

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T04:57:35.610
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117

ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s

RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 67.96
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69

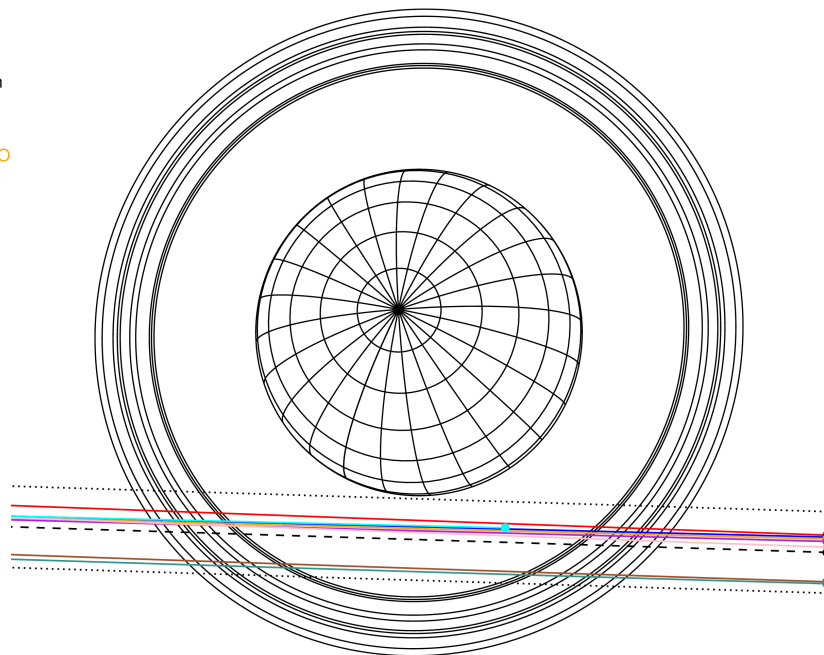
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-12-06T04:57:35.6100 α: 05 39 15.9904 α: +23 30 11.619 C/A 2.460° PA 358.21 deg v_sky -22.80 km/s D 18.12 AU
 Credit: Styled after SORA/Lucky Star

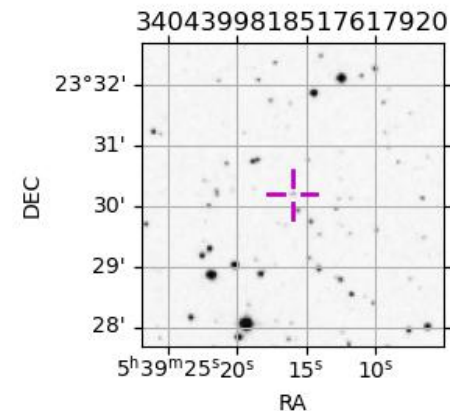
Uranus 2031-12-06T04:57:35 K14.87 G18.08 XRgt

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO

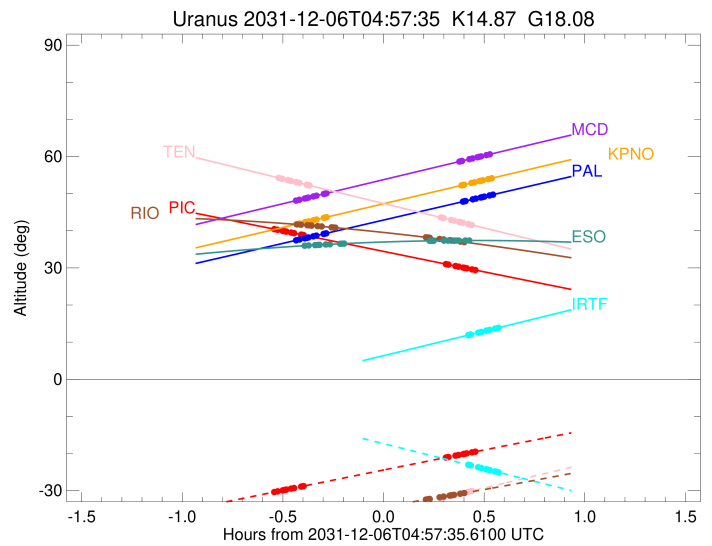
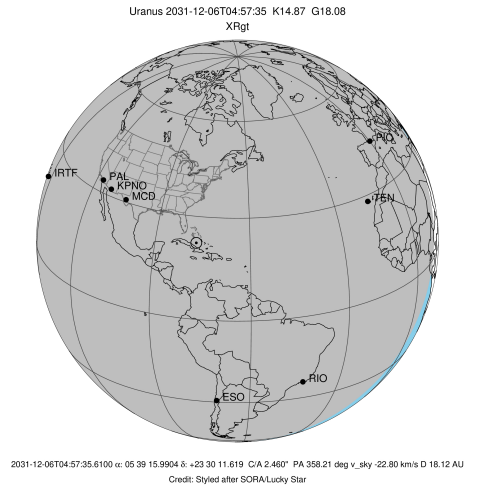


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 06 04:24 - DEC 06 05:25	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	DEC 06 04:31 - DEC 06 05:30	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 06 04:31 - DEC 06 05:29	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 06 04:31 - DEC 06 05:29	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 06 04:26 - DEC 06 05:23	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5			+++++	DEC 06 05:22 - DEC 06 05:31	PnnRne
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	DEC 06 04:31 - DEC 06 05:21	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	DEC 06 04:33 - DEC 06 05:23	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 : 2031-12-06T04:54:35.170
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.23
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.238
 C/A sky separation (km) : 29414.5
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

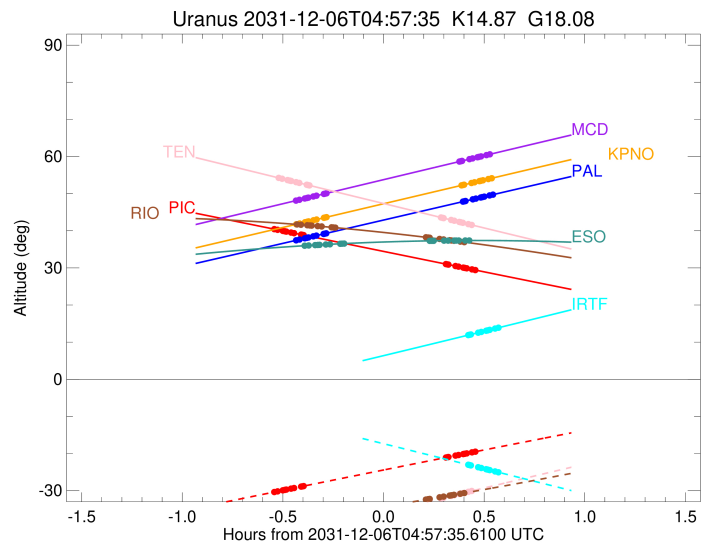
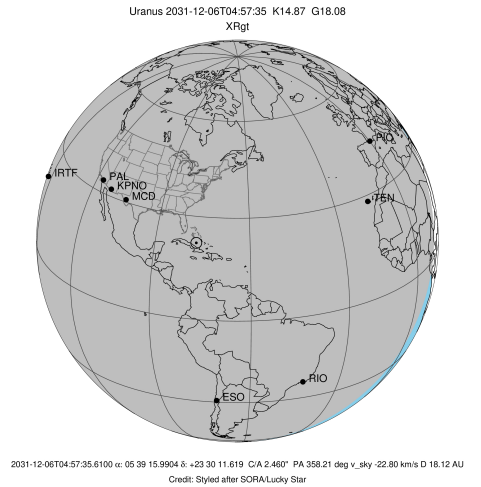


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:24:43.212		40.50	-30.44	51512.59	-18.99		
lambda	I	2031-12-06T04:26:02.232		40.25	-30.20	50026.71	-18.66		
delta	I	2031-12-06T04:27:35.686		39.97	-29.91	48300.35	-18.28		
gamma	I	2031-12-06T04:28:12.767		39.85	-29.80	47625.38	-18.12		
eta	I	2031-12-06T04:28:37.634		39.78	-29.72	47176.12	-18.01		
beta	I	2031-12-06T04:30:01.553		39.52	-29.47	45680.73	-17.61		
alpha	I	2031-12-06T04:30:54.837		39.36	-29.30	44748.10	-17.34		
4	I	2031-12-06T04:33:03.463		38.96	-28.91	42563.09	-16.58		
5	I	2031-12-06T04:33:28.728		38.89	-28.83	42155.37	-16.44		
6	I	2031-12-06T04:33:48.234		38.83	-28.77	41825.24	-16.33		

No planet occultations

6	E	2031-12-06T05:16:13.445		31.02	-21.08	41877.95	16.30		
5	E	2031-12-06T05:16:34.727		30.96	-21.01	42226.34	16.40		
4	E	2031-12-06T05:16:52.952		30.90	-20.96	42526.89	16.54		
alpha	E	2031-12-06T05:19:03.194		30.50	-20.57	44731.39	17.30		
beta	E	2031-12-06T05:19:56.135		30.34	-20.41	45653.68	17.56		
eta	E	2031-12-06T05:21:21.846		30.08	-20.15	47176.12	17.96		
gamma	E	2031-12-06T05:21:46.561		30.00	-20.08	47621.36	18.07		
delta	E	2031-12-06T05:22:23.971		29.89	-19.97	48300.35	18.23		
lambda	E	2031-12-06T05:23:57.704		29.60	-19.69	50026.71	18.60		
epsilon	E	2031-12-06T05:25:00.134		29.41	-19.50	51195.08	18.93		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T05:00:30.690
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.76
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.314
 C/A sky separation (km) : 30410.9
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

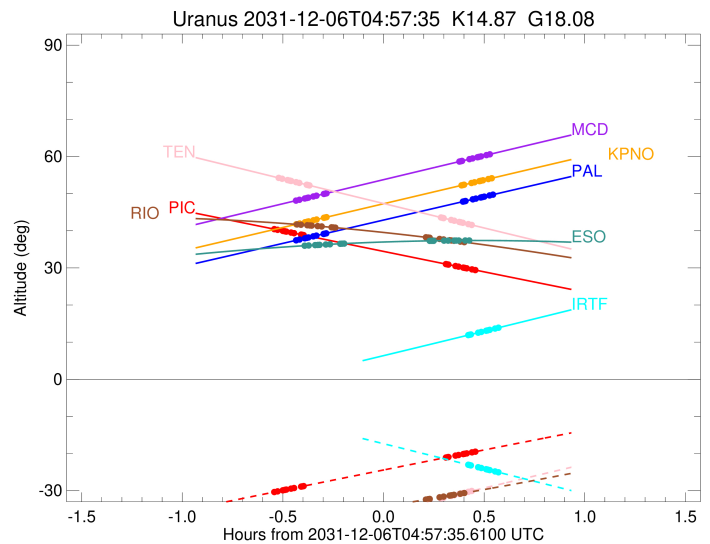
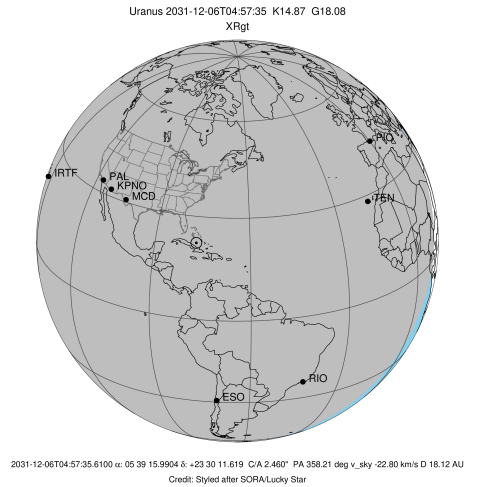


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:31:13.568		37.37	-47.65	51515.03	-18.66		
lambda	I	2031-12-06T04:32:34.199		37.65	-47.93	50026.71	-18.30		
delta	I	2031-12-06T04:34:09.573		37.98	-48.26	48300.35	-17.89		
gamma	I	2031-12-06T04:34:47.481		38.11	-48.40	47625.29	-17.72		
eta	I	2031-12-06T04:35:12.915		38.20	-48.48	47176.12	-17.60		
beta	I	2031-12-06T04:36:38.907		38.50	-48.78	45680.64	-17.16		
alpha	I	2031-12-06T04:37:33.602		38.69	-48.97	44748.43	-16.87		
4	I	2031-12-06T04:39:46.275		39.15	-49.44	42562.05	-16.03		
5	I	2031-12-06T04:40:12.349		39.24	-49.53	42155.17	-15.88		
6	I	2031-12-06T04:40:32.473		39.31	-49.60	41826.24	-15.76		

No planet occultations

6	E	2031-12-06T05:21:18.673		47.86	-58.06	41877.36	15.80		
5	E	2031-12-06T05:21:40.411		47.94	-58.13	42222.76	15.92		
4	E	2031-12-06T05:21:59.352		48.00	-58.20	42526.53	16.08		
alpha	E	2031-12-06T05:24:13.027		48.47	-58.65	44732.67	16.92		
beta	E	2031-12-06T05:25:07.062		48.66	-58.84	45654.43	17.21		
eta	E	2031-12-06T05:26:34.336		48.96	-59.14	47176.12	17.66		
gamma	E	2031-12-06T05:26:59.464		49.05	-59.22	47621.29	17.78		
delta	E	2031-12-06T05:27:37.473		49.19	-59.35	48300.35	17.95		
lambda	E	2031-12-06T05:29:12.523		49.52	-59.68	50026.71	18.36		
epsilon	E	2031-12-06T05:30:16.462		49.74	-59.89	51209.11	18.73		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T05:00:20.250
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.79
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.336
 C/A sky separation (km) : 30707.4
 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

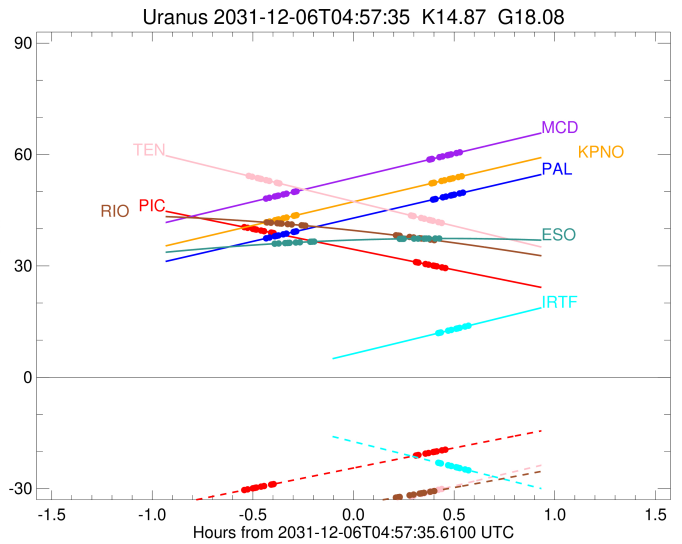
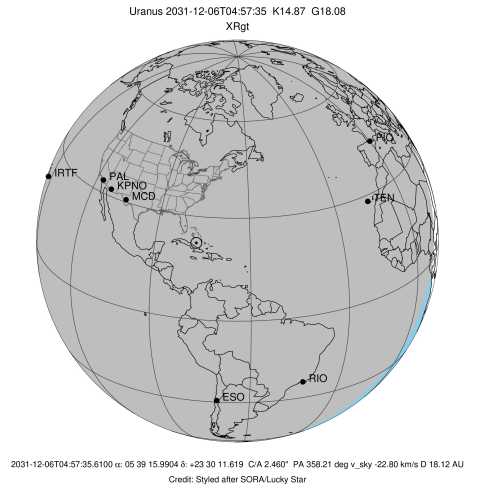


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:31:15.362		41.67	-52.16	51516.35	-18.59		
lambda	I	2031-12-06T04:32:36.408		41.96	-52.45	50026.71	-18.22		
delta	I	2031-12-06T04:34:12.250		42.30	-52.79	48300.35	-17.80		
gamma	I	2031-12-06T04:34:50.366		42.44	-52.92	47625.25	-17.62		
eta	I	2031-12-06T04:35:15.943		42.53	-53.01	47176.12	-17.50		
beta	I	2031-12-06T04:36:42.479		42.83	-53.32	45680.60	-17.05		
alpha	I	2031-12-06T04:37:37.547		43.03	-53.51	44748.58	-16.75		
4	I	2031-12-06T04:39:51.368		43.50	-53.99	42561.59	-15.89		
5	I	2031-12-06T04:40:17.663		43.60	-54.08	42155.10	-15.73		
6	I	2031-12-06T04:40:37.954		43.67	-54.15	41826.69	-15.60		

No planet occultations

6	E	2031-12-06T05:20:52.838		52.24	-62.60	41877.21	15.64		
5	E	2031-12-06T05:21:14.753		52.32	-62.67	42221.97	15.77		
4	E	2031-12-06T05:21:33.921		52.39	-62.74	42526.46	15.92		
alpha	E	2031-12-06T05:23:48.762		52.87	-63.20	44732.95	16.79		
beta	E	2031-12-06T05:24:43.182		53.06	-63.39	45654.60	17.10		
eta	E	2031-12-06T05:26:11.014		53.37	-63.69	47176.12	17.55		
gamma	E	2031-12-06T05:26:36.290		53.46	-63.78	47621.27	17.67		
delta	E	2031-12-06T05:27:14.515		53.60	-63.91	48300.35	17.86		
lambda	E	2031-12-06T05:28:50.051		53.93	-64.24	50026.71	18.28		
epsilon	E	2031-12-06T05:29:54.431		54.16	-64.46	51211.91	18.65		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T05:00:00.790
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.83
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.362
 C/A sky separation (km) : 31049.1
 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

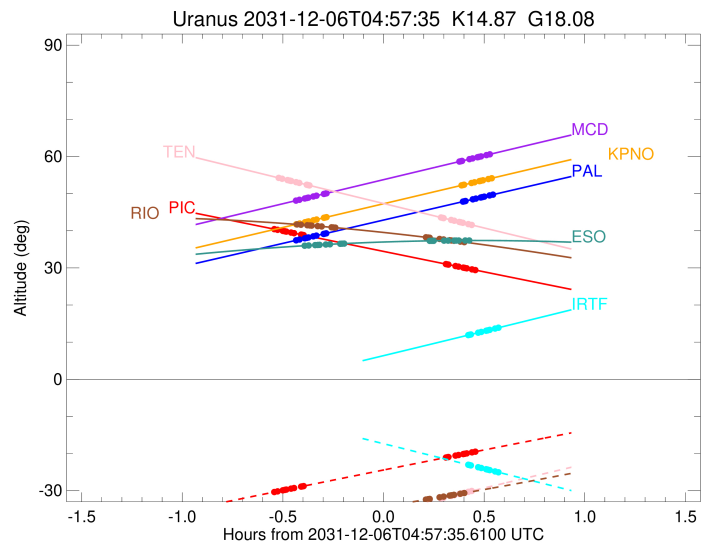
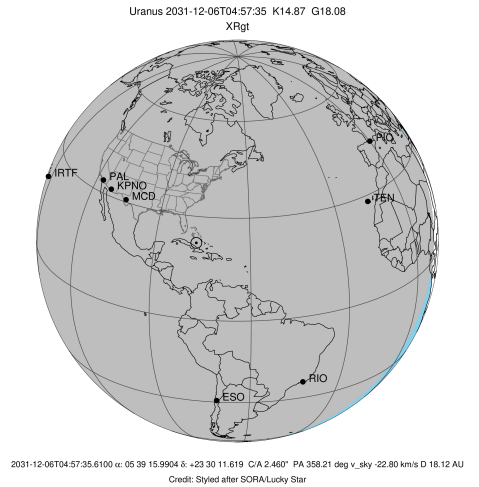


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:31:10.479		48.06	-58.72	51517.89	-18.50		
lambda	I	2031-12-06T04:32:32.001		48.35	-59.01	50026.71	-18.12		
delta	I	2031-12-06T04:34:08.378		48.70	-59.36	48300.35	-17.69		
gamma	I	2031-12-06T04:34:46.736		48.84	-59.49	47625.19	-17.51		
eta	I	2031-12-06T04:35:12.479		48.93	-59.58	47176.12	-17.38		
beta	I	2031-12-06T04:36:39.647		49.24	-59.89	45680.54	-16.91		
alpha	I	2031-12-06T04:37:35.153		49.44	-60.09	44748.76	-16.60		
4	I	2031-12-06T04:39:50.331		49.93	-60.57	42561.03	-15.71		
5	I	2031-12-06T04:40:16.886		50.03	-60.67	42155.02	-15.55		
6	I	2031-12-06T04:40:37.377		50.10	-60.74	41827.22	-15.42		

No planet occultations

6	E	2031-12-06T05:20:15.136		58.65	-69.06	41877.04	15.45		
5	E	2031-12-06T05:20:37.264		58.73	-69.14	42221.05	15.58		
4	E	2031-12-06T05:20:56.703		58.80	-69.21	42526.38	15.75		
alpha	E	2031-12-06T05:23:12.935		59.29	-69.67	44733.26	16.64		
beta	E	2031-12-06T05:24:07.813		59.49	-69.86	45654.78	16.96		
eta	E	2031-12-06T05:25:36.304		59.81	-70.16	47176.12	17.43		
gamma	E	2031-12-06T05:26:01.754		59.90	-70.24	47621.26	17.55		
delta	E	2031-12-06T05:26:40.232		60.03	-70.38	48300.35	17.74		
lambda	E	2031-12-06T05:28:16.339		60.38	-70.70	50026.71	18.18		
epsilon	E	2031-12-06T05:29:21.231		60.61	-70.92	51215.07	18.56		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T04:54:41.450
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.37
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.383
 C/A sky separation (km) : 31320.1
 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

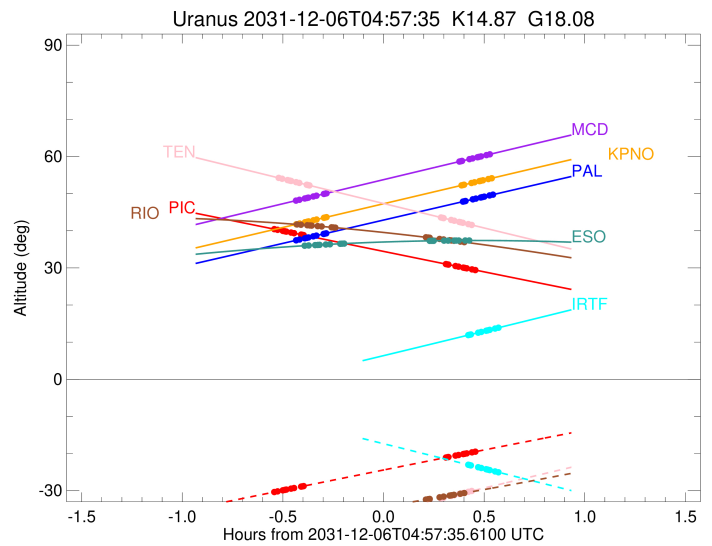
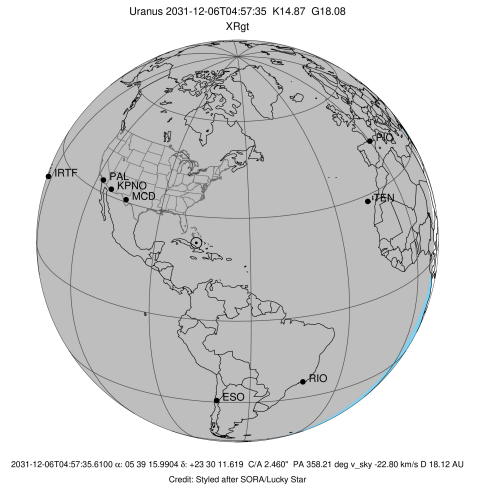


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:26:01.365		54.32	-42.71	51520.58	-18.45		
lambda	I	2031-12-06T04:27:23.294		54.02	-42.41	50026.71	-18.06		
delta	I	2031-12-06T04:29:00.053		53.66	-42.06	48300.35	-17.62		
gamma	I	2031-12-06T04:29:38.593		53.52	-41.92	47625.11	-17.42		
eta	I	2031-12-06T04:30:04.457		53.42	-41.82	47176.12	-17.29		
beta	I	2031-12-06T04:31:32.117		53.10	-41.50	45680.45	-16.81		
alpha	I	2031-12-06T04:32:27.958		52.89	-41.30	44749.03	-16.49		
4	I	2031-12-06T04:34:44.275		52.39	-40.80	42560.21	-15.57		
5	I	2031-12-06T04:35:11.019		52.29	-40.70	42154.93	-15.40		
6	I	2031-12-06T04:35:31.649		52.22	-40.63	41828.01	-15.27		

No planet occultations

6	E	2031-12-06T05:14:45.178		43.58	-32.08	41877.03	15.24		
5	E	2031-12-06T05:15:07.611		43.49	-32.00	42221.04	15.37		
4	E	2031-12-06T05:15:27.314		43.42	-31.92	42526.38	15.54		
alpha	E	2031-12-06T05:17:45.233		42.92	-31.43	44733.23	16.45		
beta	E	2031-12-06T05:18:40.731		42.72	-31.23	45654.76	16.77		
eta	E	2031-12-06T05:20:10.165		42.39	-30.90	47176.12	17.25		
gamma	E	2031-12-06T05:20:35.875		42.29	-30.81	47621.26	17.38		
delta	E	2031-12-06T05:21:14.737		42.15	-30.67	48300.35	17.57		
lambda	E	2031-12-06T05:22:51.762		41.80	-30.32	50026.71	18.01		
epsilon	E	2031-12-06T05:23:57.185		41.56	-30.08	51213.92	18.39		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T05:01:46.300
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.37
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.302
 C/A sky separation (km) : 30261.8
 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

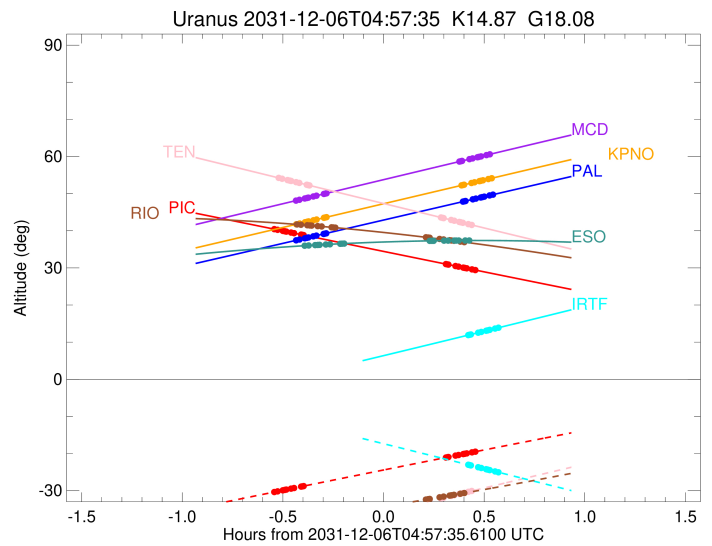
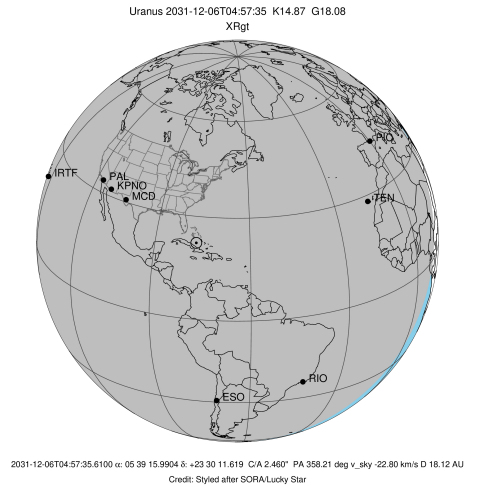


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:32:05.222		0.85x	-11.68	51514.08	-18.50		
lambda	I	2031-12-06T04:33:26.473		1.14x	-11.98	50026.71	-18.15		
delta	I	2031-12-06T04:35:02.611		1.48x	-12.34	48300.35	-17.76		
gamma	I	2031-12-06T04:35:40.809		1.62x	-12.48	47625.32	-17.58		
eta	I	2031-12-06T04:36:06.437		1.71x	-12.57	47176.12	-17.47		
beta	I	2031-12-06T04:37:33.054		2.02x	-12.89	45680.67	-17.04		
alpha	I	2031-12-06T04:38:28.133		2.22x	-13.10	44748.33	-16.76		
4	I	2031-12-06T04:40:41.605		2.70x	-13.59	42562.36	-15.94		
5	I	2031-12-06T04:41:07.844		2.79x	-13.69	42155.22	-15.80		
6	I	2031-12-06T04:41:28.100		2.86x	-13.76	41825.95	-15.68		

No planet occultations

6	E	2031-12-06T05:22:53.876	11.90	-23.03	41877.40	15.73
5	E	2031-12-06T05:23:15.722	11.98	-23.12	42223.00	15.85
4	E	2031-12-06T05:23:34.736	12.05	-23.19	42526.55	16.00
alpha	E	2031-12-06T05:25:49.081	12.55	-23.69	44732.60	16.83
beta	E	2031-12-06T05:26:43.421	12.75	-23.90	45654.39	17.12
eta	E	2031-12-06T05:28:11.220	13.07	-24.23	47176.12	17.55
gamma	E	2031-12-06T05:28:36.504	13.16	-24.32	47621.29	17.67
delta	E	2031-12-06T05:29:14.753	13.30	-24.47	48300.35	17.84
lambda	E	2031-12-06T05:30:50.428	13.66	-24.83	50026.71	18.24
epsilon	E	2031-12-06T05:31:54.774	13.89	-25.07	51208.58	18.60

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T04:56:14.890
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.37
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.810
 C/A sky separation (km) : 36938.2
 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

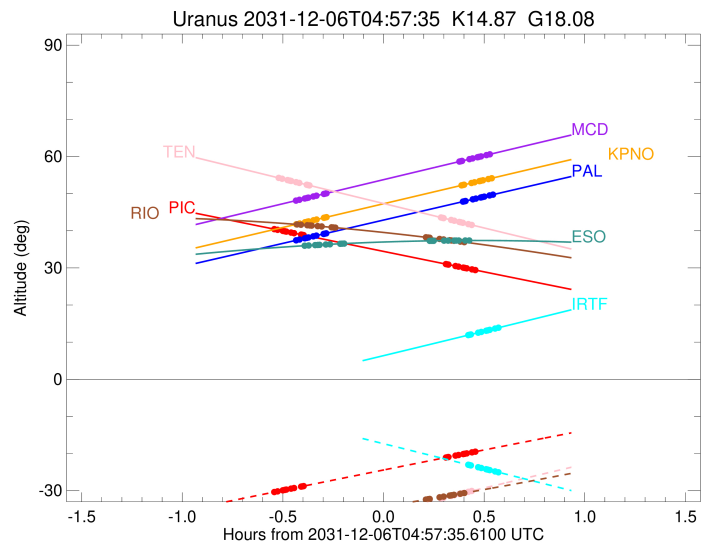
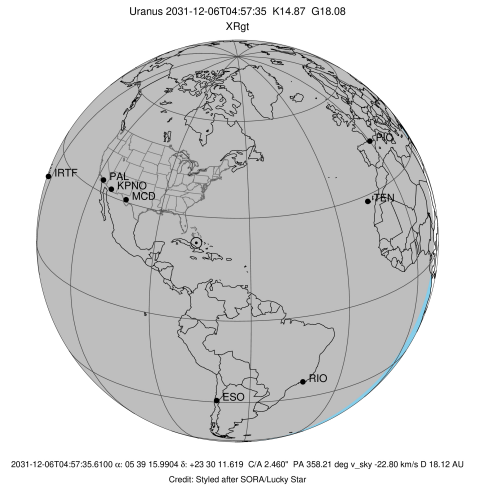


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:31:24.873		41.74	-37.74	51540.60	-16.19		
lambda	I	2031-12-06T04:33:00.220		41.62	-37.54	50026.71	-15.60		
delta	I	2031-12-06T04:34:53.517		41.49	-37.31	48300.35	-14.87		
gamma	I	2031-12-06T04:35:39.484		41.43	-37.21	47624.24	-14.55		
eta	I	2031-12-06T04:36:10.521		41.39	-37.15	47176.12	-14.33		
beta	I	2031-12-06T04:37:58.027		41.26	-36.92	45679.06	-13.50		
alpha	I	2031-12-06T04:39:08.065		41.17	-36.77	44751.34	-12.93		
4	I	2031-12-06T04:42:09.764		40.93	-36.38	42550.53	-11.23		
5	I	2031-12-06T04:42:45.977		40.88	-36.30	42156.18	-10.90		
6	I	2031-12-06T04:43:14.590		40.84	-36.23	41838.18	-10.62		

No planet occultations

6	E	2031-12-06T05:10:16.650		38.24	-32.41	41872.19	10.61		
5	E	2031-12-06T05:10:47.135		38.19	-32.33	42202.65	10.90		
4	E	2031-12-06T05:11:16.204		38.13	-32.26	42526.13	11.23		
alpha	E	2031-12-06T05:14:19.365		37.79	-31.79	44739.10	12.92		
beta	E	2031-12-06T05:15:28.999		37.66	-31.62	45658.54	13.49		
eta	E	2031-12-06T05:17:18.152		37.45	-31.34	47176.12	14.31		
gamma	E	2031-12-06T05:17:48.998		37.39	-31.26	47621.03	14.53		
delta	E	2031-12-06T05:18:35.229		37.30	-31.14	48300.35	14.85		
lambda	E	2031-12-06T05:20:28.643		37.08	-30.84	50026.71	15.58		
epsilon	E	2031-12-06T05:21:47.517		36.93	-30.63	51273.88	16.17		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-06T04:58:08.160
 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 : 3404399818517617920
 2Mass ID (if available) : 05391598+2330117
 ICRS Star Coord at Epoch: 05h 39m 15.99041s +23:30:11.61937s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.866
 G magnitude : 18.083
 RP magnitude : 17.047
 BP magnitude : 19.037
 DUPflag : 0
 Distance (au) : 18.123
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.80
 Sun-Target sep (deg) : 168.16
 Sun-Moon sep (deg) : 68.49
 B (ring opening deg) : 79.07
 PA of pole (deg) : 41.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.849
 C/A sky separation (km) : 37452.6
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-06T04:33:41.416		35.96	-38.45	51541.82	-15.92		
lambda	I	2031-12-06T04:35:18.548		36.04	-38.45	50026.71	-15.30		
delta	I	2031-12-06T04:37:14.183		36.14	-38.44	48300.35	-14.54		
gamma	I	2031-12-06T04:38:01.219		36.18	-38.44	47624.17	-14.21		
eta	I	2031-12-06T04:38:33.014		36.21	-38.44	47176.12	-13.97		
beta	I	2031-12-06T04:40:23.497		36.30	-38.42	45678.91	-13.10		
alpha	I	2031-12-06T04:41:35.768		36.36	-38.41	44751.49	-12.50		
4	I	2031-12-06T04:44:45.177		36.50	-38.38	42549.62	-10.69		
5	I	2031-12-06T04:45:23.171		36.53	-38.37	42156.56	-10.33		
6	I	2031-12-06T04:45:53.379		36.55	-38.36	41839.24	-10.02		

No planet occultations

6	E	2031-12-06T05:11:24.831		37.29	-37.65	41871.41	10.02		
5	E	2031-12-06T05:11:56.867		37.29	-37.63	42200.42	10.33		
4	E	2031-12-06T05:12:27.677		37.30	-37.61	42526.27	10.69		
alpha	E	2031-12-06T05:15:38.357		37.34	-37.47	44739.76	12.51		
beta	E	2031-12-06T05:16:50.126		37.35	-37.41	45659.01	13.11		
eta	E	2031-12-06T05:18:42.100		37.36	-37.32	47176.12	13.98		
gamma	E	2031-12-06T05:19:13.655		37.37	-37.29	47621.01	14.21		
delta	E	2031-12-06T05:20:00.886		37.37	-37.25	48300.35	14.55		
lambda	E	2031-12-06T05:21:56.450		37.38	-37.15	50026.71	15.31		
epsilon	E	2031-12-06T05:23:17.053		37.38	-37.08	51280.89	15.93		