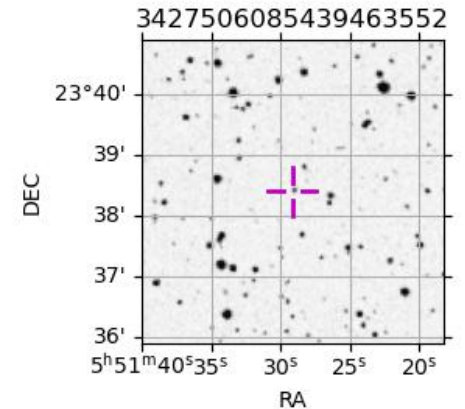
2033-04-20T21:36:57.0900 ex: 05 51 29.1288 s: +23 38 23.832 C/A 3.027" PA 179.17 deg v\_sky +22.40 km/s D 19.52 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2033-04-20T21:36:57 K14.59 G16.98 XRgt

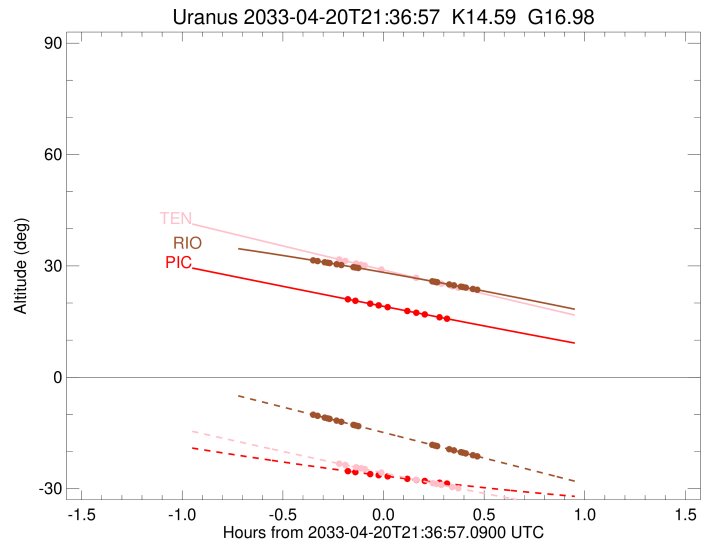
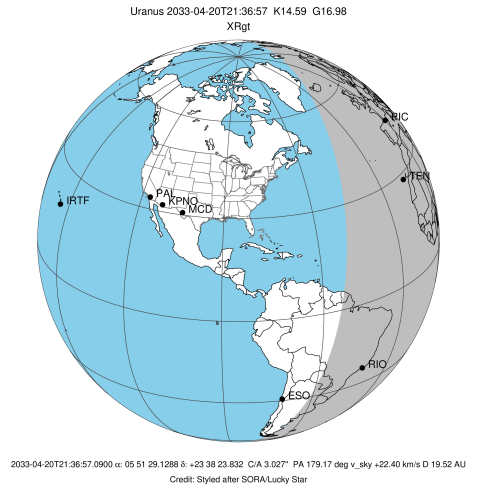


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	APR 20 21:27 - APR 20 21:55	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
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	+++++		+++++	APR 20 21:24 - APR 20 21:58	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	+++++		+++++	APR 20 21:16 - APR 20 22:04	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					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-20T21:40:14.720  
 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 : 3427506085439463552  
 2Mass ID (if available) : 05512911+2338238  
 ICRS Star Coord at Epoch: 05h 51m 29.12884s +23:38:23.83245s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.592  
 G magnitude : 16.982  
 RP magnitude : 16.232  
 BP magnitude : 17.612  
 DUPflag : 0  
 Distance (au) : 19.520  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 22.40  
 Sun-Target sep (deg) : 57.40  
 Sun-Moon sep (deg) : 165.77  
 B (ring opening deg) : 76.94  
 PA of pole (deg) : 51.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.288  
 C/A sky separation (km) : 46549.2  
 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

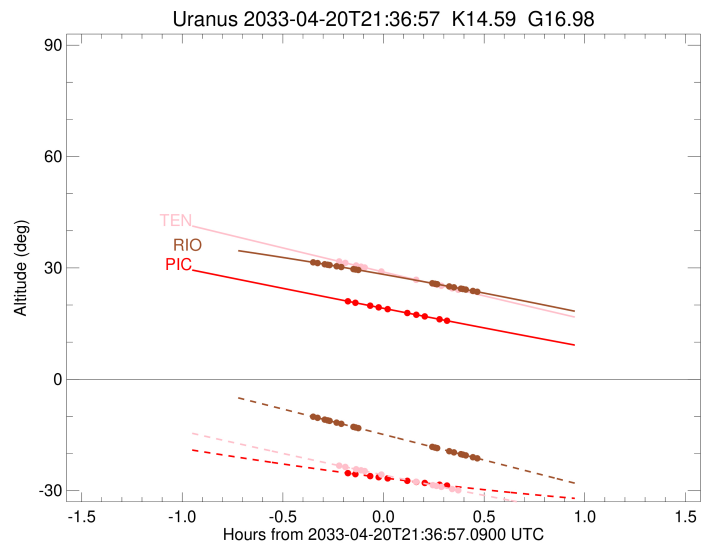
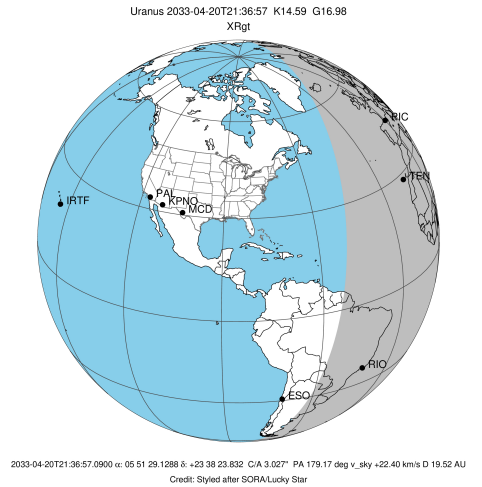


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-04-20T21:27:02.092		20.88	-25.38	50797.40	-8.51		
lambda	I	2033-04-20T21:28:36.326		20.60	-25.57	50026.71	-7.76		
delta	I	2033-04-20T21:33:02.031		19.81	-26.09	48300.35	-5.19		
gamma	I	2033-04-20T21:35:35.754		19.35	-26.40	47623.59	-3.60		
eta	I	2033-04-20T21:38:20.264		18.86	-26.71	47176.12	-1.83		

No planet occultations

eta	E	2033-04-20T21:43:54.349		17.88	-27.34	47176.12	1.83		
gamma	E	2033-04-20T21:46:38.389		17.39	-27.65	47622.29	3.60		
delta	E	2033-04-20T21:49:12.308		16.94	-27.93	48300.35	5.20		
lambda	E	2033-04-20T21:53:37.579		16.16	-28.40	50026.71	7.77		
epsilon	E	2033-04-20T21:55:06.784		15.90	-28.56	50755.88	8.53		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-20T21:40:39.630  
 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 : 3427506085439463552  
 2Mass ID (if available) : 05512911+2338238  
 ICRS Star Coord at Epoch: 05h 51m 29.12884s +23:38:23.83245s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.592  
 G magnitude : 16.982  
 RP magnitude : 16.232  
 BP magnitude : 17.612  
 DUPflag : 0  
 Distance (au) : 19.520  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 22.40  
 Sun-Target sep (deg) : 57.40  
 Sun-Moon sep (deg) : 165.64  
 B (ring opening deg) : 76.94  
 PA of pole (deg) : 51.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.156  
 C/A sky separation (km) : 44675.8  
 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



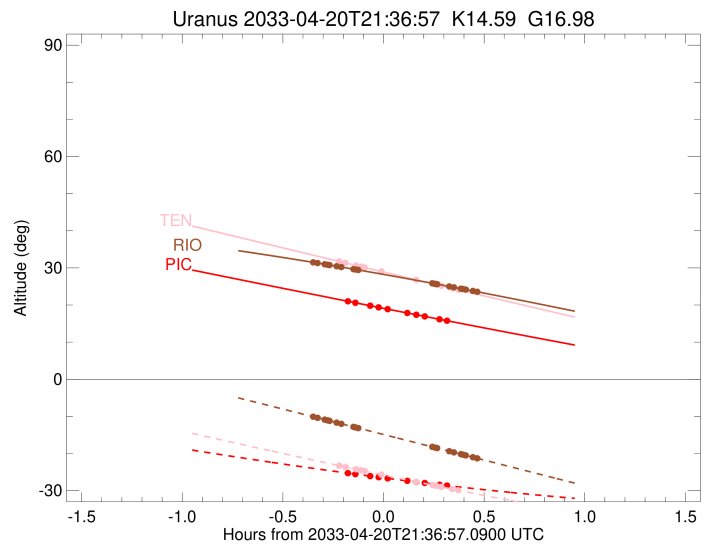
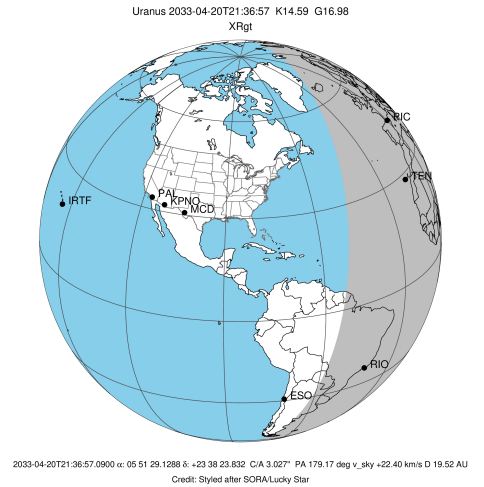
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-04-20T21:24:17.521		31.62	-23.38	50816.92	-10.29		
lambda	I	2033-04-20T21:25:36.010		31.34	-23.63	50026.71	-9.75		
delta	I	2033-04-20T21:28:49.683		30.64	-24.25	48300.35	-8.05		
gamma	I	2033-04-20T21:30:18.206		30.32	-24.53	47624.39	-7.21		
eta	I	2033-04-20T21:31:23.174		30.09	-24.74	47176.12	-6.58		
beta	I	2033-04-20T21:36:30.294		28.99	-25.71	45641.24	-3.36		

No planet occultations

beta	E	2033-04-20T21:46:30.378		26.84	-27.58	45641.32	3.37		
eta	E	2033-04-20T21:51:37.018		25.74	-28.52	47176.12	6.59		
gamma	E	2033-04-20T21:52:41.501		25.51	-28.71	47621.77	7.23		
delta	E	2033-04-20T21:54:10.201		25.19	-28.98	48300.35	8.07		
lambda	E	2033-04-20T21:57:23.389		24.51	-29.57	50026.71	9.77		
epsilon	E	2033-04-20T21:58:36.768		24.24	-29.79	50766.17	10.32		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-20T21:39:44.030  
 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 : 3427506085439463552  
 2Mass ID (if available) : 05512911+2338238  
 ICRS Star Coord at Epoch: 05h 51m 29.12884s +23:38:23.83245s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.592  
 G magnitude : 16.982  
 RP magnitude : 16.232  
 BP magnitude : 17.612  
 DUPflag : 0  
 Distance (au) : 19.520  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 22.40  
 Sun-Target sep (deg) : 57.40  
 Sun-Moon sep (deg) : 165.49  
 B (ring opening deg) : 76.94  
 PA of pole (deg) : 51.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.736  
 C/A sky separation (km) : 38728.7  
 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	2033-04-20T21:16:19.317		31.44	-10.16	50873.60	-14.23		
lambda	I	2033-04-20T21:17:19.161		31.30	-10.39	50026.71	-13.97		
delta	I	2033-04-20T21:19:26.411		30.98	-10.88	48300.35	-13.15		
gamma	I	2033-04-20T21:20:18.426		30.85	-11.07	47625.84	-12.78		
eta	I	2033-04-20T21:20:53.955		30.76	-11.21	47176.12	-12.53		
beta	I	2033-04-20T21:23:01.200		30.44	-11.69	45643.77	-11.54		
alpha	I	2033-04-20T21:24:26.596		30.22	-12.02	44684.82	-10.84		
4	I	2033-04-20T21:28:06.618		29.65	-12.86	42527.25	-8.78		
5	I	2033-04-20T21:28:38.086		29.57	-12.98	42243.74	-8.50		
6	I	2033-04-20T21:29:23.623		29.45	-13.15	41868.35	-7.98		

No planet occultations

6	E	2033-04-20T21:51:28.281		25.86	-18.21	41841.22	7.99		
5	E	2033-04-20T21:52:23.633		25.71	-18.42	42297.22	8.52		
4	E	2033-04-20T21:52:50.502		25.63	-18.52	42532.94	8.80		
alpha	E	2033-04-20T21:56:30.564		25.01	-19.37	44703.74	10.86		
beta	E	2033-04-20T21:57:54.263		24.77	-19.69	45644.08	11.57		
eta	E	2033-04-20T22:00:01.109		24.41	-20.17	47176.12	12.56		
gamma	E	2033-04-20T22:00:36.175		24.31	-20.31	47621.16	12.82		
delta	E	2033-04-20T22:01:28.404		24.16	-20.51	48300.35	13.19		
lambda	E	2033-04-20T22:03:35.262		23.79	-20.99	50026.71	14.02		
epsilon	E	2033-04-20T22:04:30.048		23.64	-21.20	50803.79	14.28		