

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-29T15:25:12.420
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3414852669403770624
 2Mass ID (if available) : 05204116+2313124

ICRS Star Coord at Epoch: 05h 20m 41.16137s +23:13:12.41099s

RUWE (>1.4 is poor) : 1.02
 K magnitude : 12.871
 G magnitude : 16.096
 RP magnitude : 15.153
 BP magnitude : 17.010
 DUPflag : 0
 Distance (au) : 18.199
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.58
 Sun-Target sep (deg) : 166.04
 Sun-Moon sep (deg) : 133.27
 B (ring opening deg) : 81.51
 PA of pole (deg) : 19.05

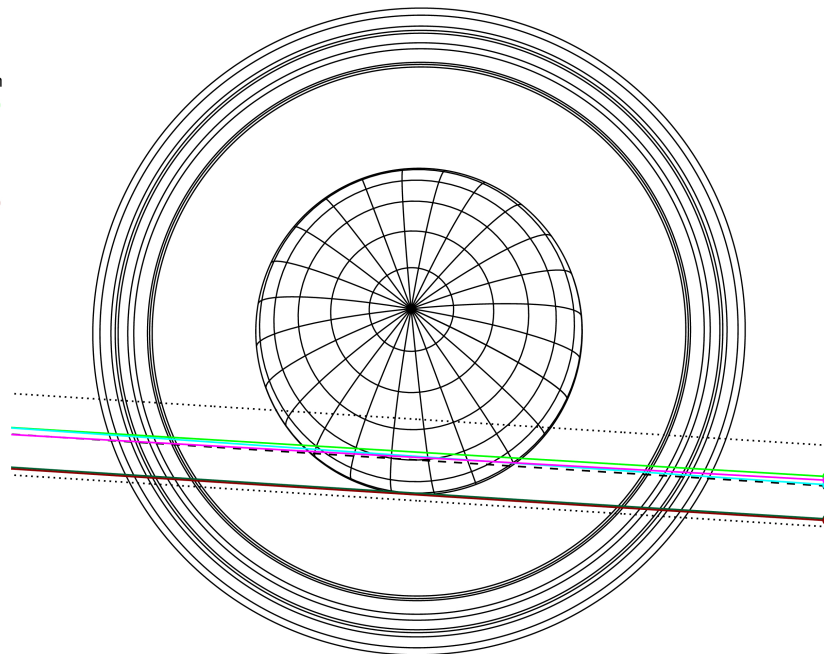
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2030-11-29T15:25:12.4200 ra: 05 20 41.1614 s: +23 13 12.4111 C/A 1.5177 PA 356.37 deg v_sky -22.58 km/s D 18.20 AU
 Credit: Styled after SORA/Lucky Star

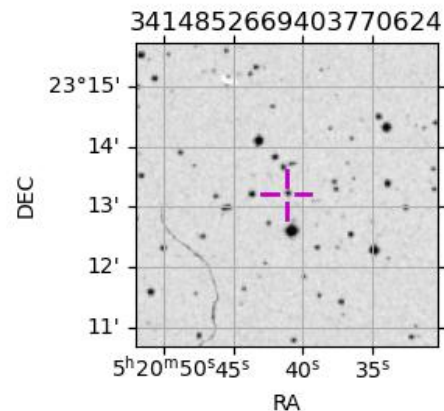
Uranus 2030-11-29T15:25:12 K12.87 G16.10 PgtRgt

Earth
 PMO
 IRTF
 KAV
 AAT
 MSO

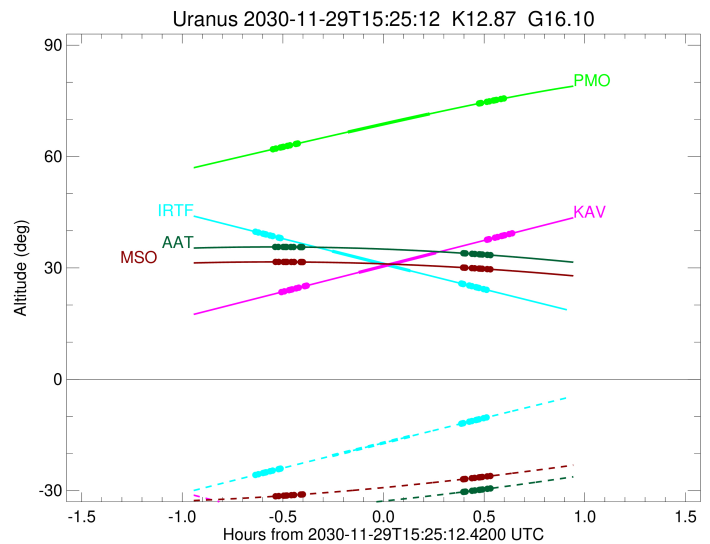
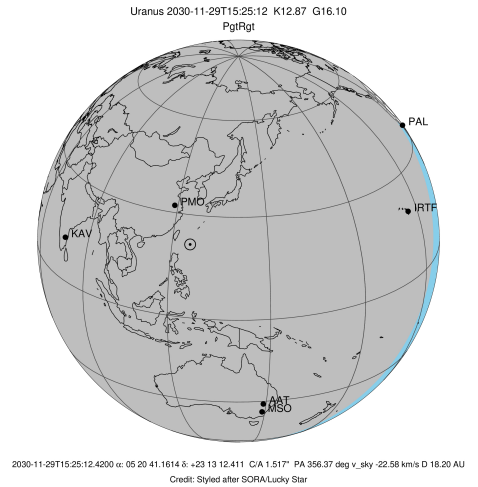


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	NOV 29 14:52 - NOV 29 16:01	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	NOV 29 14:47 - NOV 29 15:56	PieRie
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	NOV 29 14:55 - NOV 29 16:03	PieRie
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	+++++		+++++	NOV 29 14:53 - NOV 29 15:57	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	NOV 29 14:53 - NOV 29 15:57	PnnRie

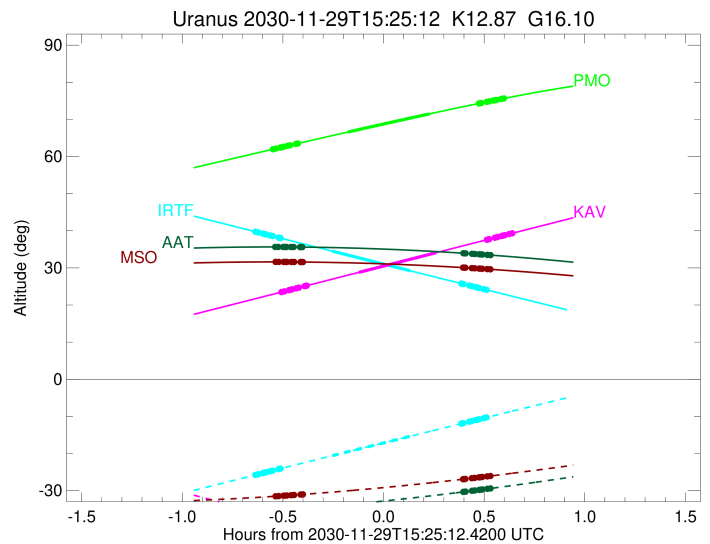
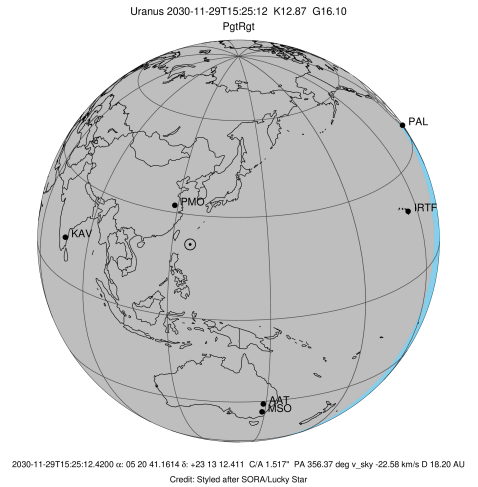


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-29T15:26:34.670
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3414852669403770624
 2Mass ID (if available) : 05204116+2313124
 ICRS Star Coord at Epoch: 05h 20m 41.16137s +23:13:12.41099s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 12.871
 G magnitude : 16.096
 RP magnitude : 15.153
 BP magnitude : 17.010
 DUPflag : 0
 Distance (au) : 18.199
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.58
 Sun-Target sep (deg) : 166.04
 Sun-Moon sep (deg) : 134.15
 B (ring opening deg) : 81.51
 PA of pole (deg) : 19.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.430
 C/A sky separation (km) : 18879.8
 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



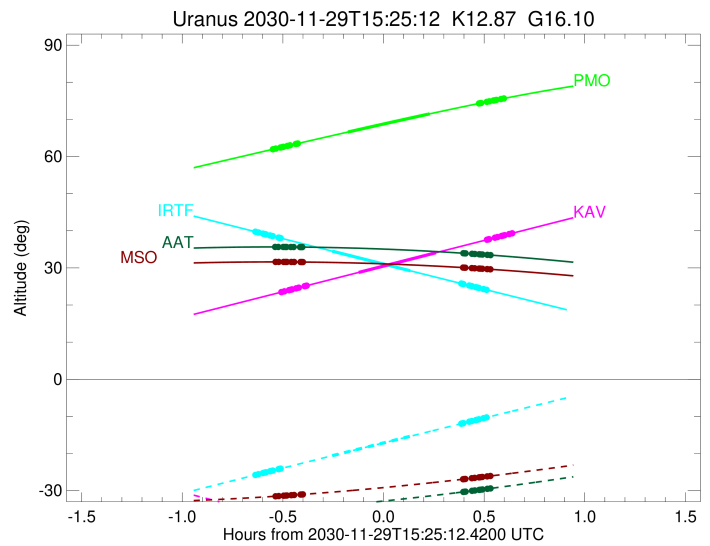
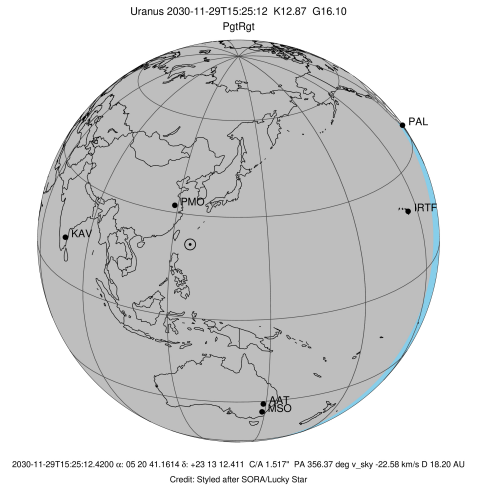
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-29T14:52:33.555		62.03	-73.02	50746.15	-21.25		
lambda	I	2030-11-29T14:53:07.435		62.15	-73.12	50026.71	-21.21		
delta	I	2030-11-29T14:54:29.077		62.43	-73.35	48300.35	-21.08		
gamma	I	2030-11-29T14:55:01.323		62.54	-73.45	47621.52	-21.02		
eta	I	2030-11-29T14:55:22.528		62.62	-73.51	47176.12	-20.99		
beta	I	2030-11-29T14:56:34.189		62.87	-73.71	45676.94	-20.85		
alpha	I	2030-11-29T14:57:21.438		63.03	-73.85	44693.28	-20.76		
4	I	2030-11-29T14:59:06.439		63.40	-74.15	42527.87	-20.51		
5	I	2030-11-29T14:59:22.635		63.45	-74.19	42197.46	-20.48		
6	I	2030-11-29T14:59:39.690		63.51	-74.24	41850.85	-20.44		
Uranus	I	2030-11-29T15:14:37.304		66.61	-76.57	25042.43		-8.04	-8.42
Uranus	E	2030-11-29T15:38:58.552		71.50	-79.19	25450.65		-3.63	-3.80
6	E	2030-11-29T15:53:41.866		74.31	-79.66	41861.79	20.47		
5	E	2030-11-29T15:54:03.915		74.37	-79.66	42314.33	20.52		
4	E	2030-11-29T15:54:18.224		74.42	-79.66	42607.78	20.55		
alpha	E	2030-11-29T15:56:01.902		74.73	-79.64	44752.07	20.80		
beta	E	2030-11-29T15:56:45.475		74.87	-79.63	45660.21	20.89		
eta	E	2030-11-29T15:57:57.801		75.09	-79.60	47176.12	21.03		
gamma	E	2030-11-29T15:58:19.258		75.15	-79.59	47627.76	21.07		
delta	E	2030-11-29T15:58:51.141		75.25	-79.58	48300.35	21.12		
lambda	E	2030-11-29T16:00:12.606		75.49	-79.54	50026.71	21.26		
epsilon	E	2030-11-29T16:01:17.382		75.68	-79.50	51406.78	21.30		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-29T15:21:19.300
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3414852669403770624
 2Mass ID (if available) : 05204116+2313124
 ICRS Star Coord at Epoch: 05h 20m 41.16137s +23:13:12.41099s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 12.871
 G magnitude : 16.096
 RP magnitude : 15.153
 BP magnitude : 17.010
 DUPflag : 0
 Distance (au) : 18.199
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.58
 Sun-Target sep (deg) : 166.04
 Sun-Moon sep (deg) : 133.07
 B (ring opening deg) : 81.51
 PA of pole (deg) : 19.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.480
 C/A sky separation (km) : 19536.5
 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



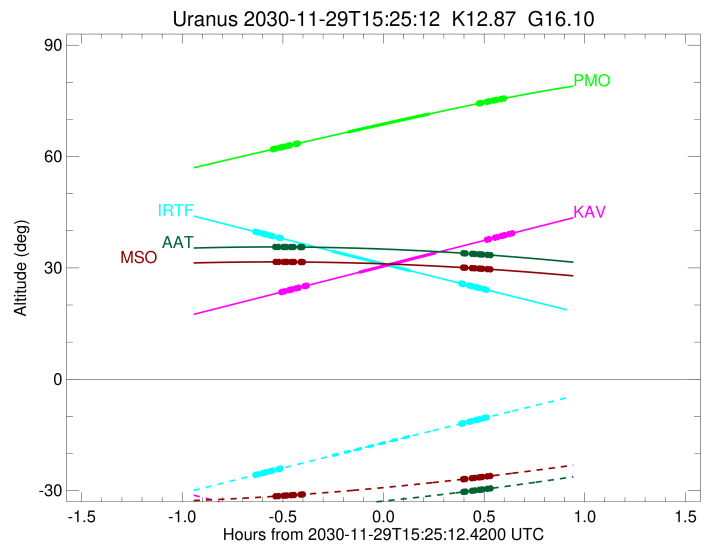
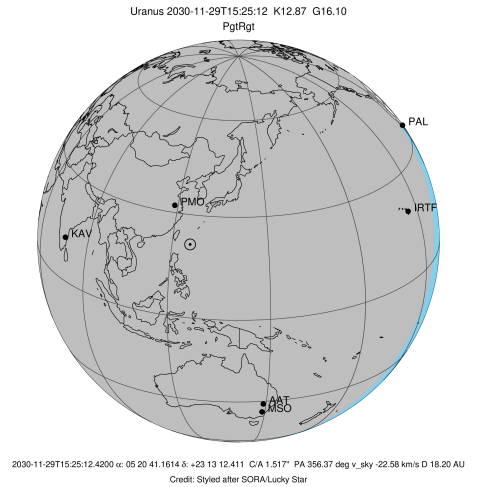
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-29T14:47:20.628		39.67	-25.70	50745.17	-21.06		
lambda	I	2030-11-29T14:47:54.769		39.54	-25.57	50026.71	-21.02		
delta	I	2030-11-29T14:49:17.190		39.22	-25.26	48300.35	-20.87		
gamma	I	2030-11-29T14:49:49.763		39.10	-25.14	47621.46	-20.81		
eta	I	2030-11-29T14:50:11.183		39.02	-25.06	47176.12	-20.77		
beta	I	2030-11-29T14:51:23.597		38.74	-24.78	45677.25	-20.62		
alpha	I	2030-11-29T14:52:11.366		38.56	-24.60	44693.88	-20.52		
4	I	2030-11-29T14:53:57.653		38.15	-24.20	42528.24	-20.25		
5	I	2030-11-29T14:54:13.991		38.09	-24.14	42199.41	-20.22		
6	I	2030-11-29T14:54:31.303		38.03	-24.07	41851.95	-20.17		
Uranus	I	2030-11-29T15:09:53.139		34.52	-20.60	25026.32		-8.17	-8.55
Uranus	E	2030-11-29T15:33:14.479		29.22	-15.34	25436.55		-3.86	-4.04
6	E	2030-11-29T15:48:24.726		25.79	-11.96	41862.08	20.10		
5	E	2030-11-29T15:48:47.173		25.70	-11.87	42314.43	20.15		
4	E	2030-11-29T15:49:01.735		25.65	-11.82	42607.56	20.18		
alpha	E	2030-11-29T15:50:47.288		25.25	-11.43	44752.03	20.44		
beta	E	2030-11-29T15:51:31.629		25.08	-11.26	45660.34	20.54		
eta	E	2030-11-29T15:52:45.181		24.81	-10.99	47176.12	20.68		
gamma	E	2030-11-29T15:53:06.997		24.72	-10.91	47627.73	20.72		
delta	E	2030-11-29T15:53:39.410		24.60	-10.79	48300.35	20.78		
lambda	E	2030-11-29T15:55:02.205		24.29	-10.48	50026.71	20.92		
epsilon	E	2030-11-29T15:56:07.950		24.04	-10.24	51405.39	20.97		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-29T15:29:06.400
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3414852669403770624
 2Mass ID (if available) : 05204116+2313124
 ICRS Star Coord at Epoch: 05h 20m 41.16137s +23:13:12.41099s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 12.871
 G magnitude : 16.096
 RP magnitude : 15.153
 BP magnitude : 17.010
 DUPflag : 0
 Distance (au) : 18.199
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.58
 Sun-Target sep (deg) : 166.04
 Sun-Moon sep (deg) : 134.22
 B (ring opening deg) : 81.51
 PA of pole (deg) : 19.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.493
 C/A sky separation (km) : 19704.1
 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_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	2030-11-29T14:55:05.681		23.56	-37.38	50745.54	-20.93		
lambda	I	2030-11-29T14:55:40.065		23.69	-37.51	50026.71	-20.88		
delta	I	2030-11-29T14:57:03.025		24.01	-37.83	48300.35	-20.74		
gamma	I	2030-11-29T14:57:35.808		24.13	-37.96	47621.48	-20.68		
eta	I	2030-11-29T14:57:57.368		24.21	-38.04	47176.12	-20.64		
beta	I	2030-11-29T14:59:10.254		24.49	-38.33	45677.14	-20.49		
alpha	I	2030-11-29T14:59:58.336		24.68	-38.51	44693.67	-20.39		
4	I	2030-11-29T15:01:45.304		25.09	-38.93	42528.11	-20.12		
5	I	2030-11-29T15:02:01.769		25.15	-38.99	42198.78	-20.09		
6	I	2030-11-29T15:02:19.182		25.22	-39.06	41851.60	-20.04		
Uranus	I	2030-11-29T15:17:48.990		28.78	-42.66	25027.15		-8.16	-8.54
Uranus	E	2030-11-29T15:40:51.104		34.09	-48.00	25424.67		-4.04	-4.23
6	E	2030-11-29T15:56:04.367		37.59	-51.52	41862.70	20.13		
5	E	2030-11-29T15:56:26.747		37.68	-51.60	42314.63	20.18		
4	E	2030-11-29T15:56:41.256		37.74	-51.66	42607.06	20.21		
alpha	E	2030-11-29T15:58:26.609		38.14	-52.06	44751.93	20.48		
beta	E	2030-11-29T15:59:10.866		38.31	-52.23	45660.70	20.59		
eta	E	2030-11-29T16:00:24.204		38.59	-52.52	47176.12	20.74		
gamma	E	2030-11-29T16:00:45.952		38.67	-52.60	47627.64	20.78		
delta	E	2030-11-29T16:01:18.272		38.80	-52.72	48300.35	20.84		
lambda	E	2030-11-29T16:02:40.797		39.12	-53.04	50026.71	20.99		
epsilon	E	2030-11-29T16:03:46.045		39.37	-53.29	51399.86	21.04		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-29T15:24:51.650
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3414852669403770624
 2Mass ID (if available) : 05204116+2313124
 ICRS Star Coord at Epoch: 05h 20m 41.16137s +23:13:12.41099s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 12.871
 G magnitude : 16.096
 RP magnitude : 15.153
 BP magnitude : 17.010
 DUPflag : 0
 Distance (au) : 18.199
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.58
 Sun-Target sep (deg) : 166.04
 Sun-Moon sep (deg) : 133.56
 B (ring opening deg) : 81.51
 PA of pole (deg) : 19.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.917
 C/A sky separation (km) : 25300.3
 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



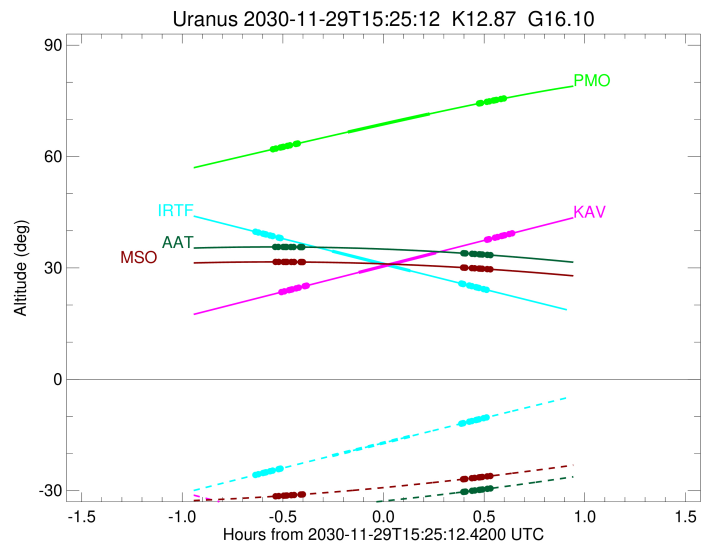
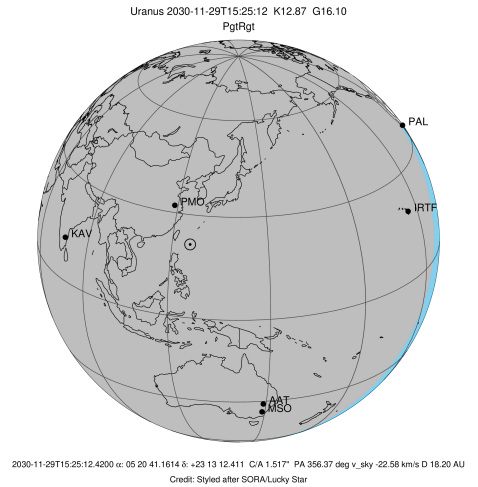
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-29T14:53:15.138		35.64	-35.34	50743.70	-19.88		
lambda	I	2030-11-29T14:53:51.306		35.64	-35.30	50026.71	-19.77		
delta	I	2030-11-29T14:55:19.165		35.64	-35.21	48300.35	-19.52		
gamma	I	2030-11-29T14:55:54.056		35.64	-35.17	47621.21	-19.41		
eta	I	2030-11-29T14:56:17.031		35.64	-35.14	47176.12	-19.33		
beta	I	2030-11-29T14:57:35.003		35.63	-35.05	45678.78	-19.07		
alpha	I	2030-11-29T14:58:26.685		35.62	-35.00	44697.51	-18.88		
4	I	2030-11-29T15:00:22.975		35.61	-34.86	42530.97	-18.39		
5	I	2030-11-29T15:00:40.576		35.61	-34.84	42211.11	-18.33		
6	I	2030-11-29T15:00:59.943		35.60	-34.81	41858.10	-18.23		

No planet occultations

6	E	2030-11-29T15:49:01.741		33.95	-30.34	41867.61	18.23		
5	E	2030-11-29T15:49:26.093		33.93	-30.30	42315.22	18.33		
4	E	2030-11-29T15:49:41.837		33.91	-30.27	42602.52	18.39		
alpha	E	2030-11-29T15:51:37.003		33.80	-30.05	44750.80	18.87		
beta	E	2030-11-29T15:52:25.128		33.75	-29.96	45663.41	19.06		
eta	E	2030-11-29T15:53:43.938		33.67	-29.80	47176.12	19.33		
gamma	E	2030-11-29T15:54:07.217		33.64	-29.76	47626.97	19.40		
delta	E	2030-11-29T15:54:41.821		33.60	-29.69	48300.35	19.51		
lambda	E	2030-11-29T15:56:09.706		33.51	-29.52	50026.71	19.77		
epsilon	E	2030-11-29T15:57:16.904		33.44	-29.39	51361.19	19.87		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-29T15:24:54.060
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3414852669403770624
 2Mass ID (if available) : 05204116+2313124
 ICRS Star Coord at Epoch: 05h 20m 41.16137s +23:13:12.41099s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 12.871
 G magnitude : 16.096
 RP magnitude : 15.153
 BP magnitude : 17.010
 DUPflag : 0
 Distance (au) : 18.199
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.58
 Sun-Target sep (deg) : 166.04
 Sun-Moon sep (deg) : 133.52
 B (ring opening deg) : 81.51
 PA of pole (deg) : 19.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.935
 C/A sky separation (km) : 25545.6
 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	2030-11-29T14:53:22.476		31.61	-31.50	50743.78	-19.79		
lambda	I	2030-11-29T14:53:58.798		31.61	-31.46	50026.71	-19.69		
delta	I	2030-11-29T14:55:27.043		31.61	-31.37	48300.35	-19.43		
gamma	I	2030-11-29T14:56:02.097		31.61	-31.34	47621.19	-19.32		
eta	I	2030-11-29T14:56:25.182		31.60	-31.31	47176.12	-19.24		
beta	I	2030-11-29T14:57:43.543		31.60	-31.23	45678.84	-18.97		
alpha	I	2030-11-29T14:58:35.497		31.59	-31.18	44697.69	-18.77		
4	I	2030-11-29T15:00:32.474		31.58	-31.05	42531.12	-18.28		
5	I	2030-11-29T15:00:50.169		31.58	-31.03	42211.68	-18.21		
6	I	2030-11-29T15:01:09.675		31.58	-31.01	41858.38	-18.11		

No planet occultations

6	E	2030-11-29T15:48:56.979		30.08	-26.92	41867.84	18.11		
5	E	2030-11-29T15:49:21.471		30.06	-26.88	42315.21	18.21		
4	E	2030-11-29T15:49:37.307		30.05	-26.85	42602.28	18.27		
alpha	E	2030-11-29T15:51:33.155		29.94	-26.65	44750.73	18.77		
beta	E	2030-11-29T15:52:21.549		29.90	-26.57	45663.54	18.96		
eta	E	2030-11-29T15:53:40.747		29.82	-26.42	47176.12	19.24		
gamma	E	2030-11-29T15:54:04.135		29.80	-26.38	47626.94	19.31		
delta	E	2030-11-29T15:54:38.901		29.76	-26.32	48300.35	19.43		
lambda	E	2030-11-29T15:56:07.170		29.68	-26.16	50026.71	19.69		
epsilon	E	2030-11-29T15:57:14.544		29.61	-26.04	51359.24	19.79		