

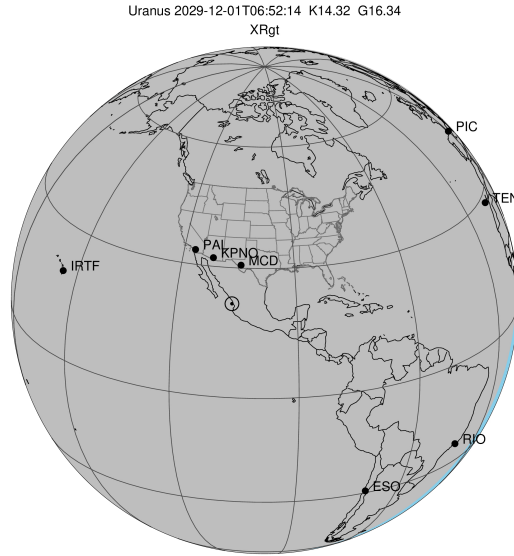
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-01T06:52:14.410
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226

ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s

RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 112.29
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96

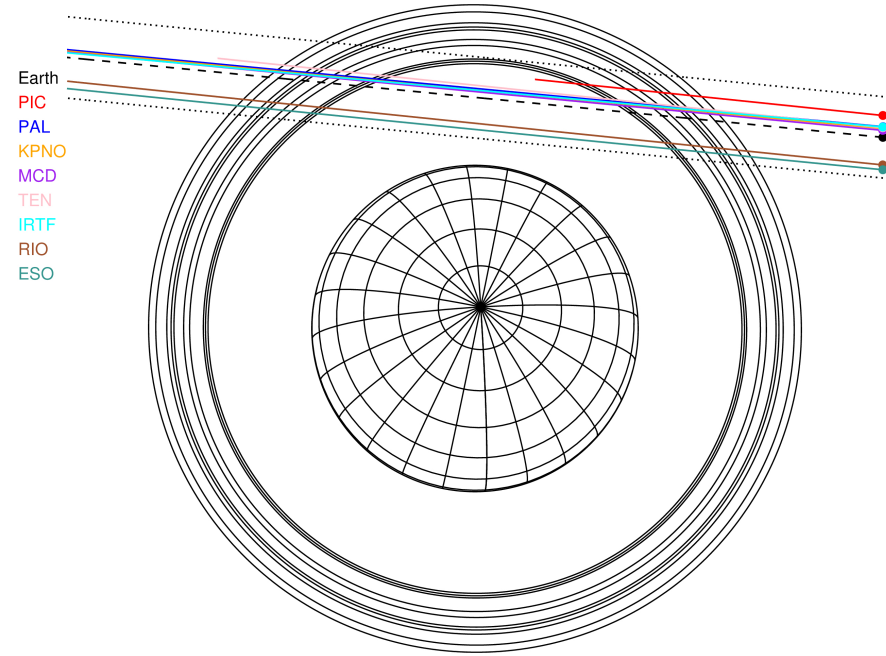
a(km) ring

- 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



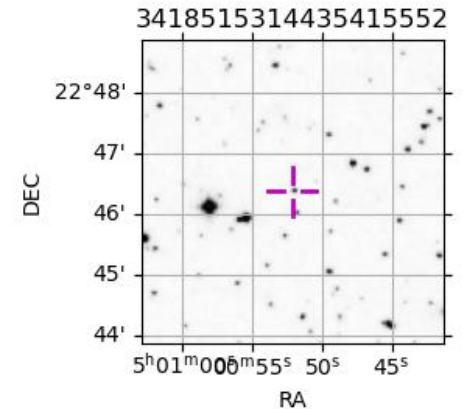
2029-12-01T06:52:14.4100 ra: 05 00 52.1172 s: +22 46 22.766 C/A 2.727'' PA 174.41 deg v_sky -23.21 km/s D 18.25 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2029-12-01T06:52:14 K14.32 G16.34 XRgt

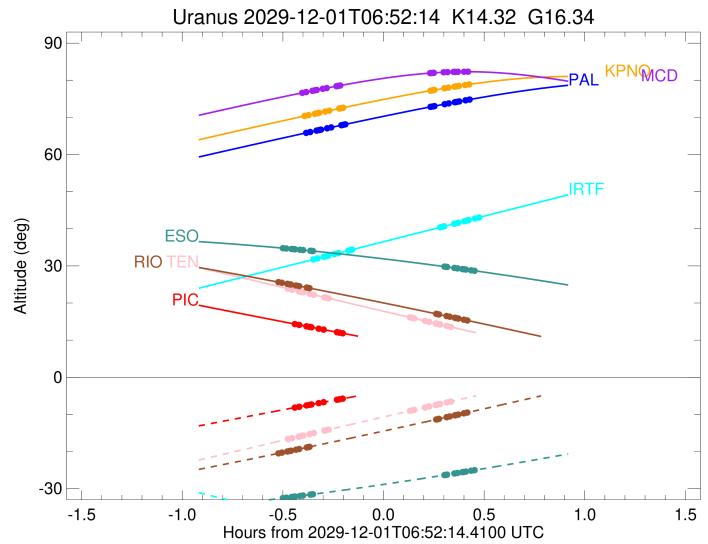
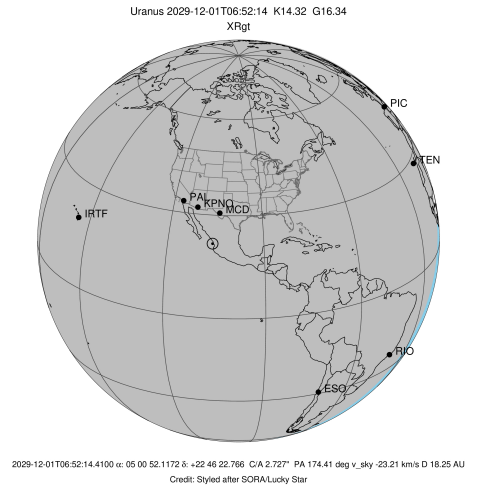


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+++++			DEC 01 06:25 - DEC 01 06:40	PnnRin
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	DEC 01 06:28 - DEC 01 07:17	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 01 06:28 - DEC 01 07:17	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 01 06:27 - DEC 01 07:17	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 01 06:23 - DEC 01 07:12	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 01 06:30 - DEC 01 07:20	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	DEC 01 06:20 - DEC 01 07:17	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	DEC 01 06:21 - DEC 01 07:19	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 : 2029-12-01T06:48:28.170
 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 : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226
 ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
 RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 112.73
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.005
 C/A sky separation (km) : 39773.8
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

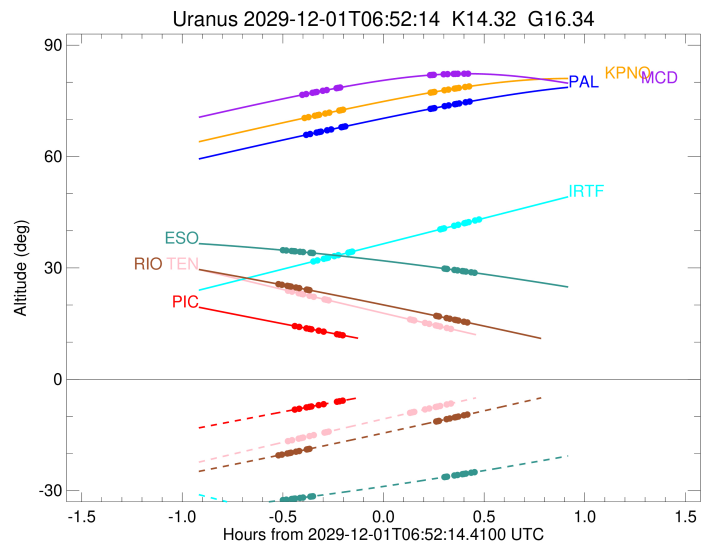
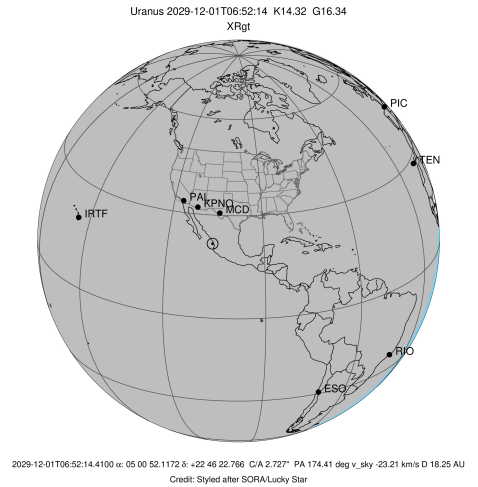


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-01T06:25:25.062		14.40	-8.23	51481.96	-14.45		
lambda	I	2029-12-01T06:27:07.592		14.10	-7.94	50026.71	-13.85		
delta	I	2029-12-01T06:29:16.603		13.72	-7.58	48300.35	-12.90		
gamma	I	2029-12-01T06:30:10.105		13.57	-7.43	47621.40	-12.48		
eta	I	2029-12-01T06:30:46.217		13.46	-7.33	47176.12	-12.18		
beta	I	2029-12-01T06:32:58.029		13.08	-6.96	45645.37	-11.03		
alpha	I	2029-12-01T06:34:23.658		12.83	-6.72	44735.77	-10.24		
4	I	2029-12-01T06:38:27.803		12.12	-6.04	42545.90	-7.64		
5	I	2029-12-01T06:39:12.445		12.00	-5.91	42211.61	-7.11		
6	I	2029-12-01T06:40:08.653		11.83	-5.75	41833.42	-6.47		

No planet occultations

6	E	2029-12-01T06:56:54.462		8.96	-2.99x	41811.36	6.46		
5	E	2029-12-01T06:57:49.024		8.81	-2.84x	42171.26	7.10		
4	E	2029-12-01T06:58:36.666		8.67	-2.71x	42528.04	7.63		
alpha	E	2029-12-01T07:02:45.176		7.98	-2.04x	44752.17	10.22		
beta	E	2029-12-01T07:04:09.063		7.74	-1.82x	45642.09	11.01		
eta	E	2029-12-01T07:06:21.424		7.37	-1.46x	47176.12	12.16		
gamma	E	2029-12-01T07:06:57.997		7.27	-1.36x	47626.13	12.45		
delta	E	2029-12-01T07:07:51.247		7.12	-1.22x	48300.35	12.87		
lambda	E	2029-12-01T07:10:00.588		6.76	-0.88x	50026.71	13.81		
epsilon	E	2029-12-01T07:11:09.748		6.57	-0.69x	50997.95	14.41		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-01T06:53:28.490
 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 : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226
 ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
 RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 113.05
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.829
 C/A sky separation (km) : 37435.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural161.bsp
 vgr2.ural161.bsp
 peph.ural160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

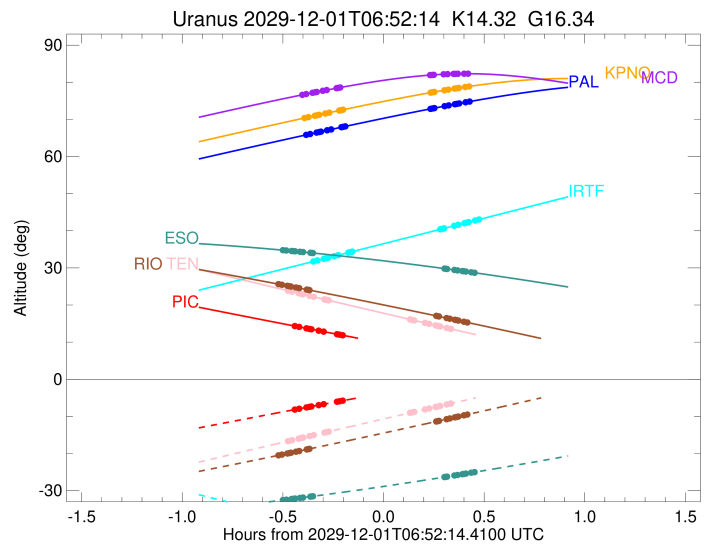
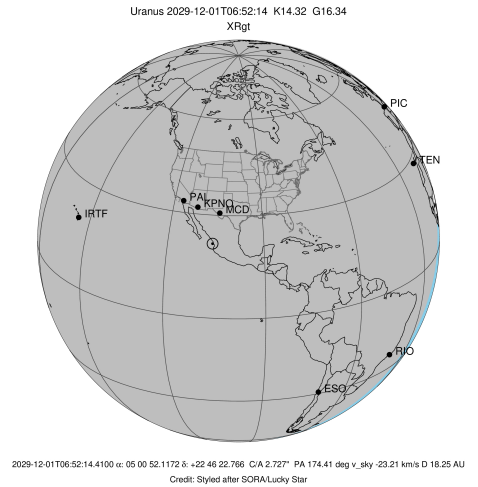


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-01T06:28:50.215		65.76	-71.25	51495.61	-15.93		
lambda	I	2029-12-01T06:30:23.613		66.07	-71.52	50026.71	-15.44		
delta	I	2029-12-01T06:32:18.214		66.45	-71.85	48300.35	-14.67		
gamma	I	2029-12-01T06:33:05.024		66.60	-71.98	47621.25	-14.34		
eta	I	2029-12-01T06:33:36.322		66.71	-72.07	47176.12	-14.10		
beta	I	2029-12-01T06:35:28.269		67.07	-72.39	45646.55	-13.21		
alpha	I	2029-12-01T06:36:39.088		67.30	-72.59	44732.82	-12.62		
4	I	2029-12-01T06:39:45.041		67.91	-73.10	42551.02	-10.80		
5	I	2029-12-01T06:40:15.601		68.01	-73.19	42222.47	-10.47		
6	I	2029-12-01T06:40:53.085		68.13	-73.29	41839.78	-10.08		

No planet occultations

6	E	2029-12-01T07:06:10.013		72.83	-76.84	41806.08	10.09		
5	E	2029-12-01T07:06:45.769		72.93	-76.90	42164.42	10.48		
4	E	2029-12-01T07:07:19.223		73.03	-76.97	42526.49	10.81		
alpha	E	2029-12-01T07:10:28.880		73.57	-77.30	44752.43	12.63		
beta	E	2029-12-01T07:11:37.798		73.77	-77.41	45642.89	13.22		
eta	E	2029-12-01T07:13:29.878		74.08	-77.59	47176.12	14.12		
gamma	E	2029-12-01T07:14:01.516		74.17	-77.63	47626.63	14.36		
delta	E	2029-12-01T07:14:47.896		74.30	-77.70	48300.35	14.69		
lambda	E	2029-12-01T07:16:42.354		74.61	-77.86	50026.71	15.46		
epsilon	E	2029-12-01T07:17:42.530		74.78	-77.94	50968.34	15.96		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-01T06:53:09.500
 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 : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226
 ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
 RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 113.10
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.810
 C/A sky separation (km) : 37191.2
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

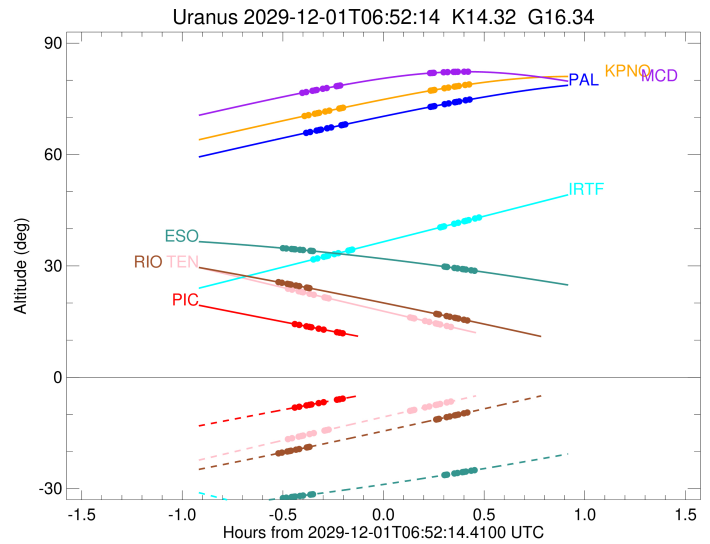
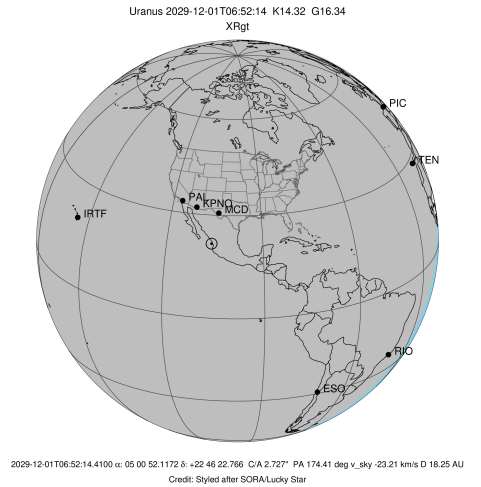


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-01T06:28:21.045		70.31	-75.56	51497.20	-16.07		
lambda	I	2029-12-01T06:29:53.714		70.62	-75.80	50026.71	-15.59		
delta	I	2029-12-01T06:31:47.154		70.99	-76.10	48300.35	-14.84		
gamma	I	2029-12-01T06:32:33.435		71.14	-76.22	47621.23	-14.51		
eta	I	2029-12-01T06:33:04.357		71.24	-76.30	47176.12	-14.28		
beta	I	2029-12-01T06:34:54.790		71.60	-76.58	45646.69	-13.41		
alpha	I	2029-12-01T06:36:04.535		71.82	-76.75	44732.49	-12.83		
4	I	2029-12-01T06:39:06.679		72.40	-77.19	42551.55	-11.07		
5	I	2029-12-01T06:39:36.430		72.50	-77.26	42223.54	-10.75		
6	I	2029-12-01T06:40:12.921		72.61	-77.34	41840.38	-10.38		

No planet occultations

6	E	2029-12-01T07:06:12.127		77.20	-79.85	41805.70	10.39		
5	E	2029-12-01T07:06:46.894		77.29	-79.88	42163.95	10.76		
4	E	2029-12-01T07:07:19.544		77.38	-79.90	42526.41	11.08		
alpha	E	2029-12-01T07:10:25.425		77.85	-80.00	44752.43	12.84		
beta	E	2029-12-01T07:11:33.285		78.02	-80.03	45642.97	13.42		
eta	E	2029-12-01T07:13:23.877		78.29	-80.05	47176.12	14.29		
gamma	E	2029-12-01T07:13:55.146		78.36	-80.06	47626.68	14.52		
delta	E	2029-12-01T07:14:41.008		78.47	-80.06	48300.35	14.85		
lambda	E	2029-12-01T07:16:34.336		78.73	-80.06	50026.71	15.60		
epsilon	E	2029-12-01T07:17:33.834		78.86	-80.05	50965.94	16.09		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-01T06:52:39.590
 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 : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226
 ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
 RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 113.16
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.791
 C/A sky separation (km) : 36939.1
 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

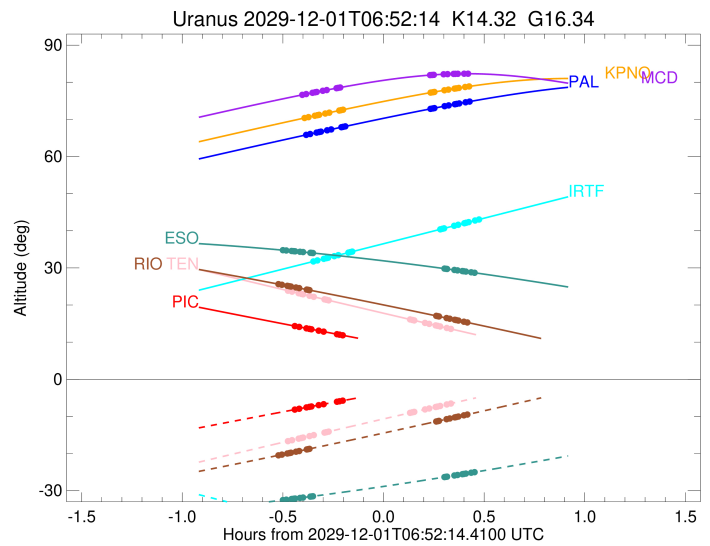
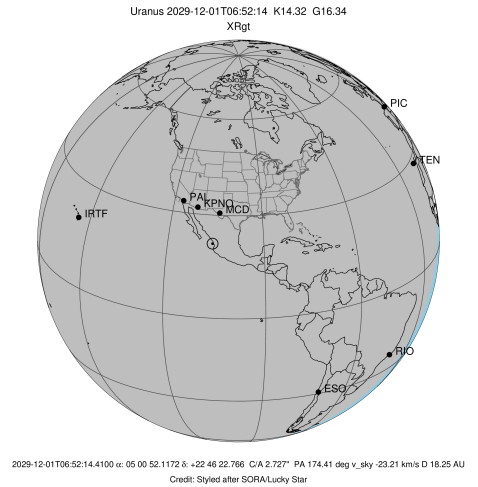


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-01T06:27:40.785		76.55	-80.51	51498.86	-16.21		
lambda	I	2029-12-01T06:29:12.725		76.83	-80.64	50026.71	-15.74		
delta	I	2029-12-01T06:31:05.004		77.17	-80.79	48300.35	-15.00		
gamma	I	2029-12-01T06:31:50.759		77.31	-80.85	47621.22	-14.68		
eta	I	2029-12-01T06:32:21.307		77.40	-80.89	47176.12	-14.46		
beta	I	2029-12-01T06:34:10.243		77.72	-81.01	45646.84	-13.61		
alpha	I	2029-12-01T06:35:18.938		77.91	-81.07	44732.14	-13.05		
4	I	2029-12-01T06:38:17.396		78.42	-81.21	42552.10	-11.34		
5	I	2029-12-01T06:38:46.375		78.50	-81.23	42224.63	-11.03		
6	I	2029-12-01T06:39:21.926		78.60	-81.25	41840.98	-10.67		

No planet occultations

6	E	2029-12-01T07:06:03.277		81.93	-80.16	41805.34	10.68		
5	E	2029-12-01T07:06:37.110		81.97	-80.10	42163.50	11.04		
4	E	2029-12-01T07:07:08.997		82.00	-80.04	42526.33	11.35		
alpha	E	2029-12-01T07:10:11.246		82.16	-79.69	44752.43	13.06		
beta	E	2029-12-01T07:11:18.076		82.21	-79.55	45643.04	13.61		
eta	E	2029-12-01T07:13:07.212		82.26	-79.32	47176.12	14.47		
gamma	E	2029-12-01T07:13:38.119		82.27	-79.25	47626.72	14.69		
delta	E	2029-12-01T07:14:23.474		82.29	-79.15	48300.35	15.01		
lambda	E	2029-12-01T07:16:15.688		82.31	-78.89	50026.71	15.75		
epsilon	E	2029-12-01T07:17:14.521		82.31	-78.75	50963.60	16.22		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-01T06:47:56.510
 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 : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226
 ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
 RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 112.91
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.863
 C/A sky separation (km) : 37891.2
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



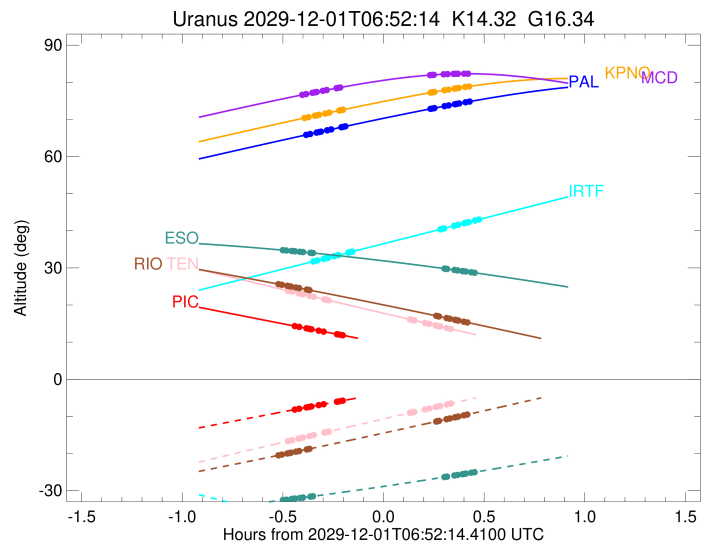
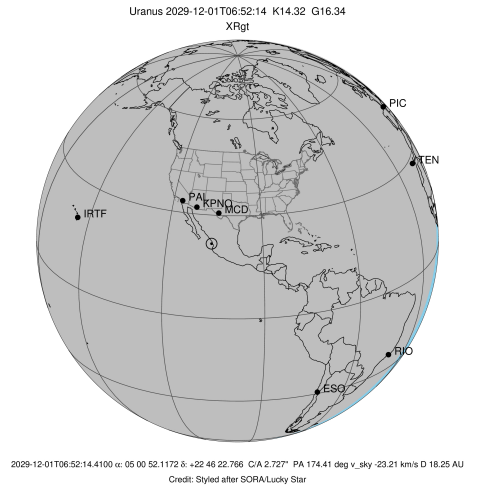
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-01T06:23:23.725		23.94	-16.74	51494.91	-15.55		
lambda	I	2029-12-01T06:24:59.452		23.59	-16.41	50026.71	-15.04		
delta	I	2029-12-01T06:26:57.292		23.17	-15.99	48300.35	-14.25		
gamma	I	2029-12-01T06:27:45.548		23.00	-15.82	47621.26	-13.90		
eta	I	2029-12-01T06:28:17.862		22.89	-15.71	47176.12	-13.65		
beta	I	2029-12-01T06:30:13.803		22.47	-15.30	45646.44	-12.72		
alpha	I	2029-12-01T06:31:27.461		22.21	-15.04	44733.11	-12.10		
4	I	2029-12-01T06:34:42.942		21.51	-14.36	42550.45	-10.18		
5	I	2029-12-01T06:35:15.472		21.40	-14.24	42221.27	-9.83		
6	I	2029-12-01T06:35:55.468		21.26	-14.10	41839.08	-9.41		

No planet occultations

6	E	2029-12-01T07:00:04.236		16.14	-9.06	41807.15	9.40		
5	E	2029-12-01T07:00:42.579		16.00	-8.93	42165.79	9.81		
4	E	2029-12-01T07:01:18.122		15.88	-8.81	42526.75	10.17		
alpha	E	2029-12-01T07:04:38.009		15.18	-8.12	44752.41	12.07		
beta	E	2029-12-01T07:05:49.960		14.92	-7.87	45642.66	12.69		
eta	E	2029-12-01T07:07:46.496		14.52	-7.47	47176.12	13.61		
gamma	E	2029-12-01T07:08:19.283		14.40	-7.36	47626.50	13.86		
delta	E	2029-12-01T07:09:07.309		14.23	-7.20	48300.35	14.20		
lambda	E	2029-12-01T07:11:05.533		13.82	-6.79	50026.71	14.99		
epsilon	E	2029-12-01T07:12:08.109		13.60	-6.58	50976.78	15.50		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-12-01T06:55:58.140
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg) : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 3418515314435415552
2Mass ID (if available) : 05005212+2246226
ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
RUWE (>1.4 is poor) : 1.40
K magnitude          : 14.323
G magnitude          : 16.342
RP magnitude         : 15.653
BP magnitude         : 16.821
DUPflag             : 0
Distance (au)       : 18.248
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.21
Sun-Target sep (deg) : 172.55
Sun-Moon sep (deg)  : 112.53
B (ring opening deg) : 82.15
PA of pole (deg)    : -14.96
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.811
C/A sky separation (km) : 37199.4
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

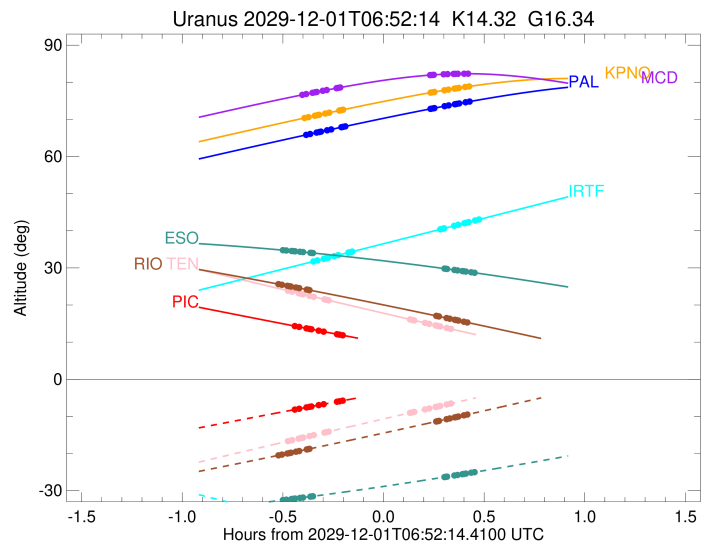
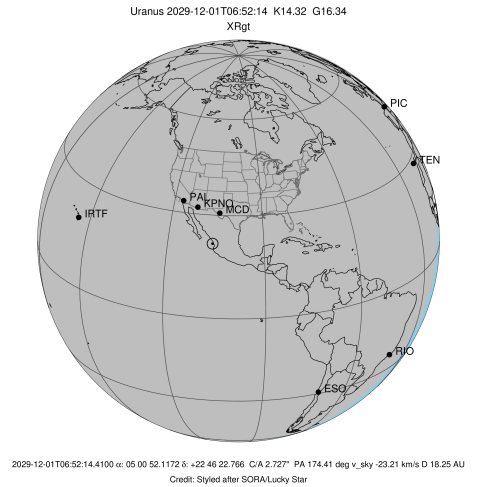


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-01T06:30:59.319		31.66	-38.82	51496.35	-15.94		
lambda	I	2029-12-01T06:32:32.691		32.02	-39.18	50026.71	-15.46		
delta	I	2029-12-01T06:34:27.050		32.45	-39.62	48300.35	-14.72		
gamma	I	2029-12-01T06:35:13.705		32.63	-39.80	47621.24	-14.39		
eta	I	2029-12-01T06:35:44.877		32.74	-39.92	47176.12	-14.17		
beta	I	2029-12-01T06:37:36.203		33.17	-40.34	45646.64	-13.30		
alpha	I	2029-12-01T06:38:46.497		33.44	-40.61	44732.62	-12.73		
4	I	2029-12-01T06:41:50.140		34.13	-41.31	42551.38	-10.98		
5	I	2029-12-01T06:42:20.146		34.25	-41.43	42223.21	-10.66		
6	I	2029-12-01T06:42:56.927		34.39	-41.57	41840.20	-10.29		

No planet occultations

6	E	2029-12-01T07:09:05.162		40.37	-47.59	41805.60	10.31		
5	E	2029-12-01T07:09:40.163		40.50	-47.73	42163.82	10.69		
4	E	2029-12-01T07:10:13.044		40.63	-47.86	42526.38	11.01		
alpha	E	2029-12-01T07:13:20.131		41.34	-48.58	44752.43	12.76		
beta	E	2029-12-01T07:14:28.416		41.61	-48.84	45643.00	13.34		
eta	E	2029-12-01T07:16:19.677		42.03	-49.27	47176.12	14.21		
gamma	E	2029-12-01T07:16:51.134		42.15	-49.39	47626.70	14.44		
delta	E	2029-12-01T07:17:37.266		42.33	-49.57	48300.35	14.76		
lambda	E	2029-12-01T07:19:31.251		42.76	-50.00	50026.71	15.51		
epsilon	E	2029-12-01T07:20:31.000		42.99	-50.23	50964.56	16.00		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-01T06:48:59.300
 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 : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226
 ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
 RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 112.89
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.416
 C/A sky separation (km) : 31971.5
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

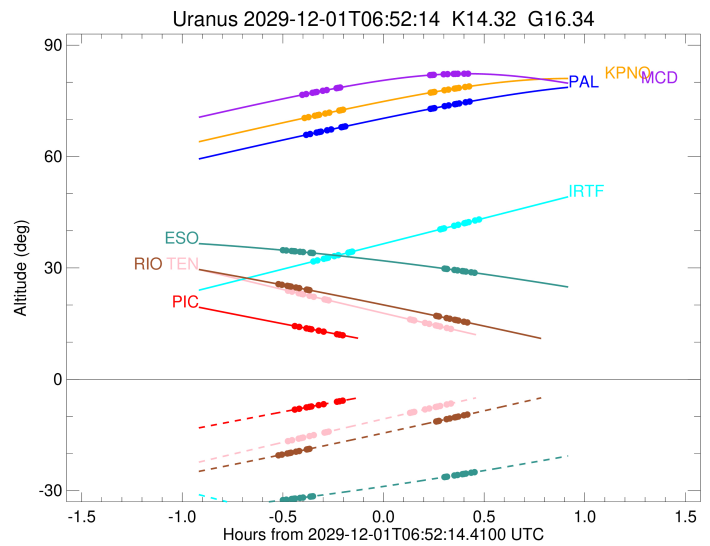
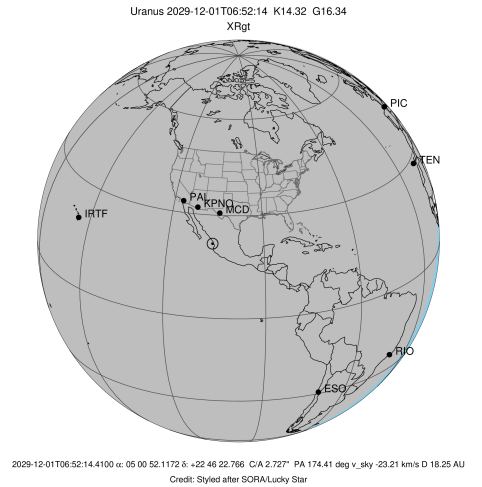


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-01T06:20:35.302		25.69	-20.55	51524.35	-18.29		
lambda	I	2029-12-01T06:21:57.797		25.45	-20.30	50026.71	-17.97		
delta	I	2029-12-01T06:23:35.135		25.17	-19.99	48300.35	-17.49		
gamma	I	2029-12-01T06:24:14.193		25.06	-19.87	47621.02	-17.29		
eta	I	2029-12-01T06:24:40.030		24.98	-19.79	47176.12	-17.15		
beta	I	2029-12-01T06:26:10.429		24.72	-19.51	45649.56	-16.62		
alpha	I	2029-12-01T06:27:06.593		24.55	-19.33	44726.16	-16.29		
4	I	2029-12-01T06:29:23.572		24.15	-18.90	42561.26	-15.30		
5	I	2029-12-01T06:29:44.465		24.09	-18.83	42242.21	-15.13		
6	I	2029-12-01T06:30:10.541		24.02	-18.75	41850.38	-14.94		

No planet occultations

6	E	2029-12-01T07:07:53.927		17.09	-11.39	41800.14	14.91		
5	E	2029-12-01T07:08:18.269		17.02	-11.31	42157.59	15.09		
4	E	2029-12-01T07:08:42.198		16.94	-11.23	42526.03	15.26		
alpha	E	2029-12-01T07:11:03.452		16.49	-10.76	44751.85	16.24		
beta	E	2029-12-01T07:11:57.896		16.32	-10.57	45644.71	16.57		
eta	E	2029-12-01T07:13:28.827		16.03	-10.27	47176.12	17.10		
gamma	E	2029-12-01T07:13:55.117		15.94	-10.18	47627.49	17.24		
delta	E	2029-12-01T07:14:33.919		15.82	-10.05	48300.35	17.44		
lambda	E	2029-12-01T07:16:11.568		15.51	-9.72	50026.71	17.91		
epsilon	E	2029-12-01T07:17:01.109		15.35	-9.55	50919.47	18.23		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-01T06:50:44.450
 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 : 3418515314435415552
 2Mass ID (if available) : 05005212+2246226
 ICRS Star Coord at Epoch: 05h 00m 52.11718s +22:46:22.76621s
 RUWE (>1.4 is poor) : 1.40
 K magnitude : 14.323
 G magnitude : 16.342
 RP magnitude : 15.653
 BP magnitude : 16.821
 DUPflag : 0
 Distance (au) : 18.248
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.21
 Sun-Target sep (deg) : 172.55
 Sun-Moon sep (deg) : 112.93
 B (ring opening deg) : 82.15
 PA of pole (deg) : -14.96
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.344
 C/A sky separation (km) : 31020.4
 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_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	2029-12-01T06:21:55.088		34.80	-32.58	51527.49	-18.70		
lambda	I	2029-12-01T06:23:15.872		34.69	-32.43	50026.71	-18.41		
delta	I	2029-12-01T06:24:50.774		34.56	-32.25	48300.35	-17.97		
gamma	I	2029-12-01T06:25:28.780		34.51	-32.18	47621.00	-17.78		
eta	I	2029-12-01T06:25:53.893		34.47	-32.13	47176.12	-17.65		
beta	I	2029-12-01T06:27:21.555		34.34	-31.97	45649.99	-17.16		
alpha	I	2029-12-01T06:28:15.953		34.26	-31.86	44725.25	-16.86		
4	I	2029-12-01T06:30:27.665		34.07	-31.61	42562.63	-15.96		
5	I	2029-12-01T06:30:47.627		34.04	-31.57	42244.72	-15.80		
6	I	2029-12-01T06:31:12.629		34.00	-31.52	41851.68	-15.63		

No planet occultations

6	E	2029-12-01T07:10:21.407		29.82	-26.36	41799.37	15.61		
5	E	2029-12-01T07:10:44.644		29.77	-26.30	42156.86	15.79		
4	E	2029-12-01T07:11:07.609		29.73	-26.24	42526.18	15.94		
alpha	E	2029-12-01T07:13:23.377		29.45	-25.92	44751.62	16.84		
beta	E	2029-12-01T07:14:15.995		29.34	-25.79	45645.09	17.14		
eta	E	2029-12-01T07:15:44.048		29.15	-25.57	47176.12	17.62		
gamma	E	2029-12-01T07:16:09.572		29.10	-25.51	47627.65	17.75		
delta	E	2029-12-01T07:16:47.261		29.02	-25.42	48300.35	17.94		
lambda	E	2029-12-01T07:18:22.312		28.82	-25.18	50026.71	18.38		
epsilon	E	2029-12-01T07:19:10.143		28.72	-25.06	50910.55	18.67		