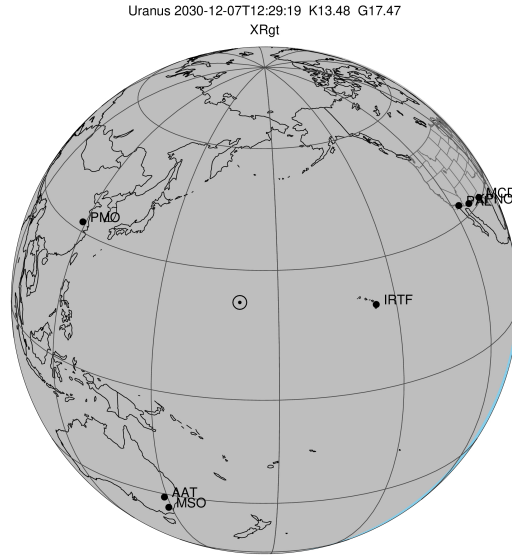


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-07T12:29:19.550
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415600096793660160
 2Mass ID (if available) : 05191528+2311544

ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s

RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.480
 G magnitude : 17.466
 RP magnitude : 16.343
 BP magnitude : 18.779
 DUPflag : 0
 Distance (au) : 18.176
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.30
 Sun-Target sep (deg) : 174.36
 Sun-Moon sep (deg) : 31.94
 B (ring opening deg) : 81.64
 PA of pole (deg) : 16.84

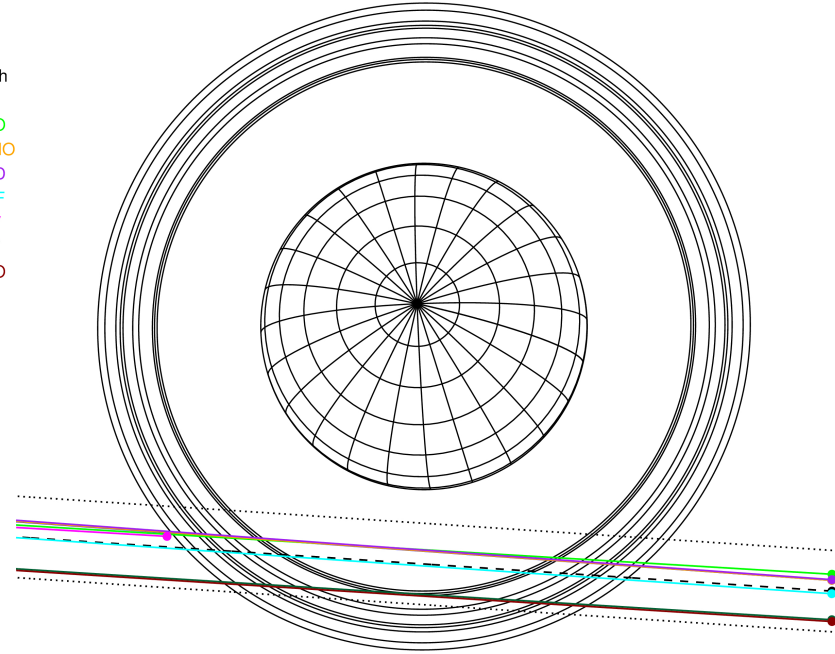
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2030-12-07T12:29:19.5500 ex: 05 19 15.2944 s: +23 11 54.195 C/A 2.809° PA 356.20 deg v_sky -23.30 km/s D 18.18 AU
 Credit: Styled after SORA/Lucky Star

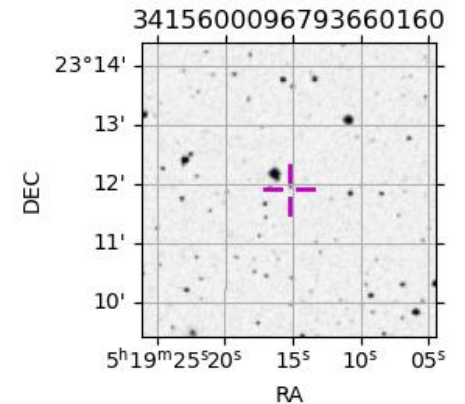
Uranus 2030-12-07T12:29:19 K13.48 G17.47 XRgt

Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 AAT
 MSO

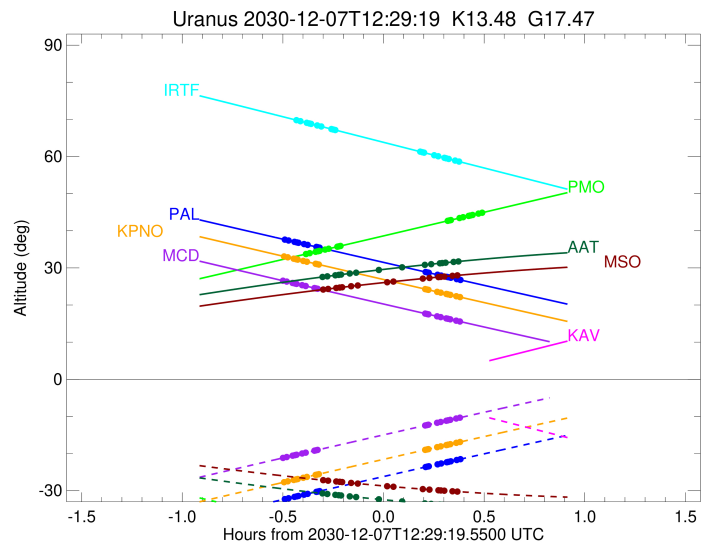
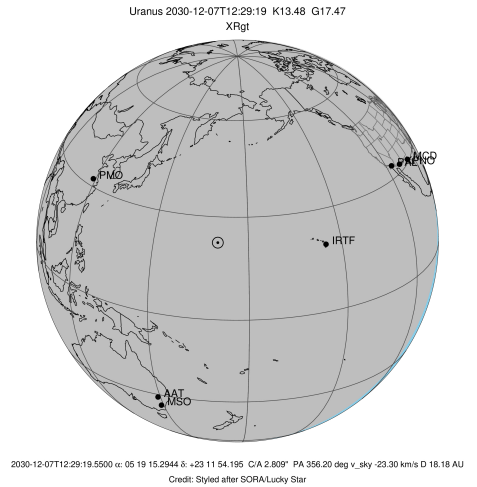


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	DEC 07 12:00 - DEC 07 12:52	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	DEC 07 12:06 - DEC 07 12:58	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 07 12:00 - DEC 07 12:52	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 07 11:59 - DEC 07 12:52	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 07 12:03 - DEC 07 12:52	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	+++++		+++++	DEC 07 12:11 - DEC 07 12:51	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 07 12:11 - DEC 07 12:51	PnnRie



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-07T12:25:53.340
 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 : 3415600096793660160
 2Mass ID (if available) : 05191528+2311544
 ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.480
 G magnitude : 17.466
 RP magnitude : 16.343
 BP magnitude : 18.779
 DUPflag : 0
 Distance (au) : 18.176
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.30
 Sun-Target sep (deg) : 174.36
 Sun-Moon sep (deg) : 32.79
 B (ring opening deg) : 81.64
 PA of pole (deg) : 16.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.662
 C/A sky separation (km) : 35088.3
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

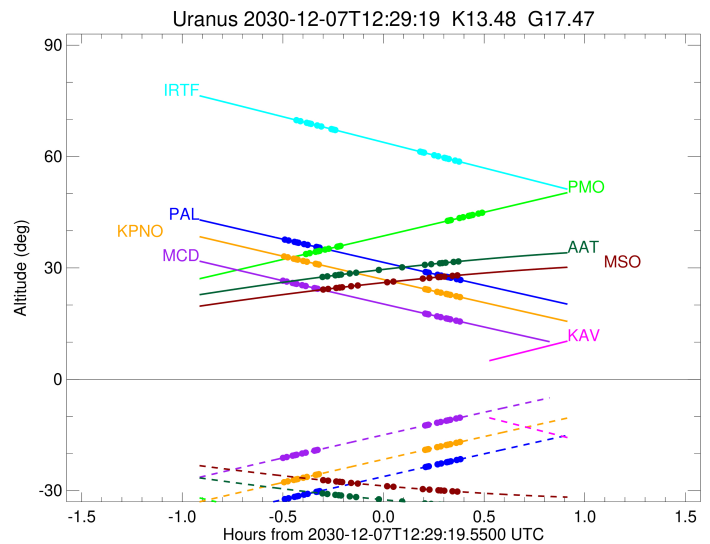
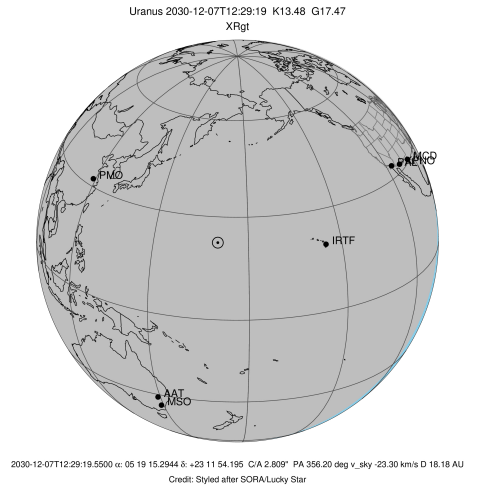


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-07T12:00:16.767		37.54	-32.20	50786.74	-16.91		
lambda	I	2030-12-07T12:01:02.190		37.38	-32.05	50026.71	-16.61		
delta	I	2030-12-07T12:02:48.087		37.01	-31.68	48300.35	-15.99		
gamma	I	2030-12-07T12:03:30.939		36.86	-31.53	47621.08	-15.72		
eta	I	2030-12-07T12:03:59.420		36.76	-31.43	47176.12	-15.53		
beta	I	2030-12-07T12:05:37.819		36.42	-31.10	45681.17	-14.84		
alpha	I	2030-12-07T12:06:43.827		36.19	-30.87	44716.64	-14.36		
4	I	2030-12-07T12:09:21.737		35.64	-30.32	42553.93	-13.04		
5	I	2030-12-07T12:09:44.172		35.56	-30.25	42267.39	-12.85		
6	I	2030-12-07T12:10:15.003		35.46	-30.14	41877.60	-12.54		

No planet occultations

6	E	2030-12-07T12:41:53.757		28.89	-23.64	41866.63	12.51		
5	E	2030-12-07T12:42:28.757		28.77	-23.52	42315.25	12.82		
4	E	2030-12-07T12:42:51.462		28.69	-23.44	42603.29	13.01		
alpha	E	2030-12-07T12:45:28.096		28.15	-22.91	44750.80	14.33		
beta	E	2030-12-07T12:46:30.784		27.94	-22.69	45663.60	14.81		
eta	E	2030-12-07T12:48:10.655		27.59	-22.35	47176.12	15.49		
gamma	E	2030-12-07T12:48:39.584		27.49	-22.26	47626.84	15.67		
delta	E	2030-12-07T12:49:22.191		27.35	-22.11	48300.35	15.94		
lambda	E	2030-12-07T12:51:08.408		26.98	-21.75	50026.71	16.56		
epsilon	E	2030-12-07T12:52:26.996		26.71	-21.49	51344.35	16.86		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-07T12:32:19.650
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3415600096793660160
 2Mass ID (if available) : 05191528+2311544
 ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.480
 G magnitude : 17.466
 RP magnitude : 16.343
 BP magnitude : 18.779
 DUPflag : 0
 Distance (au) : 18.176
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.30
 Sun-Target sep (deg) : 174.36
 Sun-Moon sep (deg) : 31.69
 B (ring opening deg) : 81.64
 PA of pole (deg) : 16.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.647
 C/A sky separation (km) : 34899.5
 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



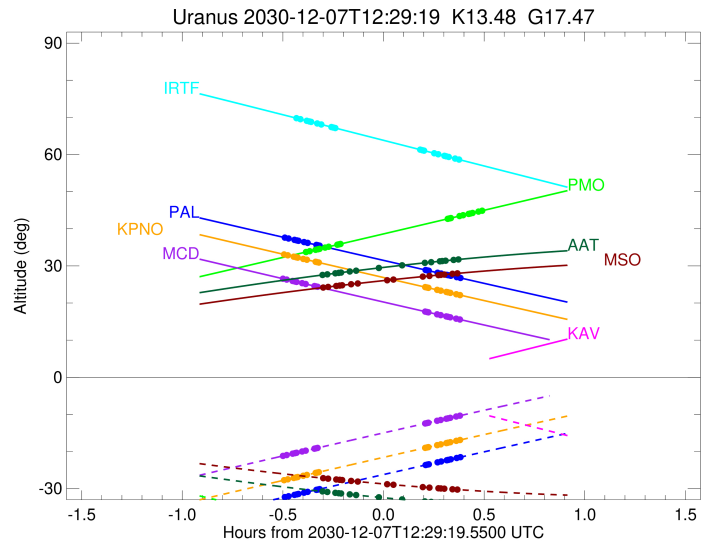
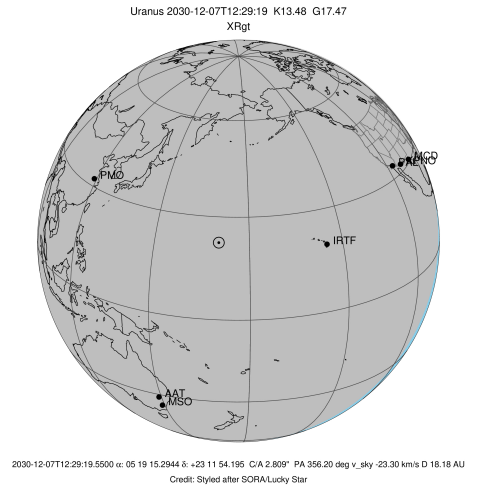
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-07T12:06:35.104		33.81	-38.73	50783.78	-16.97		
lambda	I	2030-12-07T12:07:20.193		33.97	-38.89	50026.71	-16.67		
delta	I	2030-12-07T12:09:05.643		34.34	-39.26	48300.35	-16.06		
gamma	I	2030-12-07T12:09:48.283		34.49	-39.41	47621.06	-15.80		
eta	I	2030-12-07T12:10:16.610		34.59	-39.51	47176.12	-15.62		
beta	I	2030-12-07T12:11:54.395		34.93	-39.85	45681.19	-14.95		
alpha	I	2030-12-07T12:12:59.958		35.16	-40.09	44716.02	-14.47		
4	I	2030-12-07T12:15:36.398		35.71	-40.64	42553.12	-13.19		
5	I	2030-12-07T12:15:58.611		35.79	-40.72	42265.95	-13.00		
6	I	2030-12-07T12:16:28.992		35.90	-40.82	41877.33	-12.70		

No planet occultations

6	E	2030-12-07T12:48:29.818	42.69	-47.61	41866.72	12.72
5	E	2030-12-07T12:49:04.244	42.81	-47.74	42315.25	13.03
4	E	2030-12-07T12:49:26.589	42.89	-47.81	42603.17	13.22
alpha	E	2030-12-07T12:52:01.049	43.43	-48.36	44750.75	14.51
beta	E	2030-12-07T12:53:02.973	43.65	-48.58	45663.70	14.99
eta	E	2030-12-07T12:54:41.687	44.00	-48.93	47176.12	15.66
gamma	E	2030-12-07T12:55:10.296	44.10	-49.03	47626.81	15.84
delta	E	2030-12-07T12:55:52.449	44.25	-49.18	48300.35	16.11
lambda	E	2030-12-07T12:57:37.577	44.63	-49.55	50026.71	16.72
epsilon	E	2030-12-07T12:58:55.258	44.90	-49.82	51341.97	17.02

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-07T12:25:42.720
 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 : 3415600096793660160
 2Mass ID (if available) : 05191528+2311544
 ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.480
 G magnitude : 17.466
 RP magnitude : 16.343
 BP magnitude : 18.779
 DUPflag : 0
 Distance (au) : 18.176
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.30
 Sun-Target sep (deg) : 174.36
 Sun-Moon sep (deg) : 32.78
 B (ring opening deg) : 81.64
 PA of pole (deg) : 16.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.659
 C/A sky separation (km) : 35057.0
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

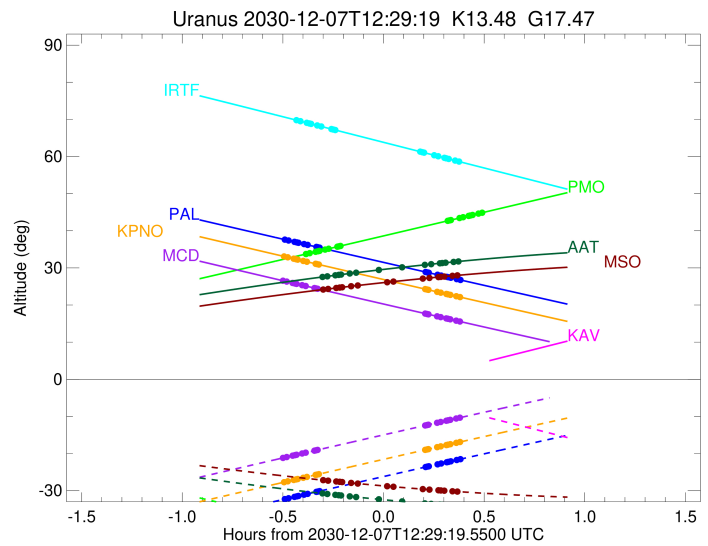
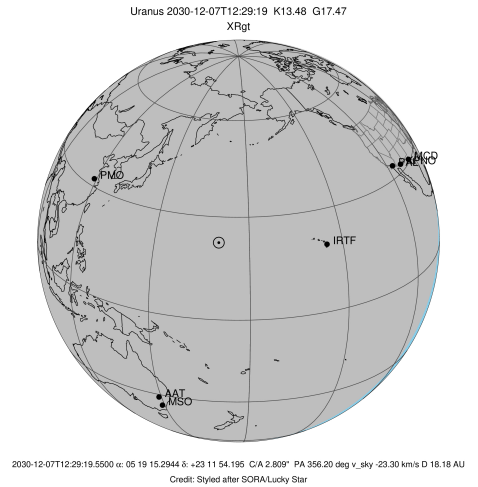


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-07T12:00:02.972		33.01	-27.65	50786.66	-16.91		
lambda	I	2030-12-07T12:00:48.403		32.85	-27.49	50026.71	-16.60		
delta	I	2030-12-07T12:02:34.321		32.48	-27.12	48300.35	-15.98		
gamma	I	2030-12-07T12:03:17.178		32.33	-26.97	47621.08	-15.71		
eta	I	2030-12-07T12:03:45.661		32.23	-26.87	47176.12	-15.53		
beta	I	2030-12-07T12:05:24.052		31.88	-26.53	45681.17	-14.84		
alpha	I	2030-12-07T12:06:30.046		31.65	-26.30	44716.61	-14.36		
4	I	2030-12-07T12:09:07.870		31.10	-25.76	42553.89	-13.05		
5	I	2030-12-07T12:09:30.288		31.02	-25.68	42267.32	-12.86		
6	I	2030-12-07T12:10:01.085		30.91	-25.57	41877.59	-12.55		

No planet occultations

6	E	2030-12-07T12:41:46.520		24.28	-19.02	41866.57	12.52		
5	E	2030-12-07T12:42:21.496		24.16	-18.90	42315.25	12.83		
4	E	2030-12-07T12:42:44.188		24.08	-18.82	42603.35	13.02		
alpha	E	2030-12-07T12:45:20.756		23.54	-18.29	44750.82	14.33		
beta	E	2030-12-07T12:46:23.436		23.33	-18.07	45663.57	14.81		
eta	E	2030-12-07T12:48:03.318		22.98	-17.73	47176.12	15.48		
gamma	E	2030-12-07T12:48:32.254		22.88	-17.63	47626.84	15.67		
delta	E	2030-12-07T12:49:14.872		22.74	-17.49	48300.35	15.94		
lambda	E	2030-12-07T12:51:01.129		22.37	-17.13	50026.71	16.55		
epsilon	E	2030-12-07T12:52:19.783		22.10	-16.86	51344.80	16.85		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-07T12:25:31.770
 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 : 3415600096793660160
 2Mass ID (if available) : 05191528+2311544
 ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.480
 G magnitude : 17.466
 RP magnitude : 16.343
 BP magnitude : 18.779
 DUPflag : 0
 Distance (au) : 18.176
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.30
 Sun-Target sep (deg) : 174.36
 Sun-Moon sep (deg) : 32.76
 B (ring opening deg) : 81.64
 PA of pole (deg) : 16.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.649
 C/A sky separation (km) : 34921.6
 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

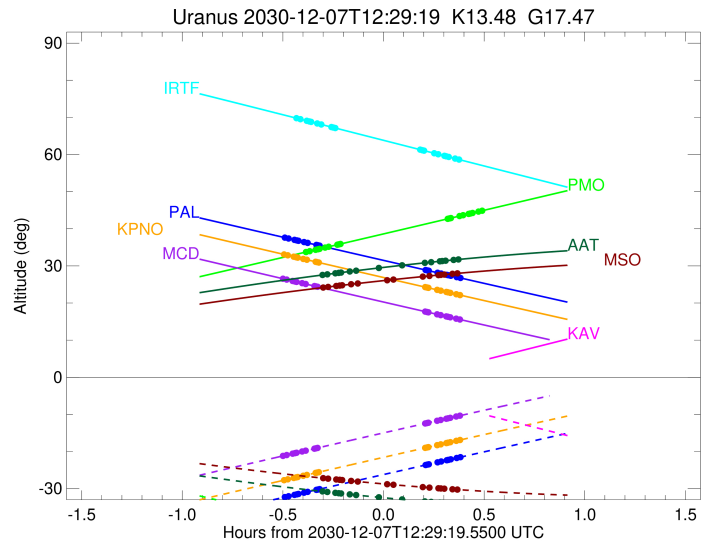
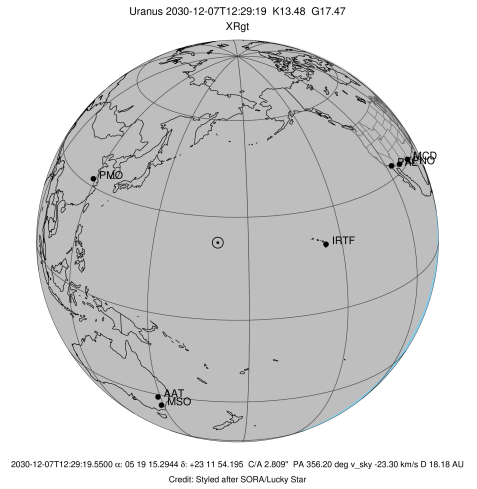


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-07T11:59:43.353		26.47	-21.11	50786.08	-16.94		
lambda	I	2030-12-07T12:00:28.666		26.31	-20.95	50026.71	-16.64		
delta	I	2030-12-07T12:02:14.347		25.94	-20.58	48300.35	-16.02		
gamma	I	2030-12-07T12:02:57.088		25.79	-20.43	47621.07	-15.76		
eta	I	2030-12-07T12:03:25.488		25.69	-20.34	47176.12	-15.58		
beta	I	2030-12-07T12:05:03.542		25.35	-20.00	45681.18	-14.90		
alpha	I	2030-12-07T12:06:09.273		25.12	-19.77	44716.46	-14.43		
4	I	2030-12-07T12:08:46.239		24.57	-19.23	42553.67	-13.14		
5	I	2030-12-07T12:09:08.514		24.49	-19.15	42266.92	-12.95		
6	I	2030-12-07T12:09:39.065		24.38	-19.04	41877.51	-12.65		

No planet occultations

6	E	2030-12-07T12:41:46.697		17.69	-12.44	41866.37	12.62		
5	E	2030-12-07T12:42:21.442		17.57	-12.32	42315.25	12.92		
4	E	2030-12-07T12:42:43.995		17.49	-12.25	42603.55	13.11		
alpha	E	2030-12-07T12:45:19.726		16.96	-11.72	44750.88	14.39		
beta	E	2030-12-07T12:46:22.146		16.74	-11.51	45663.47	14.86		
eta	E	2030-12-07T12:48:01.712		16.40	-11.17	47176.12	15.53		
gamma	E	2030-12-07T12:48:30.570		16.30	-11.08	47626.87	15.71		
delta	E	2030-12-07T12:49:13.081		16.15	-10.93	48300.35	15.97		
lambda	E	2030-12-07T12:50:59.123		15.79	-10.58	50026.71	16.58		
epsilon	E	2030-12-07T12:52:17.742		15.52	-10.31	51346.27	16.87		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-12-07T12:27:25.100
 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 : 3415600096793660160
 2Mass ID (if available) : 05191528+2311544
 ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 13.480
 G magnitude : 17.466
 RP magnitude : 16.343
 BP magnitude : 18.779
 DUPflag : 0
 Distance (au) : 18.176
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.30
 Sun-Target sep (deg) : 174.36
 Sun-Moon sep (deg) : 32.72
 B (ring opening deg) : 81.64
 PA of pole (deg) : 16.84
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.838
 C/A sky separation (km) : 37414.8
 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



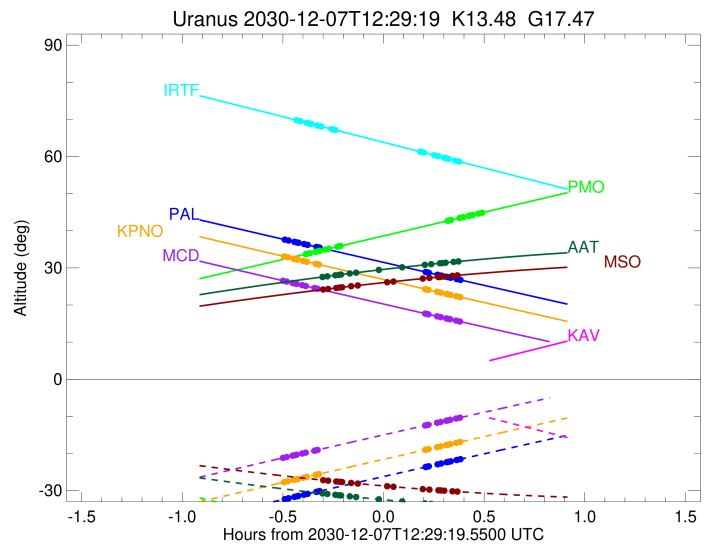
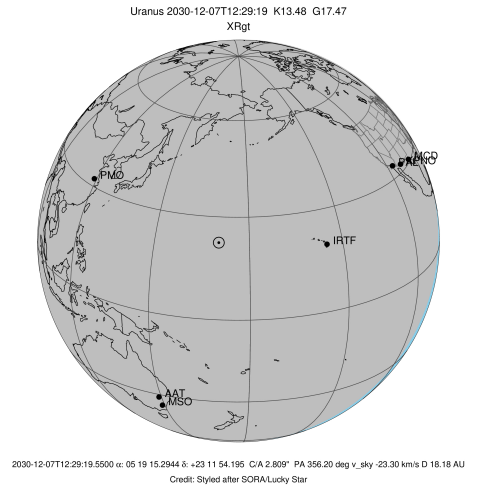
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-07T12:03:44.993		69.71	-64.13	50798.89	-15.93		
lambda	I	2030-12-07T12:04:34.155		69.52	-63.94	50026.71	-15.55		
delta	I	2030-12-07T12:06:27.939		69.09	-63.51	48300.35	-14.78		
gamma	I	2030-12-07T12:07:14.421		68.91	-63.33	47621.17	-14.44		
eta	I	2030-12-07T12:07:45.492		68.79	-63.21	47176.12	-14.21		
beta	I	2030-12-07T12:09:34.016		68.38	-62.79	45680.96	-13.33		
alpha	I	2030-12-07T12:10:47.807		68.09	-62.51	44719.64	-12.70		
4	I	2030-12-07T12:13:50.574		67.39	-61.80	42558.43	-10.94		
5	I	2030-12-07T12:14:17.256		67.29	-61.70	42275.14	-10.67		
6	I	2030-12-07T12:14:55.220		67.15	-61.56	41878.85	-10.23		

No planet occultations

6	E	2030-12-07T12:40:17.545		61.31	-55.70	41870.08	10.23		
5	E	2030-12-07T12:40:59.581		61.15	-55.54	42314.74	10.66		
4	E	2030-12-07T12:41:26.506		61.04	-55.44	42599.52	10.93		
alpha	E	2030-12-07T12:44:27.828		60.35	-54.74	44749.68	12.69		
beta	E	2030-12-07T12:45:38.259		60.08	-54.47	45665.37	13.32		
eta	E	2030-12-07T12:47:28.117		59.65	-54.05	47176.12	14.19		
gamma	E	2030-12-07T12:47:59.592		59.53	-53.93	47626.41	14.42		
delta	E	2030-12-07T12:48:45.774		59.36	-53.75	48300.35	14.76		
lambda	E	2030-12-07T12:50:39.725		58.92	-53.31	50026.71	15.53		
epsilon	E	2030-12-07T12:52:01.625		58.60	-53.00	51319.30	15.91		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-07T12:31:12.260
Event type           : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code        : AAT
Location             : Siding Spring (AAT)
Latitude (deg)       : -31.27703
E. Longitude (deg)   : 149.06608
Altitude (km)        : 1.164
Gaia source ID       : 3415600096793660160
2Mass ID (if available) : 05191528+2311544
ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 13.480
G magnitude           : 17.466
RP magnitude         : 16.343
BP magnitude         : 18.779
DUPflag              : 0
Distance (au)        : 18.176
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.30
Sun-Target sep (deg) : 174.36
Sun-Moon sep (deg)   : 31.87
B (ring opening deg) : 81.64
PA of pole (deg)     : 16.84
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.178
C/A sky separation (km) : 41890.6
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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
  
```



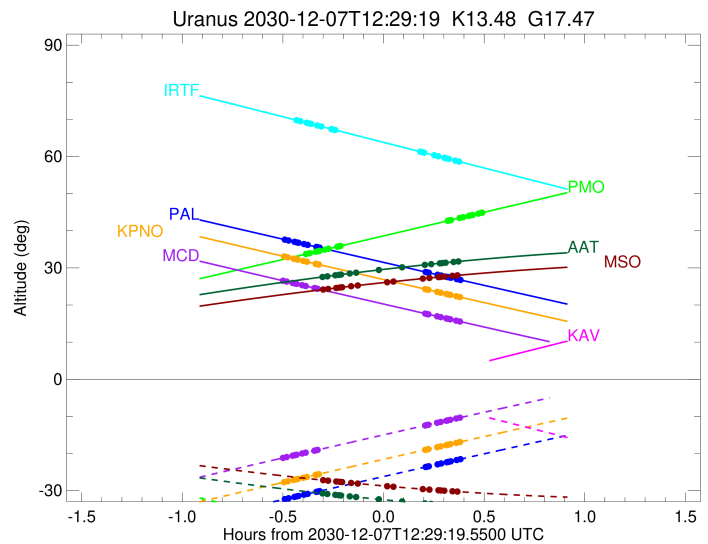
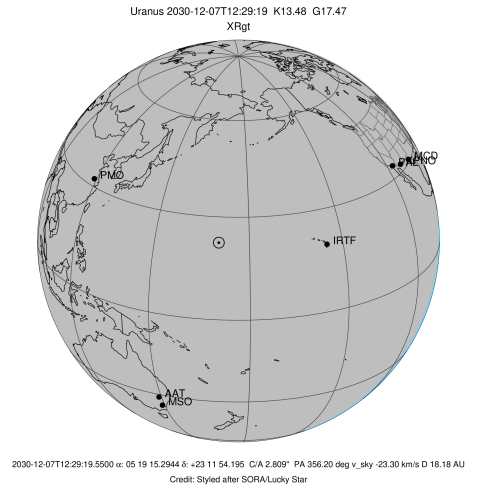
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-07T12:11:33.604		27.61	-30.80	50830.24	-13.21		
lambda	I	2030-12-07T12:12:36.032		27.73	-30.90	50026.71	-12.63		
delta	I	2030-12-07T12:14:59.517		28.01	-31.14	48300.35	-11.42		
gamma	I	2030-12-07T12:16:00.443		28.13	-31.24	47621.51	-10.86		
eta	I	2030-12-07T12:16:42.191		28.21	-31.30	47176.12	-10.47		
beta	I	2030-12-07T12:19:16.255		28.50	-31.55	45679.89	-8.92		
alpha	I	2030-12-07T12:21:10.761		28.71	-31.73	44727.26	-7.70		
4	I	2030-12-07T12:28:00.890		29.45	-32.34	42574.53	-2.71		

No planet occultations

4	E	2030-12-07T12:34:52.516		30.16	-32.91	42584.73	2.71		
alpha	E	2030-12-07T12:41:40.784		30.83	-33.44	44745.60	7.71		
beta	E	2030-12-07T12:43:31.758		31.00	-33.58	45669.49	8.93		
eta	E	2030-12-07T12:46:06.867		31.24	-33.76	47176.12	10.48		
gamma	E	2030-12-07T12:46:48.931		31.30	-33.81	47625.44	10.88		
delta	E	2030-12-07T12:47:49.426		31.40	-33.88	48300.35	11.43		
lambda	E	2030-12-07T12:50:12.728		31.61	-34.04	50026.71	12.64		
epsilon	E	2030-12-07T12:51:47.667		31.75	-34.15	51262.31	13.23		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-07T12:31:08.650
Event type           : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code        : MSO
Location             : Mt. Stromlo Observatory
Latitude (deg)       : -35.32000
E. Longitude (deg)   : 149.00833
Altitude (km)        : 0.770
Gaia source ID       : 3415600096793660160
2Mass ID (if available) : 05191528+2311544
ICRS Star Coord at Epoch: 05h 19m 15.29442s +23:11:54.19517s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 13.480
G magnitude           : 17.466
RP magnitude          : 16.343
BP magnitude          : 18.779
DUPflag              : 0
Distance (au)        : 18.176
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.30
Sun-Target sep (deg) : 174.36
Sun-Moon sep (deg)   : 31.86
B (ring opening deg) : 81.64
PA of pole (deg)     : 16.84
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.198
C/A sky separation (km) : 42153.2
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.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	2030-12-07T12:11:46.138		24.22	-27.22	50832.64	-13.02		
lambda	I	2030-12-07T12:12:49.745		24.33	-27.32	50026.71	-12.42		
delta	I	2030-12-07T12:15:15.985		24.60	-27.54	48300.35	-11.17		
gamma	I	2030-12-07T12:16:18.337		24.71	-27.63	47621.53	-10.60		
eta	I	2030-12-07T12:17:01.182		24.78	-27.69	47176.12	-10.19		
beta	I	2030-12-07T12:19:40.412		25.06	-27.93	45679.77	-8.57		
alpha	I	2030-12-07T12:21:40.416		25.27	-28.10	44727.88	-7.28		
4	I	2030-12-07T12:30:35.892		26.16	-28.82	42578.52	-0.62		

No planet occultations

4	E	2030-12-07T12:32:10.526		26.31	-28.95	42580.86	0.62		
alpha	E	2030-12-07T12:41:04.146		27.12	-29.59	44745.21	7.28		
beta	E	2030-12-07T12:43:00.619		27.29	-29.73	45669.77	8.58		
eta	E	2030-12-07T12:45:40.902		27.52	-29.90	47176.12	10.20		
gamma	E	2030-12-07T12:46:24.065		27.58	-29.95	47625.37	10.61		
delta	E	2030-12-07T12:47:25.988		27.67	-30.02	48300.35	11.18		
lambda	E	2030-12-07T12:49:52.053		27.87	-30.17	50026.71	12.43		
epsilon	E	2030-12-07T12:51:28.197		28.00	-30.27	51258.72	13.04		