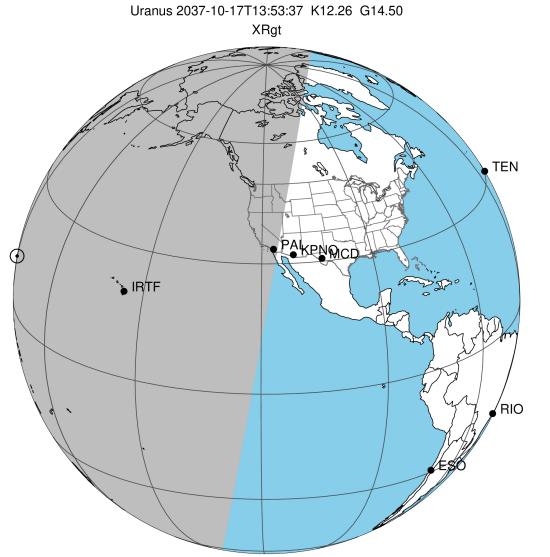


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-10-17T13:53:37.210
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 674770633860125312
 2Mass ID (if available) : 07421011+2149524

ICRS Star Coord at Epoch: 07h 42m 10.11974s +21:49:51.93106s

RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.255
 G magnitude : 14.502
 RP magnitude : 13.768
 BP magnitude : 15.099
 DUPflag : 0
 Distance (au) : 18.684
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.28
 Sun-Target sep (deg) : 90.43
 Sun-Moon sep (deg) : 161.83
 B (ring opening deg) : 53.24
 PA of pole (deg) : 86.27

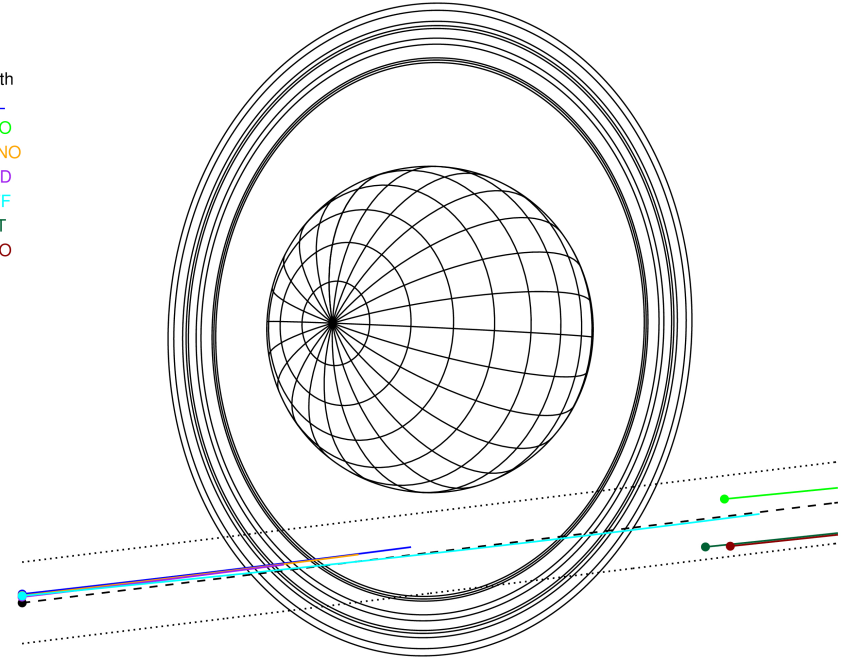
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2037-10-17T13:53:37.2100 a: 07 42 10.1197 s: +21 49 51.931 C/A 2.564° PA 7.01 deg v_sky + 6.28 km/s D 18.68 AU
 Credit: Styled after SORA/Lucky Star

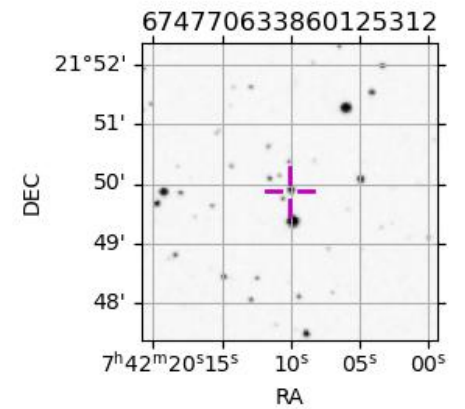
Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 AAT
 MSO

Uranus 2037-10-17T13:53:37 K12.26 G14.50 XRgt

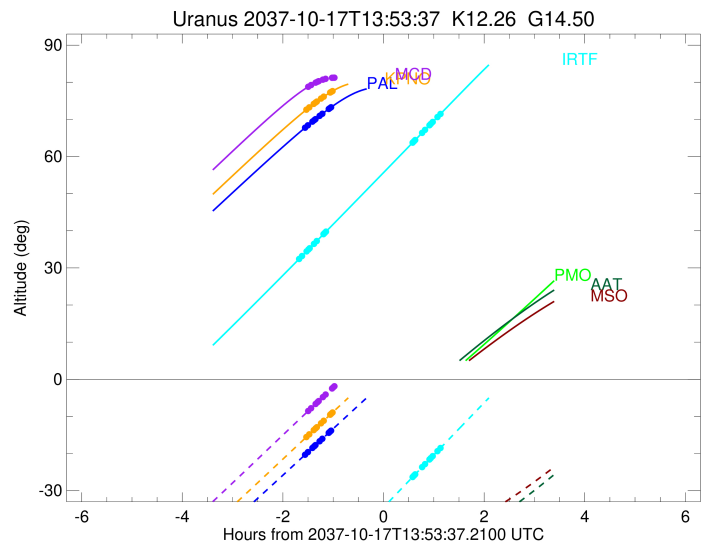
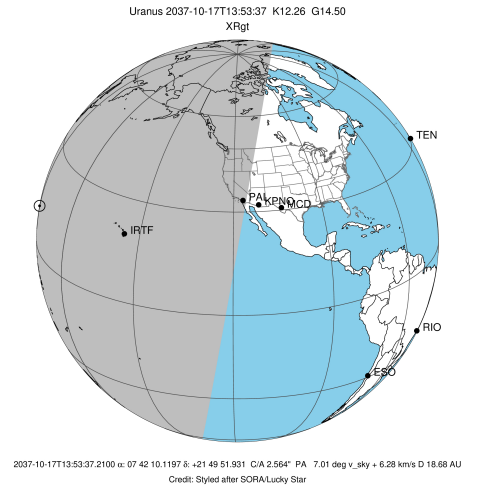


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++			OCT 17 12:20 - OCT 17 12:51	PnnRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++			OCT 17 12:22 - OCT 17 12:52	PnnRin
MCD	McDonald Obs. 2.7m	30.7	256.0	++++			OCT 17 12:24 - OCT 17 12:36	PnnRin
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	OCT 17 12:13 - OCT 17 15:02	PnnRie
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 : 2037-10-17T13:54:31.460
 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 : 674770633860125312
 2Mass ID (if available) : 07421011+2149524
 ICRS Star Coord at Epoch: 07h 42m 10.11974s +21:49:51.93106s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.255
 G magnitude : 14.502
 RP magnitude : 13.768
 BP magnitude : 15.099
 DUPflag : 0
 Distance (au) : 18.684
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.28
 Sun-Target sep (deg) : 90.43
 Sun-Moon sep (deg) : 162.10
 B (ring opening deg) : 53.24
 PA of pole (deg) : 86.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.465
 C/A sky separation (km) : 33401.1
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

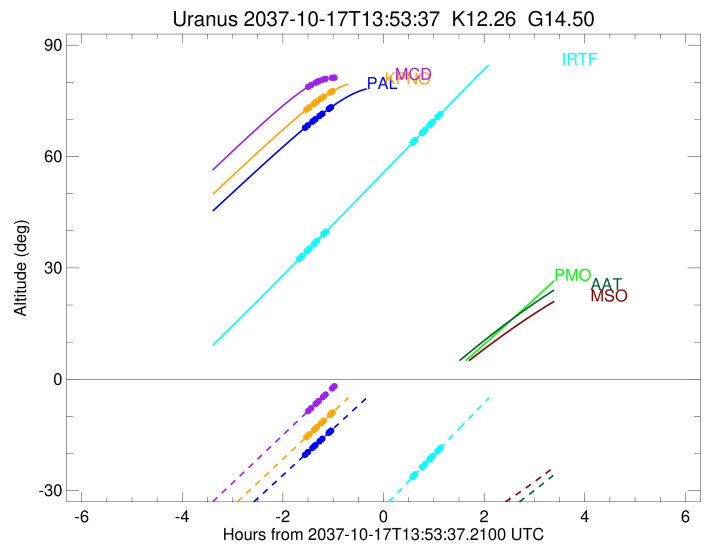
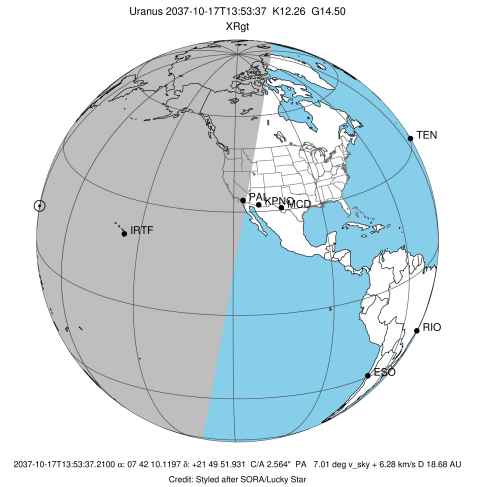


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-10-17T12:20:44.876		67.89	-20.19	50941.38	-5.55		
lambda	I	2037-10-17T12:23:31.836		68.42	-19.61	50026.71	-5.44		
delta	I	2037-10-17T12:28:54.313		69.41	-18.49	48300.35	-5.27		
gamma	I	2037-10-17T12:31:02.176		69.80	-18.04	47631.50	-5.19		
eta	I	2037-10-17T12:32:30.277		70.07	-17.73	47176.12	-5.14		
beta	I	2037-10-17T12:37:33.021		70.97	-16.68	45646.26	-4.96		
alpha	I	2037-10-17T12:40:40.247		71.52	-16.03	44733.17	-4.83		
4	I	2037-10-17T12:48:15.320		72.81	-14.44	42616.15	-4.49		
5	I	2037-10-17T12:49:55.950		73.08	-14.09	42174.74	-4.41		
6	I	2037-10-17T12:51:14.708		73.30	-13.82	41807.57	-4.35		

No planet occultations

6	E	2037-10-17T14:44:47.581		72.69	9.49x	41857.62	4.32		
5	E	2037-10-17T14:46:04.391		72.47	9.74x	42167.63	4.38		
4	E	2037-10-17T14:47:35.808		72.22	10.05x	42576.35	4.47		
alpha	E	2037-10-17T14:55:26.982		70.85	11.60x	44750.73	4.80		
beta	E	2037-10-17T14:58:35.693		70.29	12.22x	45673.34	4.92		
eta	E	2037-10-17T15:03:34.886		69.38	13.19x	47176.12	5.11		
gamma	E	2037-10-17T15:05:02.448		69.12	13.48x	47625.36	5.16		
delta	E	2037-10-17T15:07:12.470		68.71	13.90x	48300.35	5.23		
lambda	E	2037-10-17T15:12:37.505		67.69	14.95x	50026.71	5.39		
epsilon	E	2037-10-17T15:17:11.939		66.82	15.84x	51524.51	5.51		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-10-17T13:56:12.740
 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 : 674770633860125312
 2Mass ID (if available) : 07421011+2149524
 ICRS Star Coord at Epoch: 07h 42m 10.11974s +21:49:51.93106s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.255
 G magnitude : 14.502
 RP magnitude : 13.768
 BP magnitude : 15.099
 DUPflag : 0
 Distance (au) : 18.684
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.28
 Sun-Target sep (deg) : 90.43
 Sun-Moon sep (deg) : 162.03
 B (ring opening deg) : 53.24
 PA of pole (deg) : 86.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.470
 C/A sky separation (km) : 33467.8
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

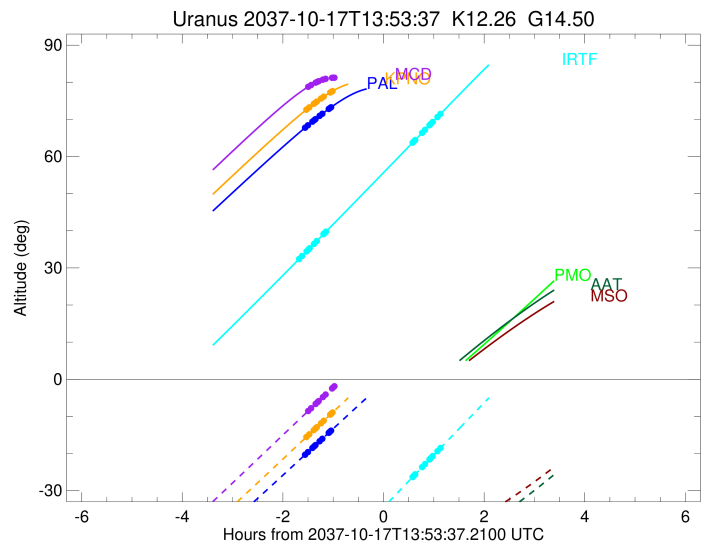
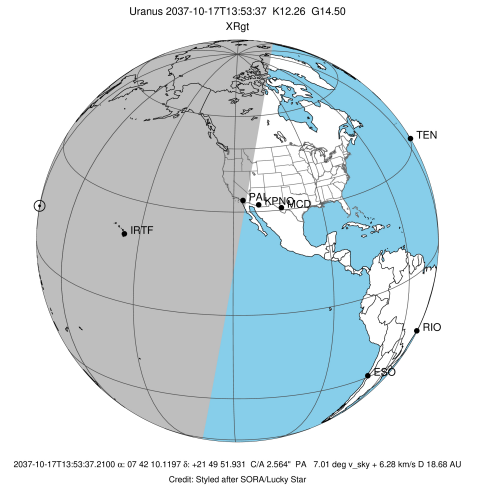


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-10-17T12:22:19.418		72.75	-15.42	50942.75	-5.53		
lambda	I	2037-10-17T12:25:07.423		73.25	-14.83	50026.71	-5.41		
delta	I	2037-10-17T12:30:31.461		74.20	-13.68	48300.35	-5.24		
gamma	I	2037-10-17T12:32:39.955		74.56	-13.23	47631.50	-5.17		
eta	I	2037-10-17T12:34:08.495		74.81	-12.91	47176.12	-5.12		
beta	I	2037-10-17T12:39:12.773		75.64	-11.84	45646.32	-4.93		
alpha	I	2037-10-17T12:42:20.971		76.13	-11.17	44733.31	-4.81		
4	I	2037-10-17T12:49:58.620		77.24	-9.56	42616.12	-4.47		
5	I	2037-10-17T12:51:39.894		77.47	-9.20	42174.48	-4.38		
6	I	2037-10-17T12:52:59.081		77.65	-8.92	41807.72	-4.32		

No planet occultations

6	E	2037-10-17T14:46:08.246		69.33	14.41x	41857.58	4.31		
5	E	2037-10-17T14:47:25.263		69.08	14.66x	42167.59	4.37		
4	E	2037-10-17T14:48:56.923		68.78	14.96x	42576.39	4.46		
alpha	E	2037-10-17T14:56:48.939		67.22	16.51x	44750.73	4.80		
beta	E	2037-10-17T14:59:57.863		66.59	17.12x	45673.33	4.92		
eta	E	2037-10-17T15:04:57.278		65.59	18.10x	47176.12	5.10		
gamma	E	2037-10-17T15:06:24.879		65.29	18.38x	47625.36	5.15		
delta	E	2037-10-17T15:08:34.938		64.85	18.80x	48300.35	5.23		
lambda	E	2037-10-17T15:13:59.969		63.74	19.84x	50026.71	5.39		
epsilon	E	2037-10-17T15:18:34.300		62.80	20.71x	51524.51	5.51		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-10-17T13:58:34.930
 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 : 674770633860125312
 2Mass ID (if available) : 07421011+2149524
 ICRS Star Coord at Epoch: 07h 42m 10.11974s +21:49:51.93106s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.255
 G magnitude : 14.502
 RP magnitude : 13.768
 BP magnitude : 15.099
 DUPflag : 0
 Distance (au) : 18.684
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.28
 Sun-Target sep (deg) : 90.43
 Sun-Moon sep (deg) : 161.93
 B (ring opening deg) : 53.24
 PA of pole (deg) : 86.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.469
 C/A sky separation (km) : 33452.6
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

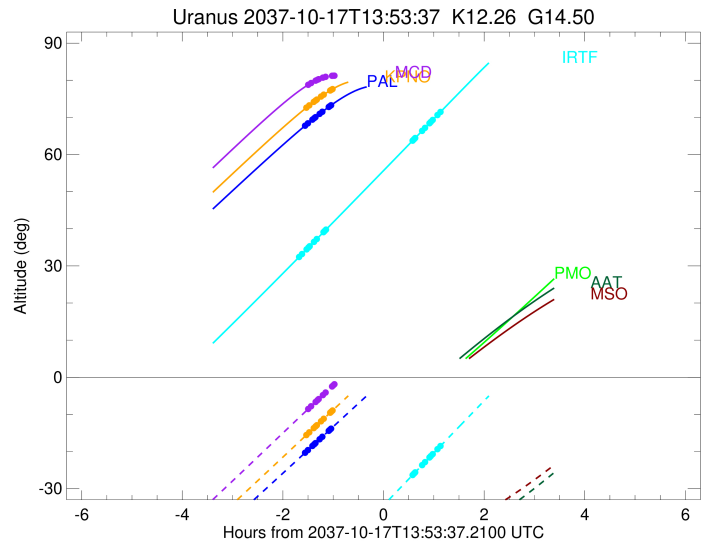
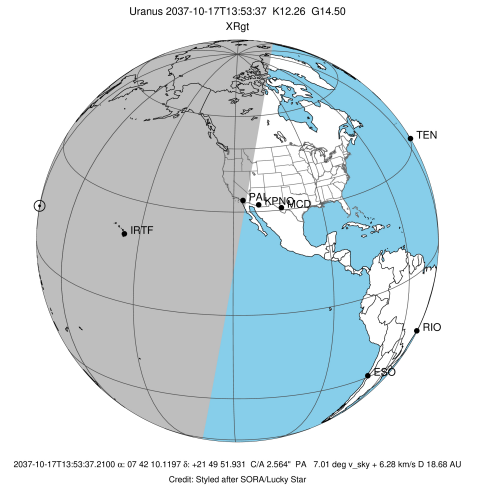


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-10-17T12:24:30.702		78.89	-8.40	50943.69	-5.51		
lambda	I	2037-10-17T12:27:19.289		79.26	-7.79	50026.71	-5.40		
delta	I	2037-10-17T12:32:44.060		79.92	-6.64	48300.35	-5.23		
gamma	I	2037-10-17T12:34:52.822		80.15	-6.18	47631.50	-5.16		
eta	I	2037-10-17T12:36:21.538		80.29	-5.86	47176.12	-5.11		
beta	I	2037-10-17T12:41:26.368		80.73	-4.78x	45646.35	-4.92		
alpha	I	2037-10-17T12:44:34.862		80.93	-4.11x	44733.39	-4.80		
4	I	2037-10-17T12:52:13.136		81.22	-2.49x	42616.11	-4.46		
5	I	2037-10-17T12:53:54.541		81.23	-2.13x	42174.35	-4.38		
6	I	2037-10-17T12:55:13.778		81.24	-1.85x	41807.79	-4.32		

No planet occultations

6	E	2037-10-17T14:48:18.131		63.11	21.29x	41857.68	4.33		
5	E	2037-10-17T14:49:34.846		62.84	21.54x	42167.71	4.39		
4	E	2037-10-17T14:51:06.090		62.52	21.83x	42576.27	4.48		
alpha	E	2037-10-17T14:58:56.205		60.86	23.34x	44750.70	4.82		
beta	E	2037-10-17T15:02:04.338		60.19	23.93x	45673.38	4.94		
eta	E	2037-10-17T15:07:02.426		59.13	24.87x	47176.12	5.13		
gamma	E	2037-10-17T15:08:29.630		58.82	25.14x	47625.35	5.18		
delta	E	2037-10-17T15:10:39.099		58.36	25.55x	48300.35	5.25		
lambda	E	2037-10-17T15:16:02.608		57.20	26.55x	50026.71	5.42		
epsilon	E	2037-10-17T15:20:35.682		56.23	27.39x	51524.91	5.54		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-10-17T13:42:31.810
 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 : 674770633860125312
 2Mass ID (if available) : 07421011+2149524
 ICRS Star Coord at Epoch: 07h 42m 10.11974s +21:49:51.93106s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.255
 G magnitude : 14.502
 RP magnitude : 13.768
 BP magnitude : 15.099
 DUPflag : 0
 Distance (au) : 18.684
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 6.28
 Sun-Target sep (deg) : 90.43
 Sun-Moon sep (deg) : 162.55
 B (ring opening deg) : 53.24
 PA of pole (deg) : 86.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.574
 C/A sky separation (km) : 34881.6
 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_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	2037-10-17T12:13:38.845		32.56	-57.80	50949.49	-5.50		
lambda	I	2037-10-17T12:16:29.093		33.21	-57.15	50026.71	-5.37		
delta	I	2037-10-17T12:21:56.599		34.46	-55.90	48300.35	-5.17		
gamma	I	2037-10-17T12:24:07.093		34.96	-55.40	47631.48	-5.08		
eta	I	2037-10-17T12:25:37.232		35.30	-55.06	47176.12	-5.02		
beta	I	2037-10-17T12:30:48.542		36.50	-53.86	45646.71	-4.80		
alpha	I	2037-10-17T12:34:02.406		37.24	-53.11	44734.24	-4.65		
4	I	2037-10-17T12:41:59.943		39.07	-51.27	42615.85	-4.24		
5	I	2037-10-17T12:43:47.231		39.48	-50.86	42172.47	-4.14		
6	I	2037-10-17T12:45:10.819		39.81	-50.53	41808.98	-4.06		

No planet occultations

6	E	2037-10-17T14:28:15.420		63.71	-26.36	41854.74	3.95		
5	E	2037-10-17T14:29:39.313		64.04	-26.03	42164.60	4.02		
4	E	2037-10-17T14:31:20.245		64.43	-25.63	42579.60	4.12		
alpha	E	2037-10-17T14:39:46.473		66.40	-23.65	44751.35	4.49		
beta	E	2037-10-17T14:43:07.232		67.18	-22.86	45672.31	4.63		
eta	E	2037-10-17T14:48:24.580		68.41	-21.62	47176.12	4.83		
gamma	E	2037-10-17T14:49:57.099		68.77	-21.26	47625.67	4.89		
delta	E	2037-10-17T14:52:14.079		69.30	-20.72	48300.35	4.96		
lambda	E	2037-10-17T14:57:55.564		70.62	-19.38	50026.71	5.14		
epsilon	E	2037-10-17T15:02:41.230		71.73	-18.26	51515.77	5.26		