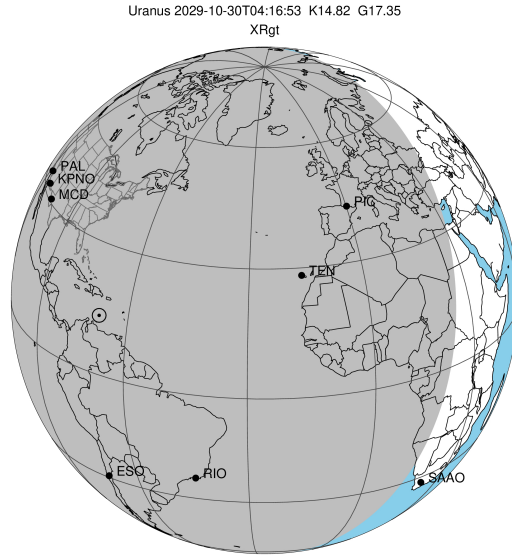


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-30T04:16:53.260
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3418390618648431360
 2Mass ID (if available) : 05055931+2252509

ICRS Star Coord at Epoch: 05h 05m 59.32210s +22:52:50.85979s

RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.821
 G magnitude : 17.350
 RP magnitude : 16.562
 BP magnitude : 18.009
 DUPflag : 0
 Distance (au) : 18.471
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.16
 Sun-Target sep (deg) : 139.04
 Sun-Moon sep (deg) : 45.50
 B (ring opening deg) : 82.26
 PA of pole (deg) : -5.84

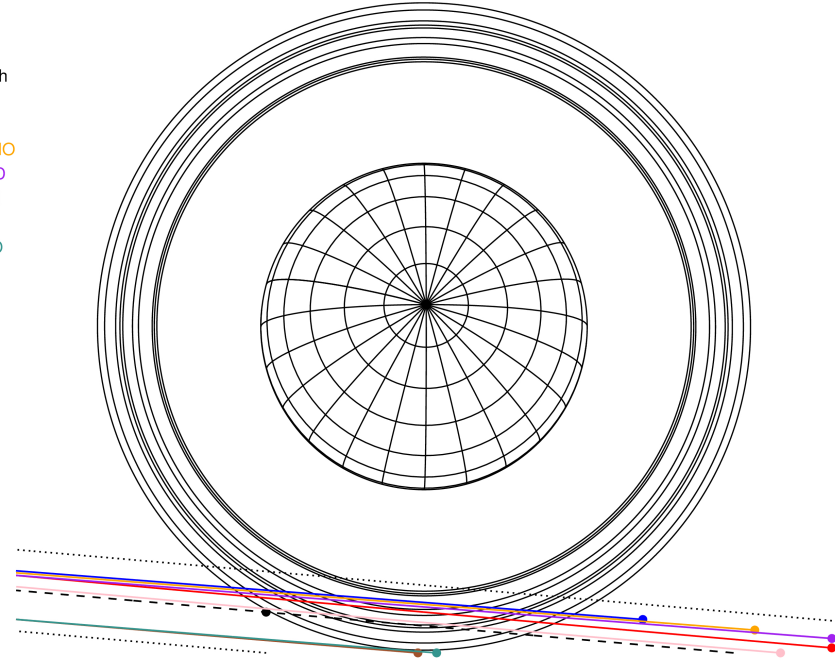
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2029-10-30T04:16:53.2600 α: 05 05 59.3221 δ: +22 52 50.860 C/A 3.481° PA 355.02 deg v_sky -16.16 km/s D 18.47 AU
 Credit: Styled after SORA/Lucky Star

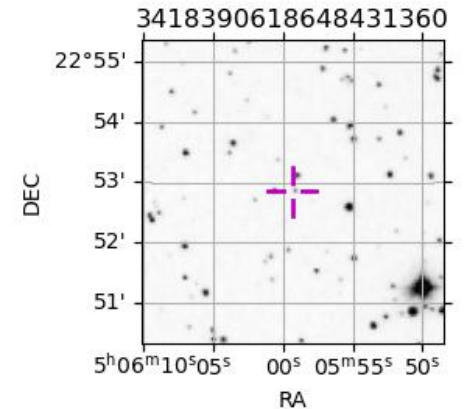
Uranus 2029-10-30T04:16:53 K14.82 G17.35 XRgt

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 RIO
 ESO

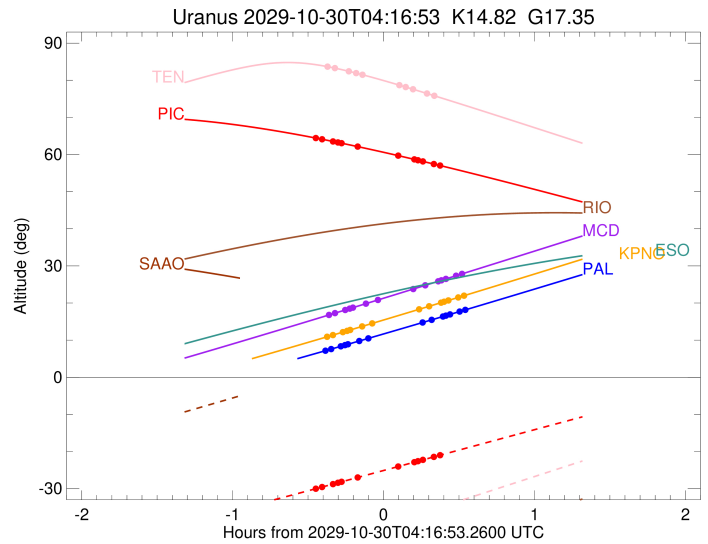
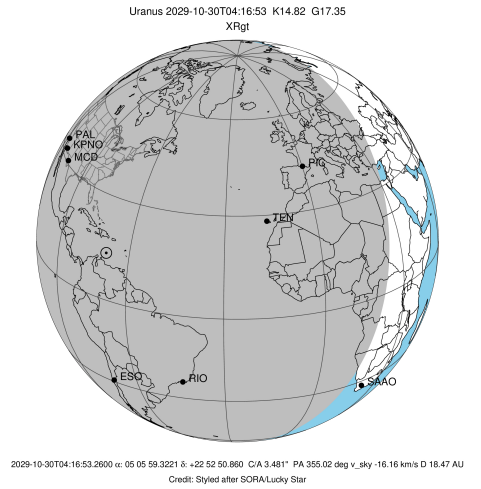


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	OCT 30 03:49 - OCT 30 04:39	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	OCT 30 03:53 - OCT 30 04:49	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	OCT 30 03:53 - OCT 30 04:48	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	OCT 30 03:54 - OCT 30 04:48	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	OCT 30 03:53 - OCT 30 04:37	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					PnnRnn
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 : 2029-10-30T04:14:41.540
 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 : 3418390618648431360
 2Mass ID (if available) : 05055931+2252509
 ICRS Star Coord at Epoch: 05h 05m 59.32210s +22:52:50.85979s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.821
 G magnitude : 17.350
 RP magnitude : 16.562
 BP magnitude : 18.009
 DUPflag : 0
 Distance (au) : 18.471
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.16
 Sun-Target sep (deg) : 139.04
 Sun-Moon sep (deg) : 45.87
 B (ring opening deg) : 82.26
 PA of pole (deg) : -5.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.326
 C/A sky separation (km) : 44553.2
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

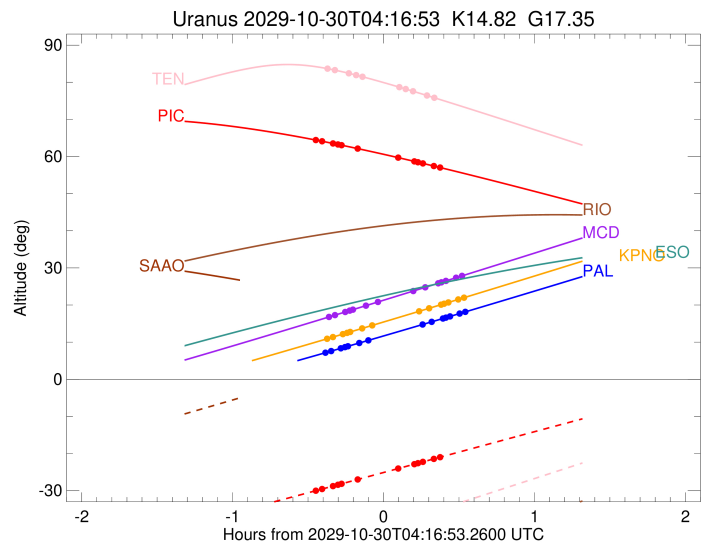
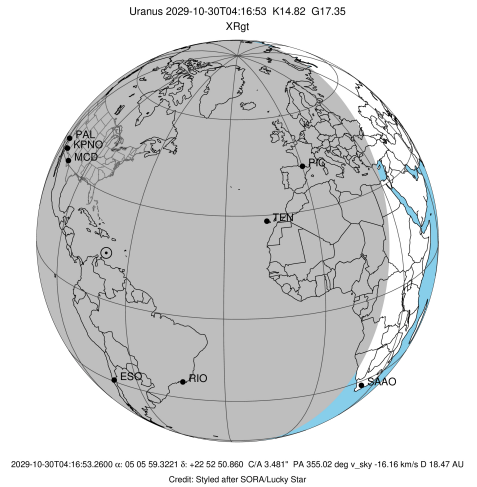


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-30T03:49:18.295		64.53	-30.14	51487.86	-7.95		
lambda	I	2029-10-30T03:52:30.211		64.11	-29.56	50026.71	-7.20		
delta	I	2029-10-30T03:56:51.316		63.52	-28.77	48300.35	-6.00		
gamma	I	2029-10-30T03:58:50.107		63.25	-28.41	47622.73	-5.41		
eta	I	2029-10-30T04:00:16.219		63.05	-28.15	47176.12	-4.96		
beta	I	2029-10-30T04:06:40.366		62.13	-26.99	45669.42	-2.86		

No planet occultations

beta	E	2029-10-30T04:22:43.555		59.71	-24.05	45675.19	2.85		
eta	E	2029-10-30T04:29:05.826		58.70	-22.88	47176.12	4.96		
gamma	E	2029-10-30T04:30:32.592		58.47	-22.62	47625.96	5.40		
delta	E	2029-10-30T04:32:30.871		58.15	-22.26	48300.35	5.99		
lambda	E	2029-10-30T04:36:52.200		57.45	-21.46	50026.71	7.20		
epsilon	E	2029-10-30T04:39:20.324		57.04	-21.00	51139.79	7.94		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-30T04:21:40.730
 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 : 3418390618648431360
 2Mass ID (if available) : 05055931+2252509
 ICRS Star Coord at Epoch: 05h 05m 59.32210s +22:52:50.85979s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.821
 G magnitude : 17.350
 RP magnitude : 16.562
 BP magnitude : 18.009
 DUPflag : 0
 Distance (au) : 18.471
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.16
 Sun-Target sep (deg) : 139.04
 Sun-Moon sep (deg) : 46.18
 B (ring opening deg) : 82.26
 PA of pole (deg) : -5.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.216
 C/A sky separation (km) : 43083.8
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

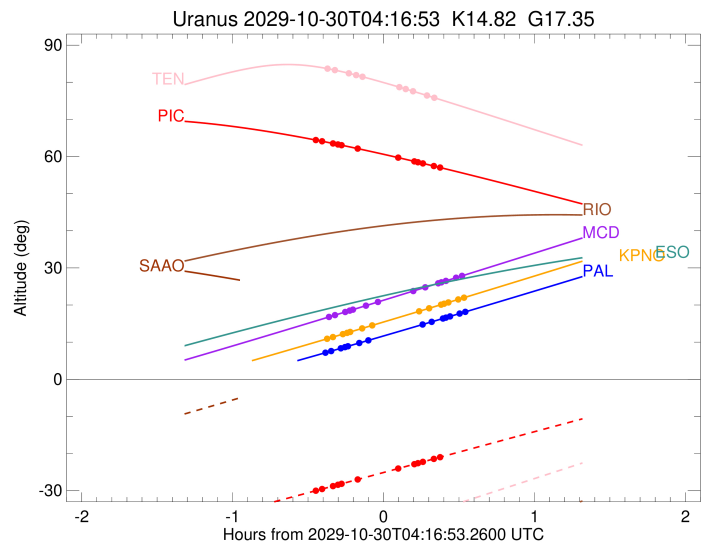
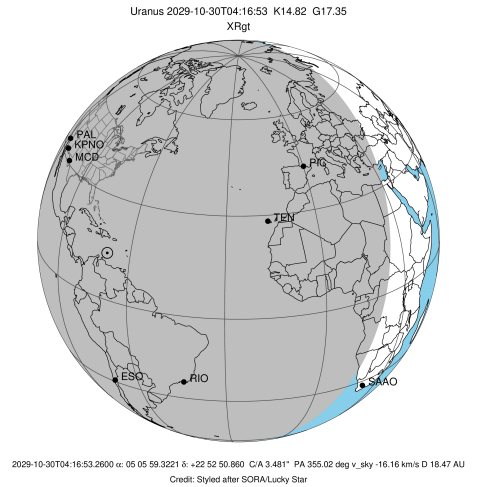


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-30T03:53:09.106		7.03	-37.09	51502.30	-8.57		
lambda	I	2029-10-30T03:56:07.072		7.60	-37.71	50026.71	-7.95		
delta	I	2029-10-30T03:59:57.646		8.35	-38.50	48300.35	-7.00		
gamma	I	2029-10-30T04:01:37.595		8.67	-38.85	47622.37	-6.56		
eta	I	2029-10-30T04:02:47.320		8.90	-39.09	47176.12	-6.24		
beta	I	2029-10-30T04:07:17.646		9.78	-40.02	45666.66	-4.92		
alpha	I	2029-10-30T04:11:02.268		10.51	-40.79	44697.27	-3.70		

No planet occultations

alpha	E	2029-10-30T04:32:13.617		14.71	-45.12	44687.69	3.71		
beta	E	2029-10-30T04:36:02.086		15.47	-45.89	45676.86	4.93		
eta	E	2029-10-30T04:40:29.259		16.36	-46.78	47176.12	6.27		
gamma	E	2029-10-30T04:41:39.271		16.59	-47.02	47626.35	6.59		
delta	E	2029-10-30T04:43:18.131		16.93	-47.35	48300.35	7.04		
lambda	E	2029-10-30T04:47:07.436		17.69	-48.11	50026.71	8.00		
epsilon	E	2029-10-30T04:49:19.957		18.14	-48.55	51121.32	8.62		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-30T04:21:45.000
 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 : 3418390618648431360
 2Mass ID (if available) : 05055931+2252509
 ICRS Star Coord at Epoch: 05h 05m 59.32210s +22:52:50.85979s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.821
 G magnitude : 17.350
 RP magnitude : 16.562
 BP magnitude : 18.009
 DUPflag : 0
 Distance (au) : 18.471
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.16
 Sun-Target sep (deg) : 139.04
 Sun-Moon sep (deg) : 46.23
 B (ring opening deg) : 82.26
 PA of pole (deg) : -5.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.239
 C/A sky separation (km) : 43392.0
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

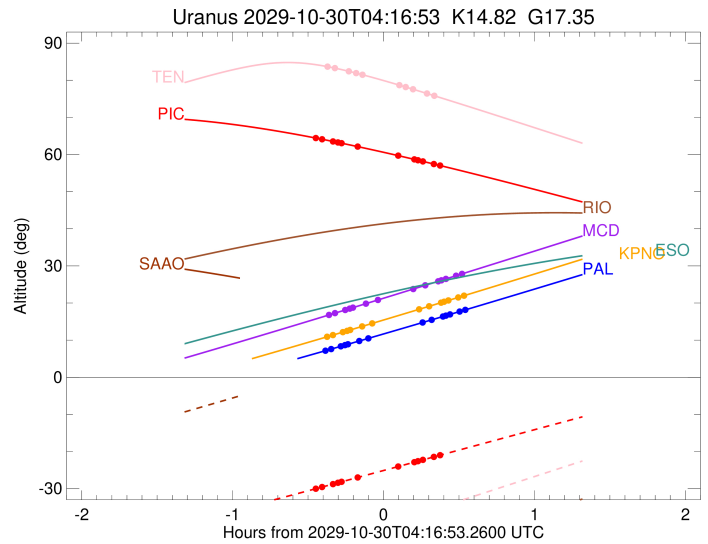
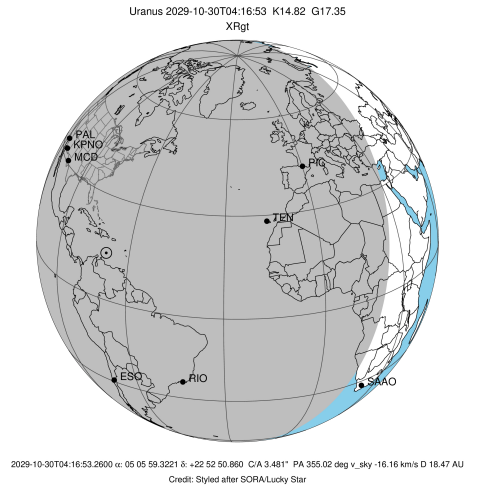


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-30T03:53:48.060		10.77	-41.83	51500.03	-8.43		
lambda	I	2029-10-30T03:56:49.017		11.37	-42.46	50026.71	-7.79		
delta	I	2029-10-30T04:00:45.351		12.16	-43.28	48300.35	-6.80		
gamma	I	2029-10-30T04:02:28.572		12.51	-43.64	47622.43	-6.33		
eta	I	2029-10-30T04:03:40.981		12.75	-43.89	47176.12	-5.99		
beta	I	2029-10-30T04:08:26.323		13.71	-44.88	45667.10	-4.57		
alpha	I	2029-10-30T04:12:35.804		14.55	-45.74	44696.43	-3.20		

No planet occultations

alpha	E	2029-10-30T04:30:48.784		18.26	-49.48	44688.17	3.20		
beta	E	2029-10-30T04:35:02.098		19.12	-50.33	45676.57	4.58		
eta	E	2029-10-30T04:39:44.286		20.09	-51.28	47176.12	6.02		
gamma	E	2029-10-30T04:40:56.980		20.34	-51.53	47626.26	6.36		
delta	E	2029-10-30T04:42:39.109		20.69	-51.87	48300.35	6.83		
lambda	E	2029-10-30T04:46:34.169		21.50	-52.65	50026.71	7.84		
epsilon	E	2029-10-30T04:48:49.771		21.97	-53.10	51126.08	8.48		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-30T04:21:43.590
 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 : 3418390618648431360
 2Mass ID (if available) : 05055931+2252509
 ICRS Star Coord at Epoch: 05h 05m 59.32210s +22:52:50.85979s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.821
 G magnitude : 17.350
 RP magnitude : 16.562
 BP magnitude : 18.009
 DUPflag : 0
 Distance (au) : 18.471
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.16
 Sun-Target sep (deg) : 139.04
 Sun-Moon sep (deg) : 46.29
 B (ring opening deg) : 82.26
 PA of pole (deg) : -5.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.269
 C/A sky separation (km) : 43788.8
 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



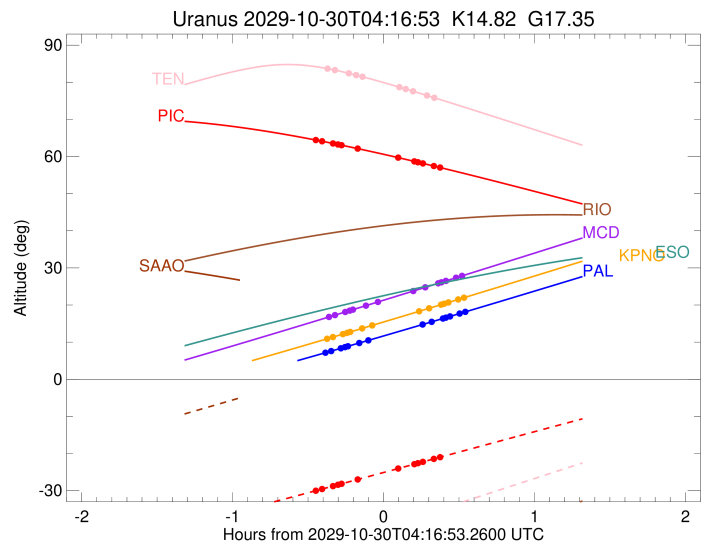
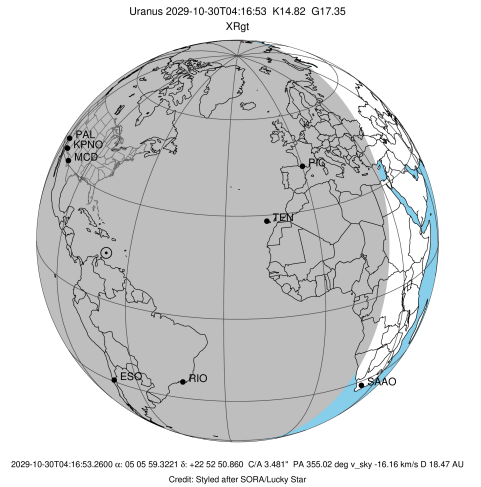
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-30T03:54:32.935		16.65	-48.59	51496.94	-8.24		
lambda	I	2029-10-30T03:57:38.002		17.29	-49.24	50026.71	-7.58		
delta	I	2029-10-30T04:01:42.505		18.13	-50.08	48300.35	-6.52		
gamma	I	2029-10-30T04:03:30.508		18.50	-50.46	47622.51	-6.02		
eta	I	2029-10-30T04:04:46.930		18.77	-50.72	47176.12	-5.66		
beta	I	2029-10-30T04:09:56.485		19.84	-51.79	45667.72	-4.07		
alpha	I	2029-10-30T04:14:57.194		20.88	-52.81	44695.12	-2.38		

No planet occultations

alpha	E	2029-10-30T04:28:24.814		23.70	-55.54	44689.00	2.38		
beta	E	2029-10-30T04:33:29.352		24.77	-56.55	45676.13	4.08		
eta	E	2029-10-30T04:38:35.772		25.84	-57.56	47176.12	5.68		
gamma	E	2029-10-30T04:39:52.481		26.11	-57.81	47626.14	6.05		
delta	E	2029-10-30T04:41:39.402		26.49	-58.16	48300.35	6.56		
lambda	E	2029-10-30T04:45:42.648		27.35	-58.95	50026.71	7.62		
epsilon	E	2029-10-30T04:48:02.506		27.84	-59.40	51132.27	8.30		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-10-30T04:15:52.670
 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 : 3418390618648431360
 2Mass ID (if available) : 05055931+2252509
 ICRS Star Coord at Epoch: 05h 05m 59.32210s +22:52:50.85979s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.821
 G magnitude : 17.350
 RP magnitude : 16.562
 BP magnitude : 18.009
 DUPflag : 0
 Distance (au) : 18.471
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -16.16
 Sun-Target sep (deg) : 139.04
 Sun-Moon sep (deg) : 46.07
 B (ring opening deg) : 82.26
 PA of pole (deg) : -5.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.448
 C/A sky separation (km) : 46185.9
 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_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	2029-10-30T03:53:53.961		83.77	-44.99	51471.63	-6.93		
lambda	I	2029-10-30T03:57:35.963		83.27	-44.18	50026.71	-6.00		
delta	I	2029-10-30T04:03:09.763		82.41	-42.97	48300.35	-4.32		
gamma	I	2029-10-30T04:06:05.762		81.92	-42.33	47623.26	-3.37		
eta	I	2029-10-30T04:08:37.512		81.48	-41.77	47176.12	-2.52		

No planet occultations

eta	E	2029-10-30T04:23:06.387		78.71	-38.60	47176.12	2.52		
gamma	E	2029-10-30T04:25:38.730		78.20	-38.04	47625.26	3.37		
delta	E	2029-10-30T04:28:34.135		77.60	-37.40	48300.35	4.32		
lambda	E	2029-10-30T04:34:07.932		76.45	-36.17	50026.71	6.00		
epsilon	E	2029-10-30T04:37:06.249		75.83	-35.52	51169.72	6.94		