

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-11T03:45:23.250  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3377547236307921280  
 2Mass ID (if available) : 06181872+2338365

ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s

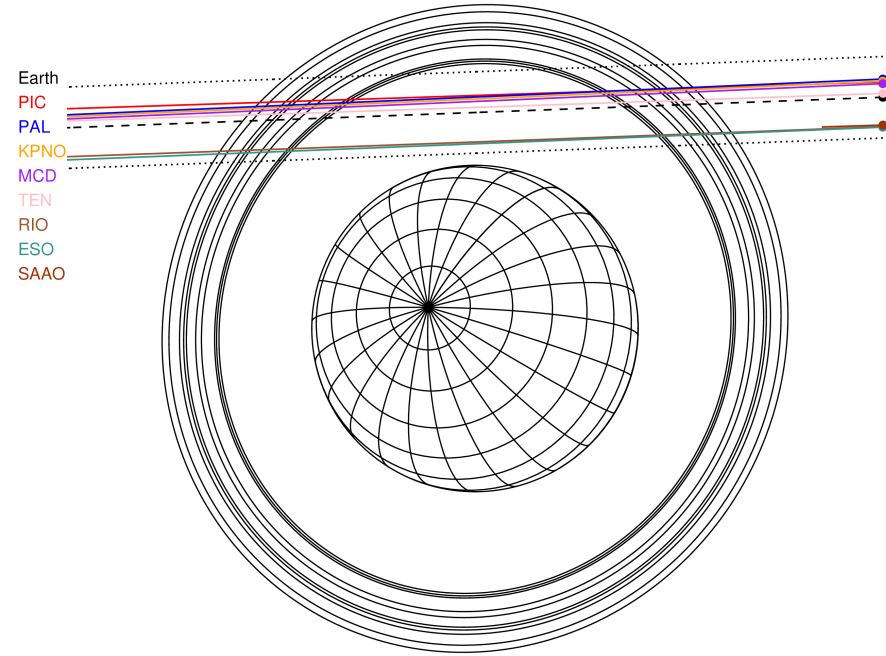
RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.982  
 G magnitude : 18.947  
 RP magnitude : 17.378  
 BP magnitude : 19.573  
 DUPflag : 0  
 Distance (au) : 18.004  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.34  
 Sun-Target sep (deg) : 164.74  
 Sun-Moon sep (deg) : 46.75  
 B (ring opening deg) : 71.67  
 PA of pole (deg) : 65.62

#	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



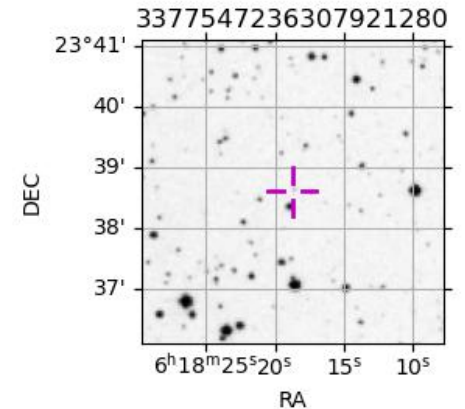
2033-12-11T03:45:23.2500 α: 06 18 18.7090 α: +23 38 36.027 C/A 2.597" PA 182.14 deg v\_sky -22.34 km/s D 18.00 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2033-12-11T03:45:23 K14.98 G18.95 XRgt

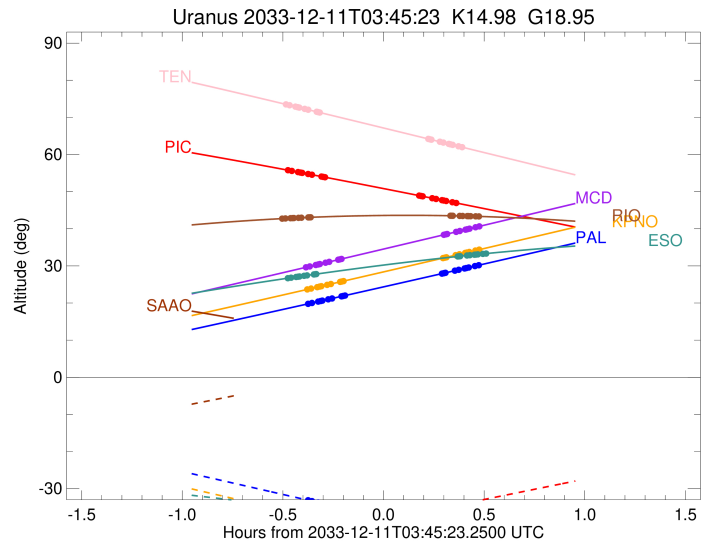
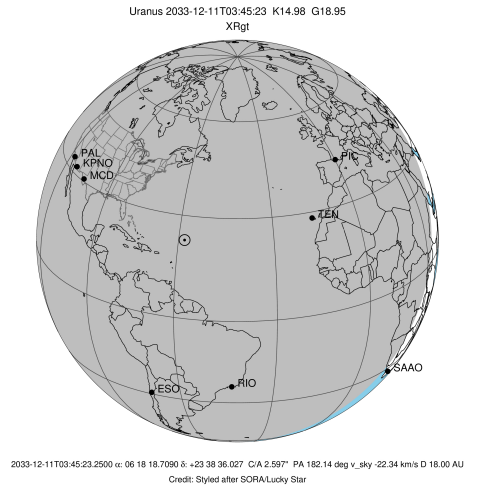


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 11 03:17 - DEC 11 04:07	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	DEC 11 03:23 - DEC 11 04:13	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 11 03:23 - DEC 11 04:13	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 11 03:22 - DEC 11 04:13	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 11 03:16 - DEC 11 04:08	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 11 03:15 - DEC 11 04:13	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	DEC 11 03:17 - DEC 11 04:16	PnnRie
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 : 2033-12-11T03:43:03.400  
 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 : 3377547236307921280  
 2Mass ID (if available) : 06181872+2338365  
 ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.982  
 G magnitude : 18.947  
 RP magnitude : 17.378  
 BP magnitude : 19.573  
 DUPflag : 0  
 Distance (au) : 18.004  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.34  
 Sun-Target sep (deg) : 164.74  
 Sun-Moon sep (deg) : 47.01  
 B (ring opening deg) : 71.67  
 PA of pole (deg) : 65.62  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.793  
 C/A sky separation (km) : 36474.5  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

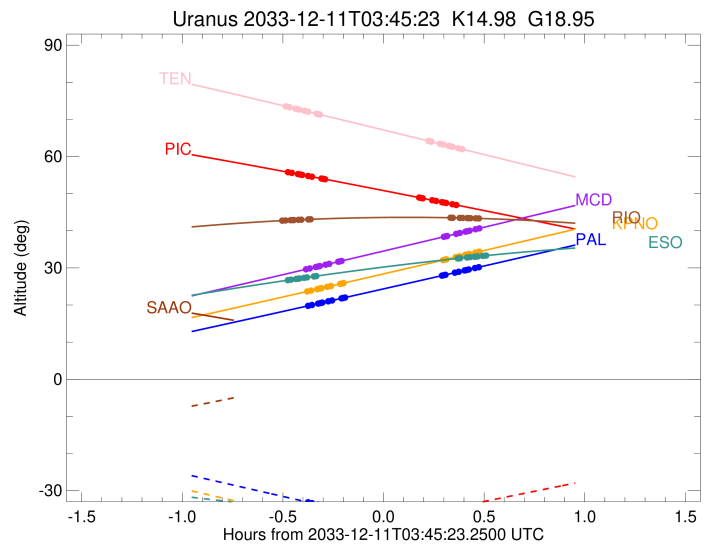
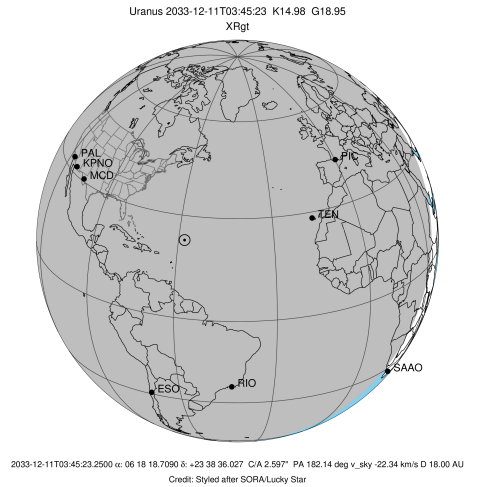


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T03:17:19.773		55.71	-43.55	50744.86	-16.23		
lambda	I	2033-12-11T03:18:04.403		55.58	-43.42	50026.71	-15.96		
delta	I	2033-12-11T03:19:54.986		55.27	-43.08	48300.35	-15.25		
gamma	I	2033-12-11T03:20:39.901		55.14	-42.95	47622.15	-14.94		
eta	I	2033-12-11T03:21:09.961		55.05	-42.85	47176.12	-14.73		
beta	I	2033-12-11T03:22:54.346		54.76	-42.54	45679.05	-13.94		
alpha	I	2033-12-11T03:24:02.780		54.56	-42.33	44743.72	-13.39		
4	I	2033-12-11T03:26:56.278		54.06	-41.80	42557.10	-11.82		
5	I	2033-12-11T03:27:27.920		53.97	-41.71	42187.51	-11.45		
6	I	2033-12-11T03:27:55.255		53.89	-41.62	41877.32	-11.20		

No planet occultations

6	E	2033-12-11T03:56:02.151		48.93	-36.48	41871.08	11.19		
5	E	2033-12-11T03:56:27.532		48.86	-36.40	42155.06	11.43		
4	E	2033-12-11T03:57:05.938		48.74	-36.28	42601.52	11.81		
alpha	E	2033-12-11T03:59:55.595		48.23	-35.76	44748.71	13.37		
beta	E	2033-12-11T04:01:02.600		48.03	-35.56	45657.89	13.92		
eta	E	2033-12-11T04:02:48.592		47.72	-35.23	47176.12	14.71		
gamma	E	2033-12-11T04:03:18.704		47.63	-35.14	47622.16	14.92		
delta	E	2033-12-11T04:04:03.697		47.49	-35.00	48300.35	15.23		
lambda	E	2033-12-11T04:05:54.485		47.16	-34.67	50026.71	15.93		
epsilon	E	2033-12-11T04:07:04.753		46.94	-34.45	51160.38	16.20		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-11T03:49:28.380  
 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 : 3377547236307921280  
 2Mass ID (if available) : 06181872+2338365  
 ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.982  
 G magnitude : 18.947  
 RP magnitude : 17.378  
 BP magnitude : 19.573  
 DUPflag : 0  
 Distance (au) : 18.004  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.34  
 Sun-Target sep (deg) : 164.74  
 Sun-Moon sep (deg) : 47.58  
 B (ring opening deg) : 71.67  
 PA of pole (deg) : 65.62  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.773  
 C/A sky separation (km) : 36213.2  
 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

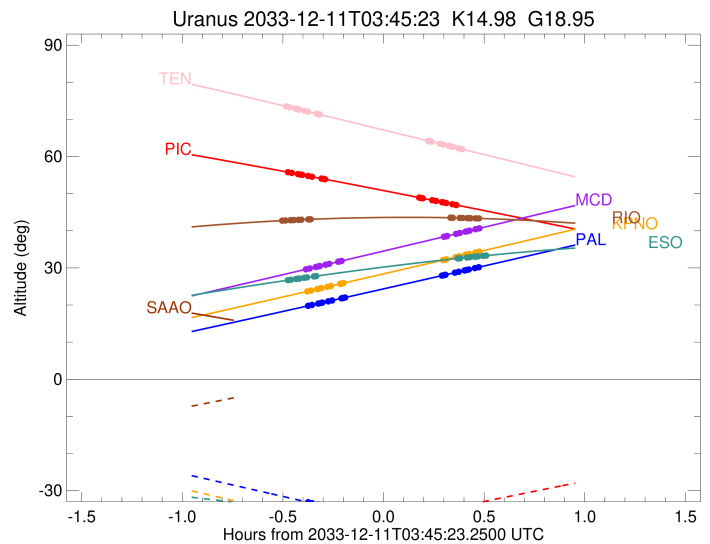
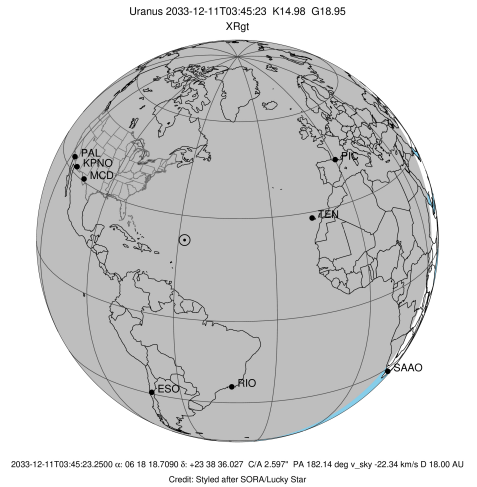


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T03:23:20.053		19.87	-33.21	50744.97	-16.19		
lambda	I	2033-12-11T03:24:04.787		20.02	-33.37	50026.71	-15.93		
delta	I	2033-12-11T03:25:55.495		20.39	-33.75	48300.35	-15.25		
gamma	I	2033-12-11T03:26:40.409		20.54	-33.91	47622.15	-14.95		
eta	I	2033-12-11T03:27:10.448		20.64	-34.01	47176.12	-14.74		
beta	I	2033-12-11T03:28:54.626		21.00	-34.37	45679.04	-13.98		
alpha	I	2033-12-11T03:30:02.789		21.23	-34.61	44743.73	-13.45		
4	I	2033-12-11T03:32:54.974		21.81	-35.20	42557.04	-11.95		
5	I	2033-12-11T03:33:26.234		21.91	-35.31	42187.61	-11.59		
6	I	2033-12-11T03:33:53.224		22.01	-35.41	41877.29	-11.36		

No planet occultations

6	E	2033-12-11T04:02:50.499		27.93	-41.44	41870.48	11.39		
5	E	2033-12-11T04:03:15.527		28.01	-41.53	42155.21	11.62		
4	E	2033-12-11T04:03:53.374		28.14	-41.66	42602.25	11.98		
alpha	E	2033-12-11T04:06:41.007		28.72	-42.25	44748.39	13.49		
beta	E	2033-12-11T04:07:47.452		28.95	-42.48	45657.50	14.02		
eta	E	2033-12-11T04:09:32.757		29.31	-42.85	47176.12	14.79		
gamma	E	2033-12-11T04:10:02.702		29.41	-42.95	47622.22	15.00		
delta	E	2033-12-11T04:10:47.457		29.56	-43.11	48300.35	15.30		
lambda	E	2033-12-11T04:12:37.766		29.94	-43.49	50026.71	15.99		
epsilon	E	2033-12-11T04:13:48.225		30.19	-43.74	51167.53	16.26		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-11T03:49:24.100  
 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 : 3377547236307921280  
 2Mass ID (if available) : 06181872+2338365  
 ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.982  
 G magnitude : 18.947  
 RP magnitude : 17.378  
 BP magnitude : 19.573  
 DUPflag : 0  
 Distance (au) : 18.004  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.34  
 Sun-Target sep (deg) : 164.74  
 Sun-Moon sep (deg) : 47.61  
 B (ring opening deg) : 71.67  
 PA of pole (deg) : 65.62  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.749  
 C/A sky separation (km) : 35899.7  
 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

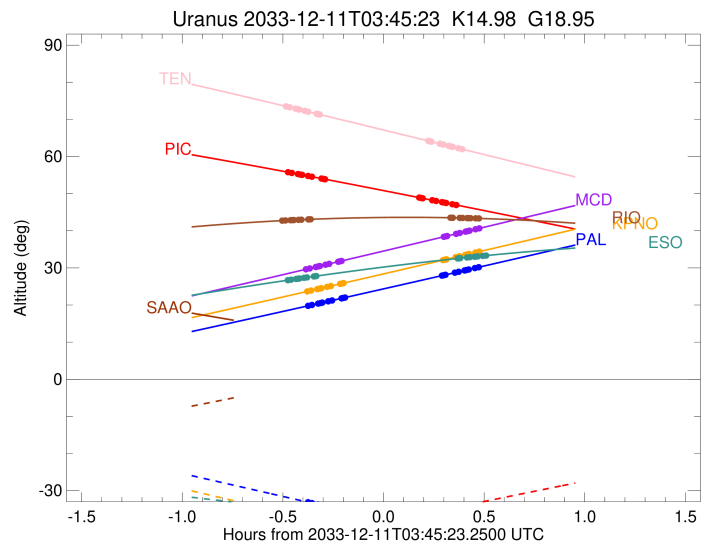
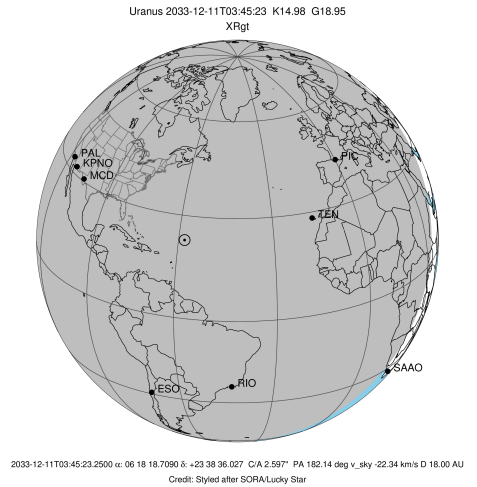


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T03:23:04.994		23.75	-37.41	50744.67	-16.37		
lambda	I	2033-12-11T03:23:49.213		23.90	-37.56	50026.71	-16.11		
delta	I	2033-12-11T03:25:38.571		24.28	-37.95	48300.35	-15.45		
gamma	I	2033-12-11T03:26:22.879		24.43	-38.11	47622.18	-15.16		
eta	I	2033-12-11T03:26:52.497		24.54	-38.21	47176.12	-14.96		
beta	I	2033-12-11T03:28:35.051		24.89	-38.57	45679.14	-14.22		
alpha	I	2033-12-11T03:29:42.039		25.12	-38.81	44743.45	-13.71		
4	I	2033-12-11T03:32:30.538		25.70	-39.40	42556.42	-12.26		
5	I	2033-12-11T03:33:00.832		25.81	-39.51	42188.59	-11.91		
6	I	2033-12-11T03:33:27.173		25.90	-39.60	41877.07	-11.69		

No planet occultations

6	E	2033-12-11T04:03:09.352		32.11	-45.90	41870.08	11.72		
5	E	2033-12-11T04:03:33.731		32.19	-45.99	42155.34	11.94		
4	E	2033-12-11T04:04:10.602		32.32	-46.12	42602.71	12.29		
alpha	E	2033-12-11T04:06:54.570		32.90	-46.70	44748.20	13.75		
beta	E	2033-12-11T04:07:59.844		33.12	-46.93	45657.28	14.26		
eta	E	2033-12-11T04:09:43.530		33.49	-47.30	47176.12	15.01		
gamma	E	2033-12-11T04:10:13.055		33.59	-47.40	47622.26	15.21		
delta	E	2033-12-11T04:10:57.207		33.75	-47.56	48300.35	15.50		
lambda	E	2033-12-11T04:12:46.174		34.13	-47.94	50026.71	16.17		
epsilon	E	2033-12-11T04:13:56.075		34.37	-48.19	51171.05	16.43		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-11T03:49:12.330  
 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 : 3377547236307921280  
 2Mass ID (if available) : 06181872+2338365  
 ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.982  
 G magnitude : 18.947  
 RP magnitude : 17.378  
 BP magnitude : 19.573  
 DUPflag : 0  
 Distance (au) : 18.004  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.34  
 Sun-Target sep (deg) : 164.74  
 Sun-Moon sep (deg) : 47.65  
 B (ring opening deg) : 71.67  
 PA of pole (deg) : 65.62  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.720  
 C/A sky separation (km) : 35523.8  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

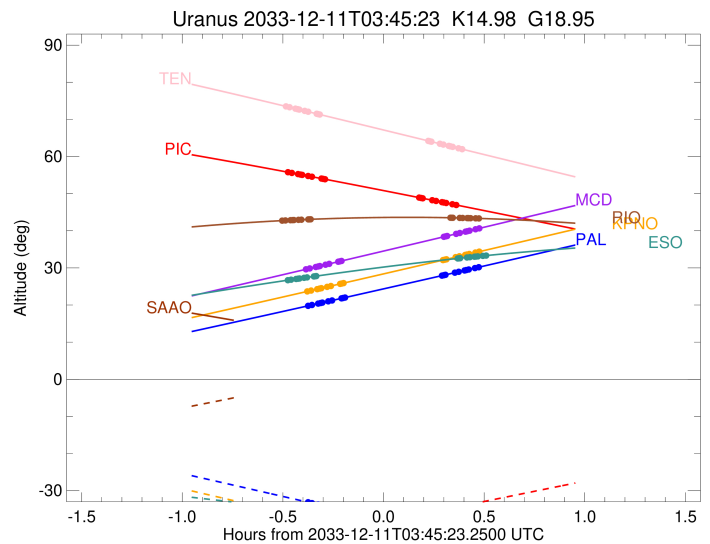
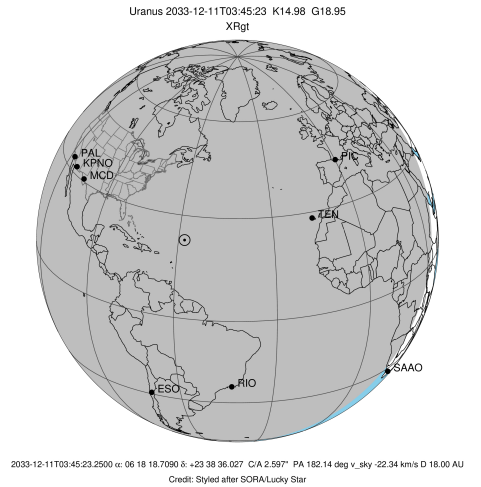


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T03:22:41.180		29.71	-43.68	50744.36	-16.58		
lambda	I	2033-12-11T03:23:24.790		29.86	-43.83	50026.71	-16.33		
delta	I	2033-12-11T03:25:12.558		30.24	-44.22	48300.35	-15.69		
gamma	I	2033-12-11T03:25:56.156		30.40	-44.38	47622.23	-15.41		
eta	I	2033-12-11T03:26:25.282		30.50	-44.48	47176.12	-15.22		
beta	I	2033-12-11T03:28:05.955		30.86	-44.84	45679.27	-14.50		
alpha	I	2033-12-11T03:29:11.593		31.09	-45.08	44743.11	-14.01		
4	I	2033-12-11T03:31:55.925		31.67	-45.67	42555.69	-12.62		
5	I	2033-12-11T03:32:25.141		31.77	-45.77	42189.76	-12.29		
6	I	2033-12-11T03:32:50.768		31.86	-45.86	41876.79	-12.08		

No planet occultations

6	E	2033-12-11T04:03:23.932		38.38	-52.44	41869.60	12.11		
5	E	2033-12-11T04:03:47.598		38.47	-52.53	42155.50	12.32		
4	E	2033-12-11T04:04:23.384		38.60	-52.65	42603.25	12.65		
alpha	E	2033-12-11T04:07:03.223		39.17	-53.23	44747.96	14.05		
beta	E	2033-12-11T04:08:07.156		39.40	-53.46	45657.02	14.55		
eta	E	2033-12-11T04:09:48.973		39.76	-53.82	47176.12	15.27		
gamma	E	2033-12-11T04:10:18.010		39.86	-53.93	47622.30	15.46		
delta	E	2033-12-11T04:11:01.462		40.02	-54.08	48300.35	15.75		
lambda	E	2033-12-11T04:12:48.857		40.40	-54.47	50026.71	16.39		
epsilon	E	2033-12-11T04:13:58.093		40.65	-54.71	51175.16	16.65		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-11T03:43:34.630  
 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 : 3377547236307921280  
 2Mass ID (if available) : 06181872+2338365  
 ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.982  
 G magnitude : 18.947  
 RP magnitude : 17.378  
 BP magnitude : 19.573  
 DUPflag : 0  
 Distance (au) : 18.004  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.34  
 Sun-Target sep (deg) : 164.74  
 Sun-Moon sep (deg) : 47.16  
 B (ring opening deg) : 71.67  
 PA of pole (deg) : 65.62  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.650  
 C/A sky separation (km) : 34602.6  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



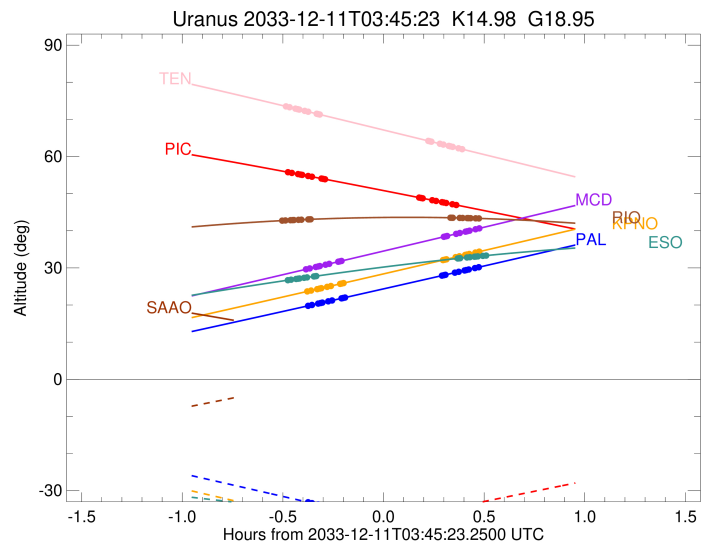
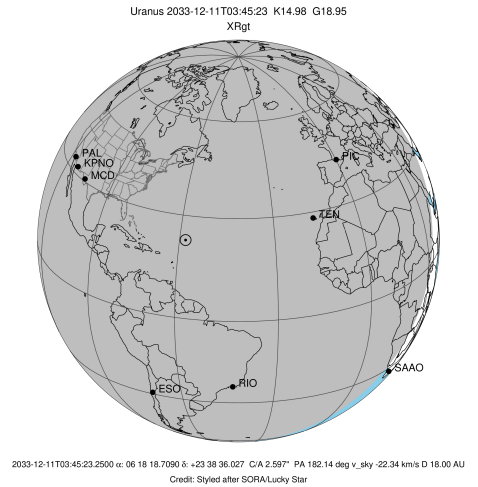
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T03:16:42.378		73.42	-58.66	50743.70	-17.19		
lambda	I	2033-12-11T03:17:24.372		73.27	-58.51	50026.71	-16.96		
delta	I	2033-12-11T03:19:07.965		72.90	-58.13	48300.35	-16.36		
gamma	I	2033-12-11T03:19:49.739		72.75	-57.98	47622.36	-16.10		
eta	I	2033-12-11T03:20:17.613		72.65	-57.87	47176.12	-15.92		
beta	I	2033-12-11T03:21:53.579		72.30	-57.52	45679.61	-15.25		
alpha	I	2033-12-11T03:22:55.939		72.07	-57.29	44742.07	-14.80		
4	I	2033-12-11T03:25:30.498		71.51	-56.72	42553.62	-13.54		
5	I	2033-12-11T03:25:57.213		71.41	-56.63	42193.15	-13.23		
6	I	2033-12-11T03:26:21.286		71.33	-56.54	41875.94	-13.05		

No planet occultations

6	E	2033-12-11T03:58:45.829		64.21	-49.40	41868.67	13.04		
5	E	2033-12-11T03:59:07.942		64.12	-49.32	42155.88	13.22		
4	E	2033-12-11T03:59:41.362		64.00	-49.20	42604.22	13.52		
alpha	E	2033-12-11T04:02:12.070		63.45	-48.64	44747.53	14.79		
beta	E	2033-12-11T04:03:12.964		63.22	-48.42	45656.56	15.24		
eta	E	2033-12-11T04:04:50.489		62.86	-48.06	47176.12	15.90		
gamma	E	2033-12-11T04:05:18.400		62.76	-47.96	47622.37	16.08		
delta	E	2033-12-11T04:06:00.230		62.61	-47.81	48300.35	16.34		
lambda	E	2033-12-11T04:07:43.972		62.23	-47.43	50026.71	16.94		
epsilon	E	2033-12-11T04:08:51.461		61.98	-47.18	51181.80	17.16		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-12-11T03:45:22.320
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        : 3377547236307921280
2Mass ID (if available) : 06181872+2338365
ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s
RUWE (>1.4 is poor)  : 1.00
K magnitude           : 14.982
G magnitude           : 18.947
RP magnitude          : 17.378
BP magnitude          : 19.573
DUPflag              : 0
Distance (au)         : 18.004
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -22.34
Sun-Target sep (deg)  : 164.74
Sun-Moon sep (deg)    : 47.18
B (ring opening deg)  : 71.67
PA of pole (deg)      : 65.62
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.235
C/A sky separation (km) : 29186.3
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
  
```

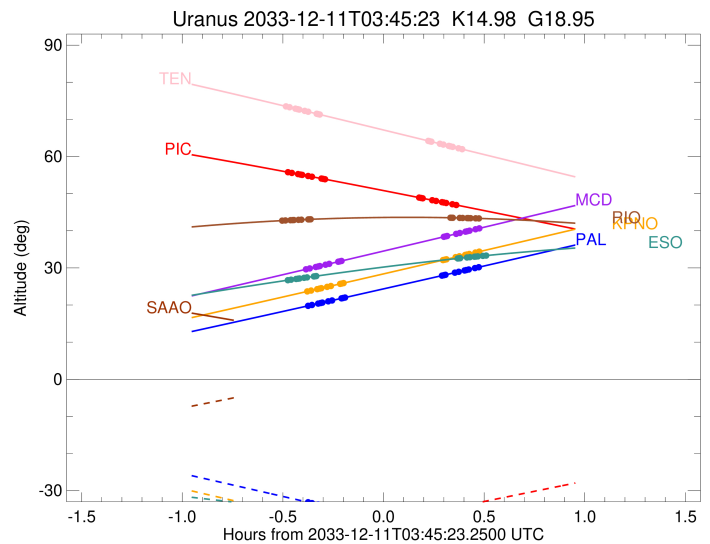
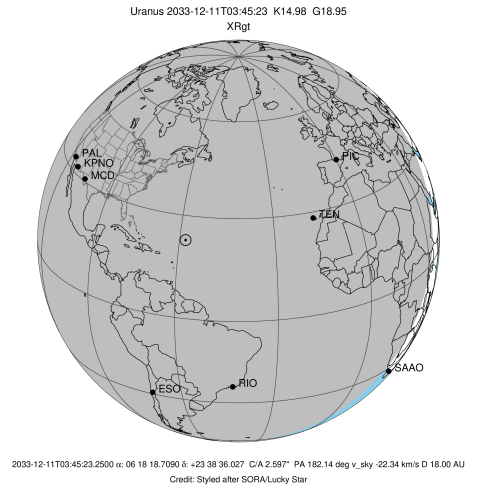


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-11T03:15:32.359		42.75	-43.68	50745.78	-19.31		
lambda	I	2033-12-11T03:16:09.712		42.78	-43.65	50026.71	-19.18		
delta	I	2033-12-11T03:17:40.600		42.85	-43.59	48300.35	-18.80		
gamma	I	2033-12-11T03:18:16.778		42.87	-43.57	47622.96	-18.64		
eta	I	2033-12-11T03:18:40.818		42.89	-43.55	47176.12	-18.53		
beta	I	2033-12-11T03:20:02.374		42.95	-43.50	45680.67	-18.13		
alpha	I	2033-12-11T03:20:54.776		42.98	-43.46	44737.49	-17.86		
4	I	2033-12-11T03:23:00.225		43.06	-43.36	42545.87	-17.13		
5	I	2033-12-11T03:23:19.699		43.08	-43.35	42207.54	-16.95		
6	I	2033-12-11T03:23:39.498		43.09	-43.33	41871.59	-16.86		

No planet occultations

6	E	2033-12-11T04:05:21.094		43.51	-40.34	41862.04	16.86		
5	E	2033-12-11T04:05:38.894		43.51	-40.31	42160.19	16.95		
4	E	2033-12-11T04:06:04.976		43.50	-40.27	42609.76	17.13		
alpha	E	2033-12-11T04:08:06.481		43.46	-40.07	44743.91	17.87		
beta	E	2033-12-11T04:08:57.284		43.45	-39.99	45653.27	18.14		
eta	E	2033-12-11T04:10:20.261		43.42	-39.85	47176.12	18.54		
gamma	E	2033-12-11T04:10:44.295		43.41	-39.82	47622.99	18.65		
delta	E	2033-12-11T04:11:20.459		43.39	-39.75	48300.35	18.81		
lambda	E	2033-12-11T04:12:51.316		43.35	-39.60	50026.71	19.19		
epsilon	E	2033-12-11T04:13:54.088		43.33	-39.49	51238.58	19.32		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-12-11T03:47:18.200  
 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 : 3377547236307921280  
 2Mass ID (if available) : 06181872+2338365  
 ICRS Star Coord at Epoch: 06h 18m 18.70902s +23:38:36.02694s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.982  
 G magnitude : 18.947  
 RP magnitude : 17.378  
 BP magnitude : 19.573  
 DUPflag : 0  
 Distance (au) : 18.004  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.34  
 Sun-Target sep (deg) : 164.74  
 Sun-Moon sep (deg) : 47.31  
 B (ring opening deg) : 71.67  
 PA of pole (deg) : 65.62  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.213  
 C/A sky separation (km) : 28901.7  
 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	2033-12-11T03:17:13.259		26.74	-34.55	50745.93	-19.32		
lambda	I	2033-12-11T03:17:50.594		26.82	-34.60	50026.71	-19.19		
delta	I	2033-12-11T03:19:21.379		27.02	-34.72	48300.35	-18.83		
gamma	I	2033-12-11T03:19:57.498		27.10	-34.77	47622.98	-18.67		
eta	I	2033-12-11T03:20:21.495		27.15	-34.80	47176.12	-18.57		
beta	I	2033-12-11T03:21:42.862		27.33	-34.91	45680.69	-18.18		
alpha	I	2033-12-11T03:22:35.120		27.44	-34.98	44737.35	-17.92		
4	I	2033-12-11T03:24:40.081		27.71	-35.13	42545.65	-17.21		
5	I	2033-12-11T03:24:59.412		27.75	-35.16	42208.00	-17.04		
6	I	2033-12-11T03:25:19.145		27.79	-35.18	41871.43	-16.95		

No planet occultations

6	E	2033-12-11T04:07:32.393		32.54	-37.44	41861.60	16.98		
5	E	2033-12-11T04:07:50.120		32.57	-37.45	42160.56	17.07		
4	E	2033-12-11T04:08:16.017		32.61	-37.47	42610.05	17.24		
alpha	E	2033-12-11T04:10:16.822		32.80	-37.52	44743.65	17.96		
beta	E	2033-12-11T04:11:07.392		32.88	-37.55	45653.06	18.22		
eta	E	2033-12-11T04:12:30.040		33.01	-37.59	47176.12	18.61		
gamma	E	2033-12-11T04:12:53.987		33.05	-37.60	47623.04	18.72		
delta	E	2033-12-11T04:13:30.023		33.10	-37.61	48300.35	18.87		
lambda	E	2033-12-11T04:15:00.598		33.24	-37.65	50026.71	19.24		
epsilon	E	2033-12-11T04:16:03.406		33.33	-37.67	51242.56	19.37		