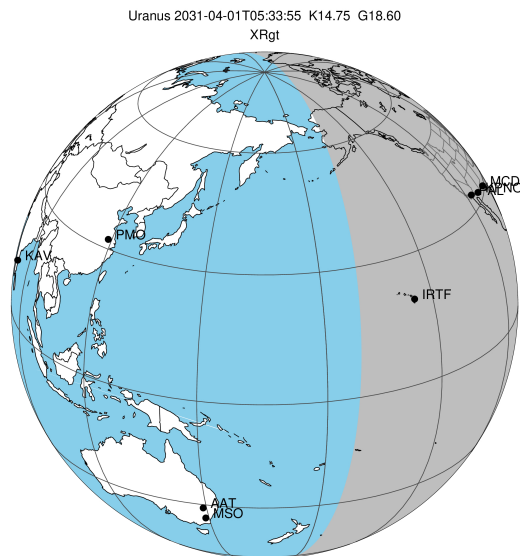


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-01T05:33:55.600
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415723753197480448
 2Mass ID (if available) : 05114822+2304458

ICRS Star Coord at Epoch: 05h 11m 48.21314s +23:04:45.55278s

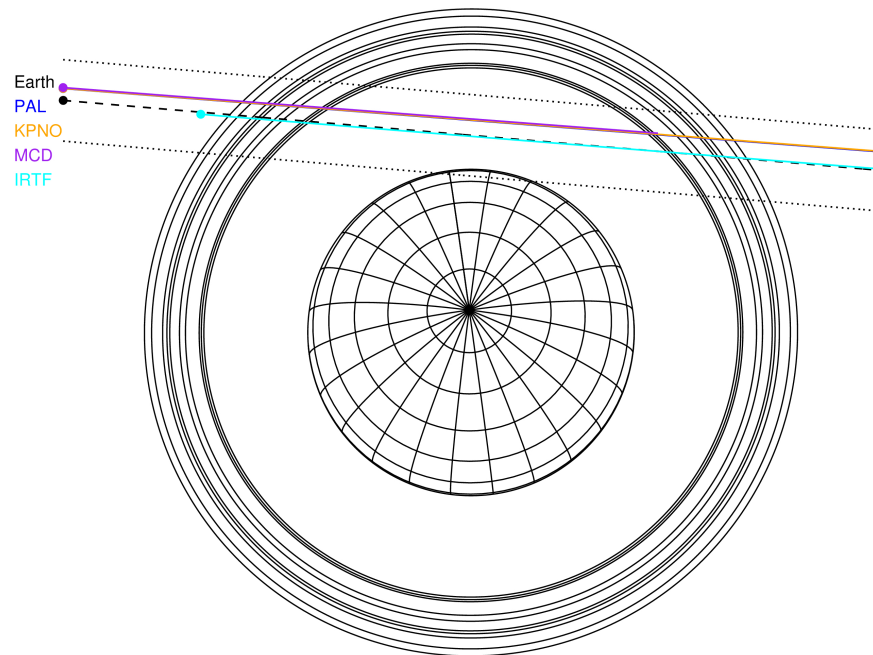
RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.749
 G magnitude : 18.596
 RP magnitude : 17.410
 BP magnitude : 19.951
 DUPflag : 0
 Distance (au) : 19.486
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.47
 Sun-Target sep (deg) : 68.06
 Sun-Moon sep (deg) : 35.35
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.48

#	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



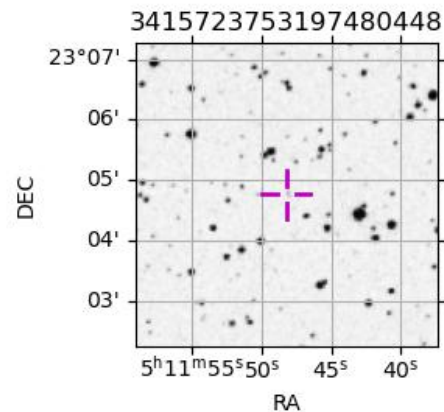
2031-04-01T05:33:55.6000 ex: 05 11 48.21314 s +23 04 45.553 C/A 2.182° PA 175.11 deg v_sky +17.47 km/s D 19.49 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-04-01T05:33:55 K14.75 G18.60 XRgt

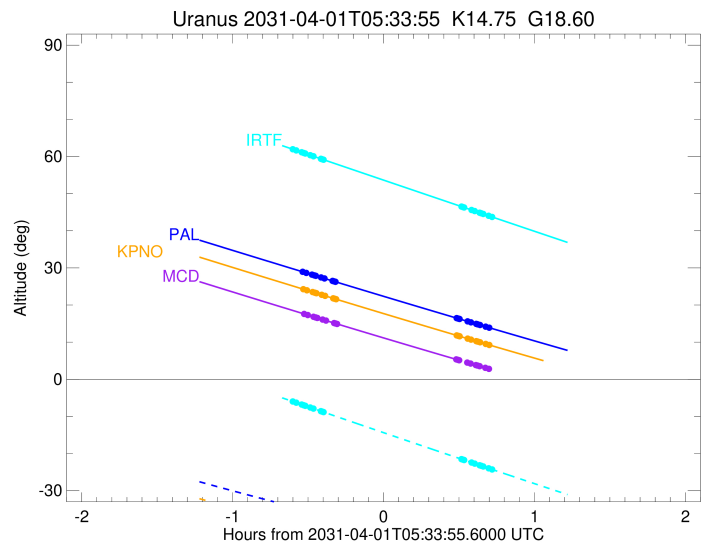
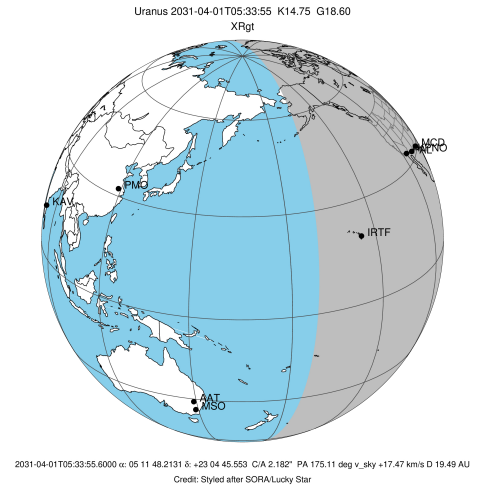


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	APR 01 05:02 - APR 01 06:16	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	APR 01 05:02 - APR 01 06:16	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++	APR 01 05:02 - APR 01 06:04	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	APR 01 04:58 - APR 01 06:17	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 : 2031-04-01T05:38:51.720
 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 : 3415723753197480448
 2Mass ID (if available) : 05114822+2304458
 ICRS Star Coord at Epoch: 05h 11m 48.21314s +23:04:45.55278s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.749
 G magnitude : 18.596
 RP magnitude : 17.410
 BP magnitude : 19.951
 DUPflag : 0
 Distance (au) : 19.486
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.47
 Sun-Target sep (deg) : 68.06
 Sun-Moon sep (deg) : 34.96
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.48
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.345
 C/A sky separation (km) : 33134.6
 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

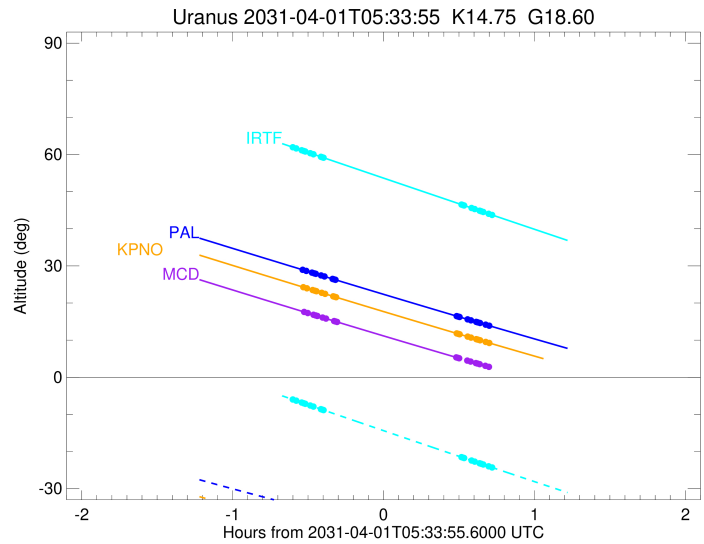
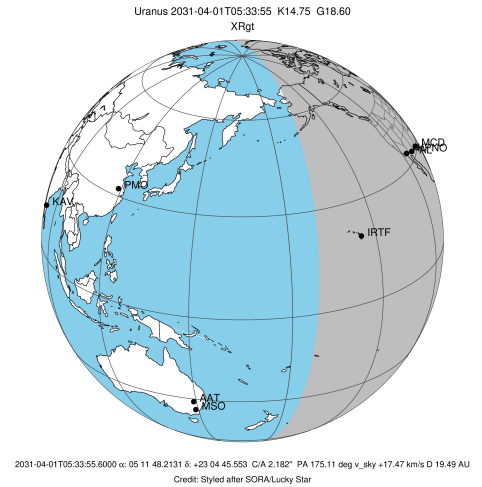


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-04-01T05:02:19.579		28.84	-35.08	50743.51	-13.02		
lambda	I	2031-04-01T05:03:14.947		28.65	-35.24	50026.71	-12.87		
delta	I	2031-04-01T05:05:31.033		28.18	-35.62	48300.35	-12.49		
gamma	I	2031-04-01T05:06:25.727		27.99	-35.78	47621.63	-12.33		
eta	I	2031-04-01T05:07:02.039		27.86	-35.88	47176.12	-12.21		
beta	I	2031-04-01T05:09:07.262		27.43	-36.23	45673.12	-11.79		
alpha	I	2031-04-01T05:10:26.675		27.16	-36.46	44748.76	-11.51		
4	I	2031-04-01T05:13:37.895		26.51	-36.99	42616.56	-10.74		
5	I	2031-04-01T05:14:10.098		26.40	-37.08	42280.63	-10.57		
6	I	2031-04-01T05:14:53.453		26.25	-37.19	41820.27	-10.39		

No planet occultations

6	E	2031-04-01T06:02:55.375		16.49	-44.41	41795.09	10.44		
5	E	2031-04-01T06:03:31.628		16.37	-44.49	42182.83	10.63		
4	E	2031-04-01T06:04:09.175		16.24	-44.58	42581.32	10.80		
alpha	E	2031-04-01T06:07:21.701		15.60	-45.00	44737.29	11.58		
beta	E	2031-04-01T06:08:39.277		15.34	-45.16	45645.93	11.87		
eta	E	2031-04-01T06:10:45.882		14.92	-45.43	47176.12	12.30		
gamma	E	2031-04-01T06:11:22.520		14.80	-45.51	47628.93	12.42		
delta	E	2031-04-01T06:12:16.225		14.62	-45.62	48300.35	12.59		
lambda	E	2031-04-01T06:14:31.262		14.17	-45.90	50026.71	12.98		
epsilon	E	2031-04-01T06:16:00.989		13.88	-46.08	51201.90	13.13		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-01T05:39:00.170
 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 : 3415723753197480448
 2Mass ID (if available) : 05114822+2304458
 ICRS Star Coord at Epoch: 05h 11m 48.21314s +23:04:45.55278s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.749
 G magnitude : 18.596
 RP magnitude : 17.410
 BP magnitude : 19.951
 DUPflag : 0
 Distance (au) : 19.486
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.47
 Sun-Target sep (deg) : 68.06
 Sun-Moon sep (deg) : 34.90
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.48
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.349
 C/A sky separation (km) : 33190.3
 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

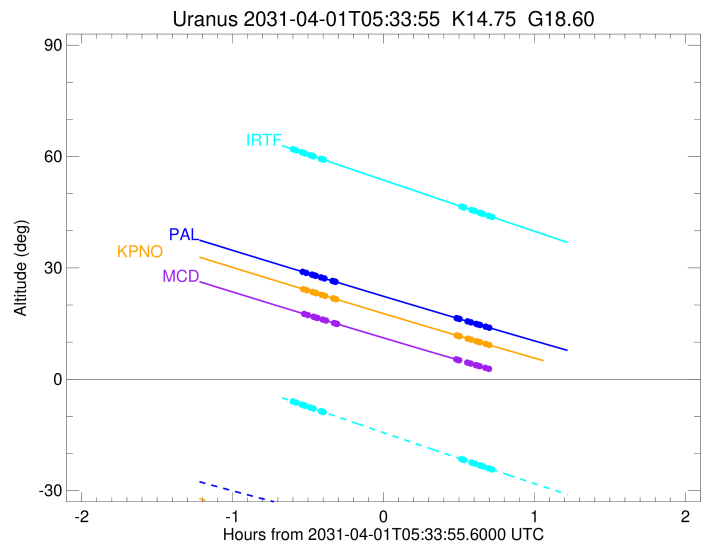
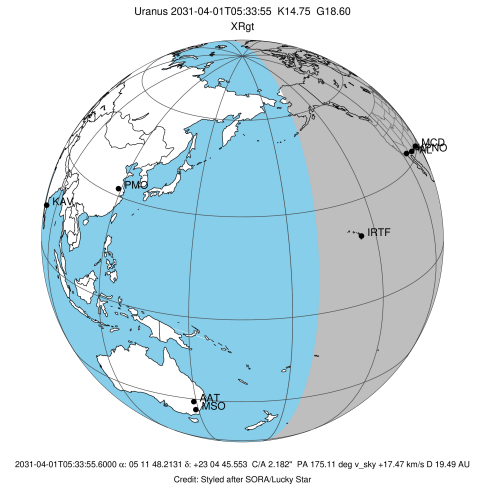


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-04-01T05:02:34.983		24.15	-39.51	50743.51	-13.02		
lambda	I	2031-04-01T05:03:30.324		23.96	-39.66	50026.71	-12.88		
delta	I	2031-04-01T05:05:46.360		23.49	-40.03	48300.35	-12.49		
gamma	I	2031-04-01T05:06:41.042		23.30	-40.18	47621.64	-12.33		
eta	I	2031-04-01T05:07:17.349		23.18	-40.27	47176.12	-12.21		
beta	I	2031-04-01T05:09:22.571		22.75	-40.61	45673.10	-11.79		
alpha	I	2031-04-01T05:10:41.997		22.47	-40.82	44748.78	-11.51		
4	I	2031-04-01T05:13:53.325		21.82	-41.33	42616.56	-10.73		
5	I	2031-04-01T05:14:25.568		21.70	-41.42	42280.51	-10.56		
6	I	2031-04-01T05:15:08.963		21.56	-41.53	41820.20	-10.38		

No planet occultations

6	E	2031-04-01T06:02:56.682		11.83	-48.18	41795.07	10.43		
5	E	2031-04-01T06:03:32.984		11.71	-48.25	42182.99	10.62		
4	E	2031-04-01T06:04:10.559		11.59	-48.33	42581.43	10.79		
alpha	E	2031-04-01T06:07:23.163		10.95	-48.70	44737.35	11.58		
beta	E	2031-04-01T06:08:40.741		10.69	-48.84	45645.96	11.87		
eta	E	2031-04-01T06:10:47.324		10.27	-49.08	47176.12	12.30		
gamma	E	2031-04-01T06:11:23.950		10.15	-49.14	47628.92	12.42		
delta	E	2031-04-01T06:12:17.635		9.97	-49.24	48300.35	12.59		
lambda	E	2031-04-01T06:14:32.600		9.52	-49.48	50026.71	12.99		
epsilon	E	2031-04-01T06:16:02.210		9.23	-49.64	51201.18	13.13		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-01T05:39:05.890
 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 : 3415723753197480448
 2Mass ID (if available) : 05114822+2304458
 ICRS Star Coord at Epoch: 05h 11m 48.21314s +23:04:45.55278s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.749
 G magnitude : 18.596
 RP magnitude : 17.410
 BP magnitude : 19.951
 DUPflag : 0
 Distance (au) : 19.486
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.47
 Sun-Target sep (deg) : 68.06
 Sun-Moon sep (deg) : 34.83
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.48
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.360
 C/A sky separation (km) : 33351.7
 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

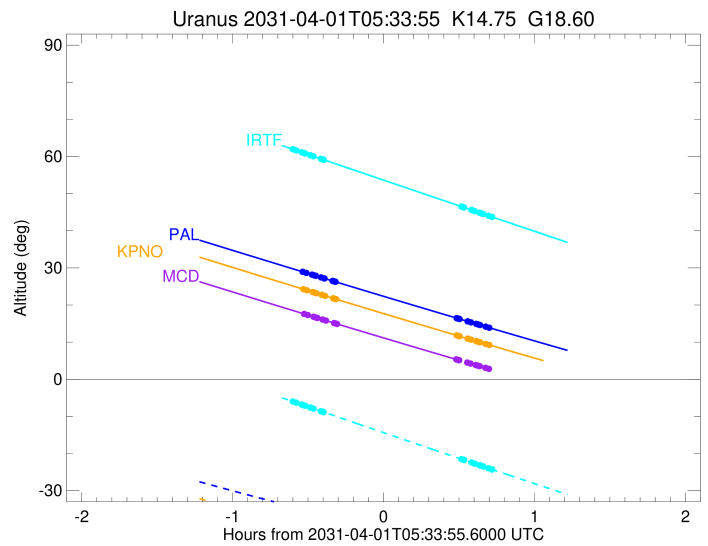
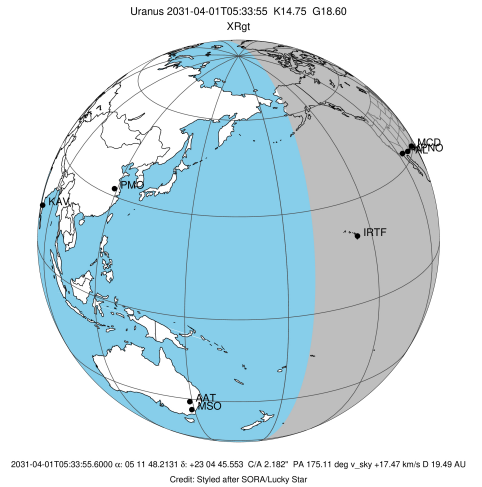


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-04-01T05:02:55.247		17.49	-45.21	50743.51	-13.01		
lambda	I	2031-04-01T05:03:50.646		17.30	-45.34	50026.71	-12.86		
delta	I	2031-04-01T05:06:06.875		16.83	-45.68	48300.35	-12.47		
gamma	I	2031-04-01T05:07:01.655		16.64	-45.81	47621.65	-12.30		
eta	I	2031-04-01T05:07:38.037		16.52	-45.90	47176.12	-12.19		
beta	I	2031-04-01T05:09:43.579		16.09	-46.20	45673.02	-11.75		
alpha	I	2031-04-01T05:11:03.241		15.81	-46.39	44748.86	-11.47		
4	I	2031-04-01T05:14:15.378		15.15	-46.84	42616.56	-10.67		
5	I	2031-04-01T05:14:47.832		15.04	-46.92	42280.12	-10.50		
6	I	2031-04-01T05:15:31.455		14.89	-47.02	41819.96	-10.31		

No planet occultations

6	E	2031-04-01T06:02:45.649		5.37	-52.43	41795.04	10.37		
5	E	2031-04-01T06:03:22.196		5.25	-52.48	42183.40	10.56		
4	E	2031-04-01T06:03:59.965		5.13	-52.53	42581.72	10.73		
alpha	E	2031-04-01T06:07:13.361		4.49x	-52.80	44737.51	11.54		
beta	E	2031-04-01T06:08:31.172		4.24x	-52.91	45646.03	11.83		
eta	E	2031-04-01T06:10:38.058		3.82x	-53.07	47176.12	12.28		
gamma	E	2031-04-01T06:11:14.755		3.70x	-53.12	47628.89	12.40		
delta	E	2031-04-01T06:12:08.537		3.53x	-53.18	48300.35	12.57		
lambda	E	2031-04-01T06:14:23.684		3.09x	-53.35	50026.71	12.97		
epsilon	E	2031-04-01T06:15:53.237		2.79x	-53.45	51199.34	13.12		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-04-01T05:37:27.640
 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 : 3415723753197480448
 2Mass ID (if available) : 05114822+2304458
 ICRS Star Coord at Epoch: 05h 11m 48.21314s +23:04:45.55278s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.749
 G magnitude : 18.596
 RP magnitude : 17.410
 BP magnitude : 19.951
 DUPflag : 0
 Distance (au) : 19.486
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 17.47
 Sun-Target sep (deg) : 68.06
 Sun-Moon sep (deg) : 35.34
 B (ring opening deg) : 82.07
 PA of pole (deg) : 4.48
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.167
 C/A sky separation (km) : 30622.6
 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	2031-04-01T04:58:22.200		61.85	-6.10	50744.30	-13.54		
lambda	I	2031-04-01T04:59:15.412		61.65	-6.31	50026.71	-13.43		
delta	I	2031-04-01T05:01:25.425		61.15	-6.82	48300.35	-13.12		
gamma	I	2031-04-01T05:02:17.412		60.95	-7.02	47621.47	-12.99		
eta	I	2031-04-01T05:02:51.807		60.81	-7.15	47176.12	-12.90		
beta	I	2031-04-01T05:04:49.706		60.36	-7.61	45674.29	-12.57		
alpha	I	2031-04-01T05:06:04.125		60.07	-7.90	44747.47	-12.36		
4	I	2031-04-01T05:09:00.487		59.40	-8.59	42616.43	-11.76		
5	I	2031-04-01T05:09:29.268		59.29	-8.70	42286.33	-11.64		
6	I	2031-04-01T05:10:08.814		59.13	-8.85	41823.91	-11.50		

No planet occultations

6	E	2031-04-01T06:04:51.294		46.54	-21.50	41795.82	11.55		
5	E	2031-04-01T06:05:23.684		46.41	-21.62	42177.22	11.69		
4	E	2031-04-01T06:05:57.940		46.28	-21.75	42577.12	11.82		
alpha	E	2031-04-01T06:08:55.867		45.60	-22.43	44734.83	12.42		
beta	E	2031-04-01T06:10:08.548		45.32	-22.71	45644.91	12.64		
eta	E	2031-04-01T06:12:08.041		44.87	-23.16	47176.12	12.98		
gamma	E	2031-04-01T06:12:42.825		44.73	-23.30	47629.26	13.07		
delta	E	2031-04-01T06:13:33.895		44.54	-23.49	48300.35	13.21		
lambda	E	2031-04-01T06:15:43.073		44.04	-23.98	50026.71	13.52		
epsilon	E	2031-04-01T06:17:11.363		43.71	-24.32	51228.80	13.63		