

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2045-12-11T16:00:55.080
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3880547757035438976
 2Mass ID (if available) : 10131243+1149512

ICRS Star Coord at Epoch: 10h 13m 12.41632s +11:49:51.15258s

RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.857
 G magnitude : 17.714
 RP magnitude : 16.790
 BP magnitude : 18.602
 DUPflag : 0
 Distance (au) : 18.007
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -2.68
 Sun-Target sep (deg) : 108.39
 Sun-Moon sep (deg) : 145.30
 B (ring opening deg) : 16.40
 PA of pole (deg) : 102.54

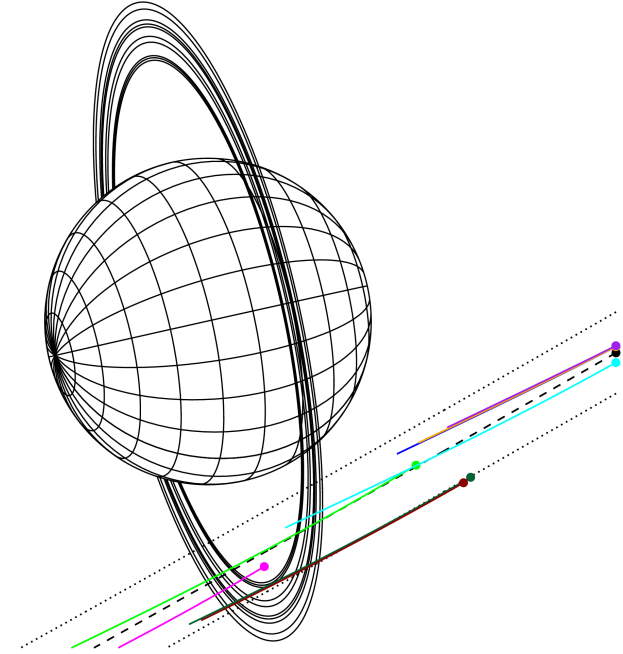
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2045-12-11T16:00:55.0800 α: 10 13 12.41632 δ: +11 49 51.153 C/A 2.695° PA 23.98 deg v_sky - 2.67 km/s D 18.01 AU
 Credit: Styled after SORA/Lucky Star

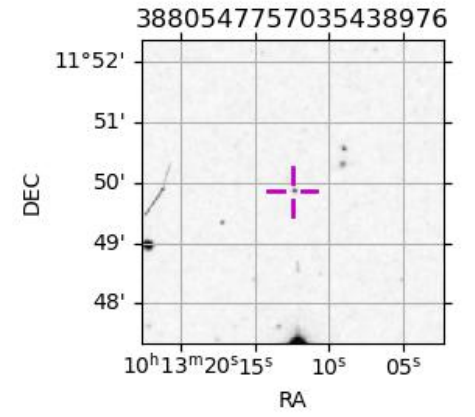
Uranus 2045-12-11T16:00:55 K14.86 G17.71 XRgt

Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 AAT
 MSO

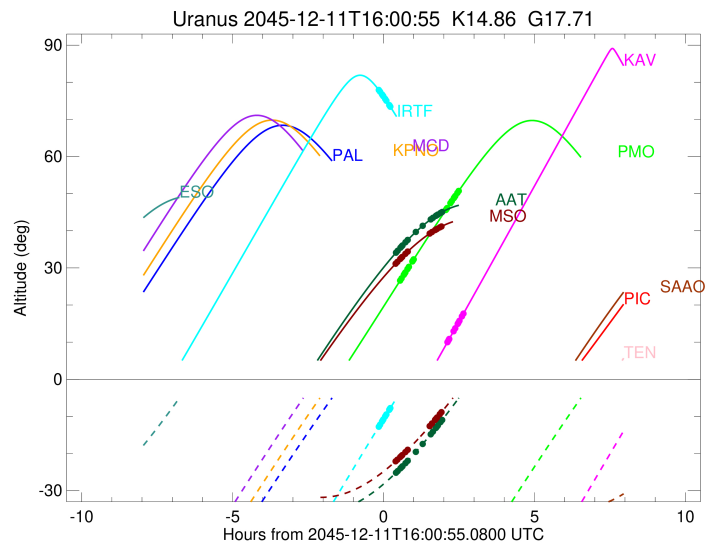
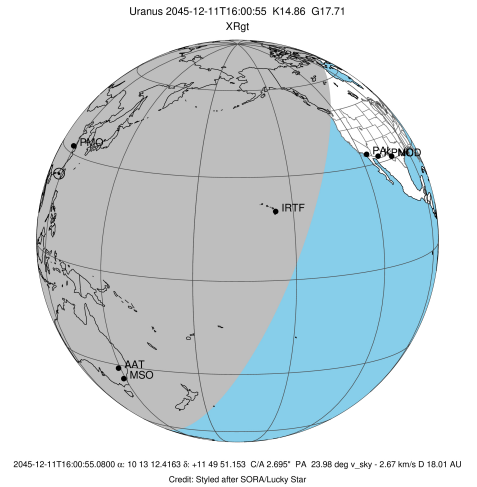


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	DEC 11 16:34 - DEC 11 18:29	PnnRie
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	+++++			DEC 11 15:52 - DEC 11 16:14	PnnRin
KAV	Kavalur Observatory	12.6	78.8			+++++	DEC 11 18:08 - DEC 11 18:38	PnnRne
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 11 16:26 - DEC 11 17:56	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 11 16:25 - DEC 11 17:54	PnnRie



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2045-12-11T16:37:47.140
 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 : 3880547757035438976
 2Mass ID (if available) : 10131243+1149512
 ICRS Star Coord at Epoch: 10h 13m 12.41632s +11:49:51.15258s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.857
 G magnitude : 17.714
 RP magnitude : 16.790
 BP magnitude : 18.602
 DUPflag : 0
 Distance (au) : 18.006
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -2.68
 Sun-Target sep (deg) : 108.39
 Sun-Moon sep (deg) : 144.78
 B (ring opening deg) : 16.40
 PA of pole (deg) : 102.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.740
 C/A sky separation (km) : 35786.2
 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

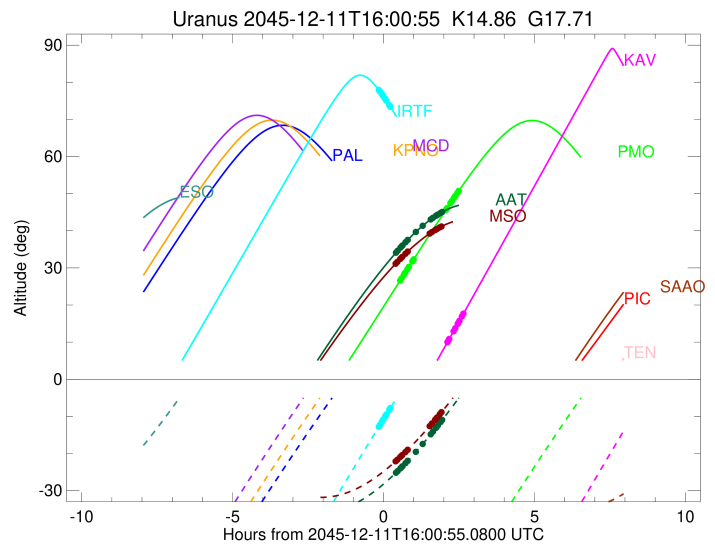
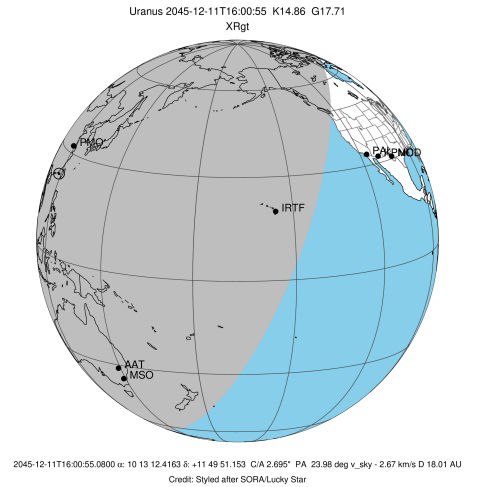


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-12-11T16:34:36.623		26.72	-78.03	50921.60	-6.62		
lambda	I	2045-12-11T16:36:52.057		27.20	-77.68	50026.71	-6.54		
delta	I	2045-12-11T16:41:21.548		28.15	-76.97	48300.35	-6.26		
gamma	I	2045-12-11T16:43:10.029		28.54	-76.68	47627.47	-6.14		
eta	I	2045-12-11T16:44:24.051		28.80	-76.47	47176.12	-6.05		
beta	I	2045-12-11T16:48:38.622		29.70	-75.75	45680.23	-5.73		
alpha	I	2045-12-11T16:51:18.850		30.27	-75.28	44751.77	-5.50		
4	I	2045-12-11T16:58:26.467		31.78	-73.99	42566.29	-4.83		
5	I	2045-12-11T16:59:53.116		32.08	-73.72	42155.24	-4.71		
6	I	2045-12-11T17:00:57.985		32.31	-73.52	41879.17	-4.61		

No planet occultations

6	E	2045-12-11T18:04:42.849		45.58	-60.69	41855.28	4.77		
5	E	2045-12-11T18:05:51.455		45.81	-60.45	42198.41	4.89		
4	E	2045-12-11T18:07:13.279		46.09	-60.16	42530.15	5.02		
alpha	E	2045-12-11T18:13:50.785		47.43	-58.77	44724.66	5.76		
beta	E	2045-12-11T18:16:35.652		47.98	-58.20	45673.10	6.02		
eta	E	2045-12-11T18:20:36.664		48.78	-57.35	47176.12	6.39		
gamma	E	2045-12-11T18:21:45.831		49.01	-57.11	47621.46	6.49		
delta	E	2045-12-11T18:23:29.315		49.35	-56.74	48300.35	6.63		
lambda	E	2045-12-11T18:27:43.217		50.19	-55.85	50026.71	6.96		
epsilon	E	2045-12-11T18:29:33.049		50.55	-55.46	50798.66	7.06		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2045-12-11T16:11:47.250
 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 : 3880547757035438976
 2Mass ID (if available) : 10131243+1149512
 ICRS Star Coord at Epoch: 10h 13m 12.41632s +11:49:51.15258s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.857
 G magnitude : 17.714
 RP magnitude : 16.790
 BP magnitude : 18.602
 DUPflag : 0
 Distance (au) : 18.007
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -2.68
 Sun-Target sep (deg) : 108.39
 Sun-Moon sep (deg) : 145.89
 B (ring opening deg) : 16.40
 PA of pole (deg) : 102.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.633
 C/A sky separation (km) : 34386.8
 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

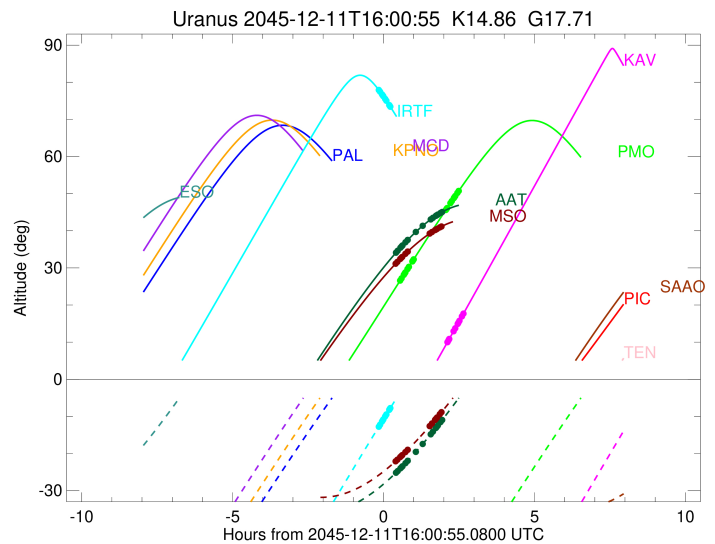
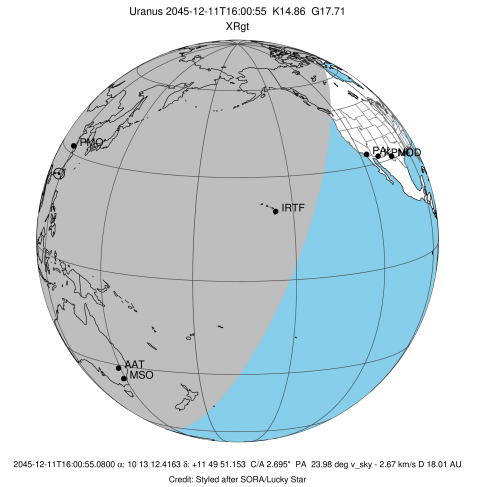


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-12-11T15:52:07.735		77.83	-12.67	50934.20	-7.59		
lambda	I	2045-12-11T15:54:07.494		77.47	-12.23	50026.71	-7.51		
delta	I	2045-12-11T15:58:01.458		76.74	-11.37	48300.35	-7.24		
gamma	I	2045-12-11T15:59:35.120		76.44	-11.02	47627.71	-7.12		
eta	I	2045-12-11T16:00:38.893		76.23	-10.79	47176.12	-7.04		
beta	I	2045-12-11T16:04:16.739		75.51	-9.99	45679.86	-6.74		
alpha	I	2045-12-11T16:06:32.258		75.06	-9.50	44752.10	-6.53		
4	I	2045-12-11T16:12:26.542		73.84	-8.20	42569.51	-5.93		
5	I	2045-12-11T16:13:39.040		73.59	-7.94	42154.86	-5.84		
6	I	2045-12-11T16:14:31.586		73.41	-7.75	41879.58	-5.75		

No planet occultations

6	E	2045-12-11T17:26:16.503		57.23	7.58x	41851.17	5.68		
5	E	2045-12-11T17:27:16.359		57.00	7.79x	42205.85	5.77		
4	E	2045-12-11T17:28:28.315		56.72	8.04x	42528.46	5.86		
alpha	E	2045-12-11T17:34:15.380		55.37	9.24x	44721.77	6.44		
beta	E	2045-12-11T17:36:44.435		54.79	9.75x	45671.74	6.64		
eta	E	2045-12-11T17:40:25.014		53.93	10.50x	47176.12	6.93		
gamma	E	2045-12-11T17:41:28.910		53.68	10.72x	47621.31	7.01		
delta	E	2045-12-11T17:43:05.046		53.30	11.05x	48300.35	7.12		
lambda	E	2045-12-11T17:47:03.114		52.38	11.86x	50026.71	7.38		
epsilon	E	2045-12-11T17:48:48.900		51.96	12.22x	50812.93	7.45		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2045-12-11T16:25:35.260
 Event type : XRgt
 : No Uranus occs
 : 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 : 3880547757035438976
 2Mass ID (if available) : 10131243+1149512
 ICRS Star Coord at Epoch: 10h 13m 12.41632s +11:49:51.15258s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.857
 G magnitude : 17.714
 RP magnitude : 16.790
 BP magnitude : 18.602
 DUPflag : 0
 Distance (au) : 18.006
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -2.68
 Sun-Target sep (deg) : 108.39
 Sun-Moon sep (deg) : 144.42
 B (ring opening deg) : 16.40
 PA of pole (deg) : 102.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.857
 C/A sky separation (km) : 37306.7
 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

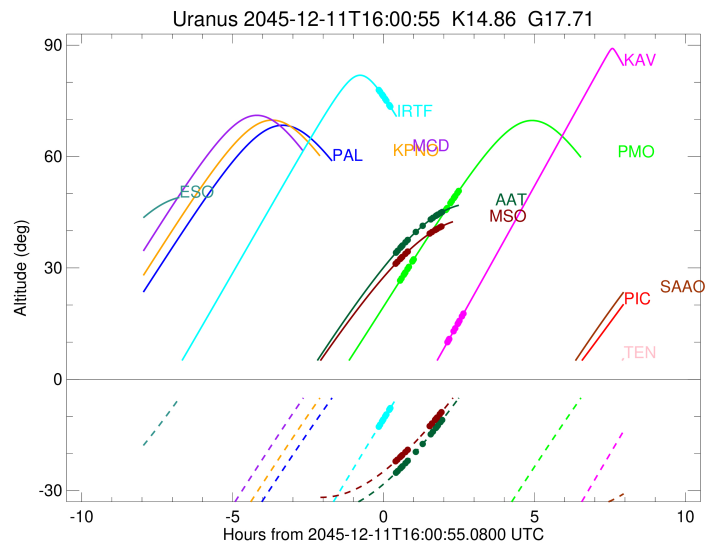
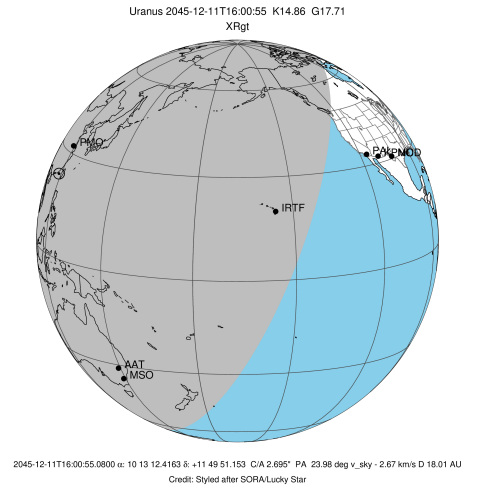


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-12-11T16:43:14.529	-10.30x	-60.77	50905.17	-5.57			
lambda	I	2045-12-11T16:45:52.909	-9.67x	-61.36	50026.71	-5.48			
delta	I	2045-12-11T16:51:16.961	-8.39x	-62.54	48300.35	-5.17			
gamma	I	2045-12-11T16:53:28.891	-7.87x	-63.02	47627.15	-5.03			
eta	I	2045-12-11T16:54:59.368	-7.51x	-63.35	47176.12	-4.94			
beta	I	2045-12-11T17:00:14.944	-6.26x	-64.49	45680.63	-4.57			
alpha	I	2045-12-11T17:03:38.525	-5.45x	-65.22	44751.14	-4.30			
4	I	2045-12-11T17:13:08.291	-3.19x	-67.23	42561.64	-3.46			
5	I	2045-12-11T17:15:05.677	-2.72x	-67.64	42156.63	-3.30			
6	I	2045-12-11T17:16:38.843	-2.35x	-67.97	41878.09	-3.14			

No planet occultations

6	E	2045-12-11T18:07:59.536	9.98	-77.24	41860.66	3.29			
5	E	2045-12-11T18:09:34.192	10.36	-77.45	42188.84	3.45			
4	E	2045-12-11T18:11:24.147	10.81	-77.67	42533.06	3.64			
alpha	E	2045-12-11T18:20:08.211	12.92	-78.60	44728.27	4.59			
beta	E	2045-12-11T18:23:31.842	13.74	-78.88	45674.69	4.91			
eta	E	2045-12-11T18:28:23.466	14.91	-79.18	47176.12	5.35			
gamma	E	2045-12-11T18:29:45.897	15.24	-79.24	47621.69	5.46			
delta	E	2045-12-11T18:31:48.183	15.74	-79.32	48300.35	5.63			
lambda	E	2045-12-11T18:36:44.265	16.93	-79.42	50026.71	6.02			
epsilon	E	2045-12-11T18:38:48.368	17.43	-79.42	50783.50	6.15			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2045-12-11T16:16:33.700
 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 : 3880547757035438976
 2Mass ID (if available) : 10131243+1149512
 ICRS Star Coord at Epoch: 10h 13m 12.41632s +11:49:51.15258s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.857
 G magnitude : 17.714
 RP magnitude : 16.790
 BP magnitude : 18.602
 DUPflag : 0
 Distance (au) : 18.007
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -2.68
 Sun-Target sep (deg) : 108.39
 Sun-Moon sep (deg) : 145.32
 B (ring opening deg) : 16.40
 PA of pole (deg) : 102.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.149
 C/A sky separation (km) : 41130.5
 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

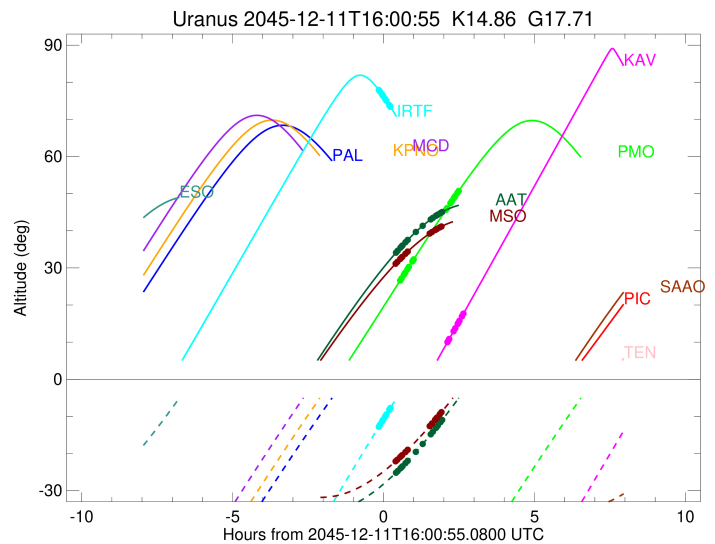
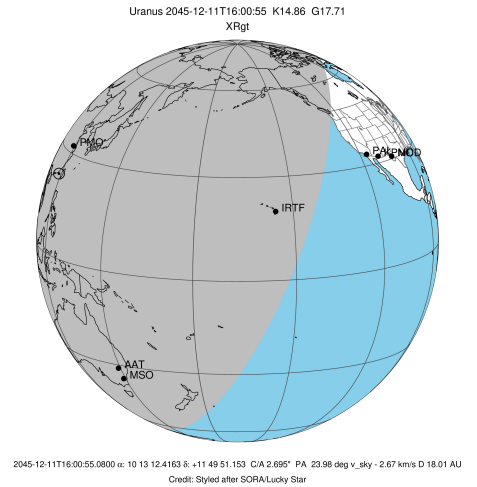


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-12-11T16:26:37.589		34.24	-25.06	50866.48	-5.62		
lambda	I	2045-12-11T16:29:08.651		34.62	-24.73	50026.71	-5.45		
delta	I	2045-12-11T16:34:40.847		35.46	-23.98	48300.35	-4.93		
gamma	I	2045-12-11T16:37:00.786		35.81	-23.66	47626.36	-4.70		
eta	I	2045-12-11T16:38:38.406		36.05	-23.44	47176.12	-4.53		
beta	I	2045-12-11T16:44:35.745		36.91	-22.60	45681.18	-3.86		
alpha	I	2045-12-11T16:48:49.379		37.51	-21.99	44748.73	-3.32		
4	I	2045-12-11T17:05:57.541		39.79	-19.44	42547.95	-0.92		

No planet occultations

4	E	2045-12-11T17:18:02.529		41.25	-17.55	42541.42	0.93		
alpha	E	2045-12-11T17:34:45.872		43.06	-14.84	44733.04	3.38		
beta	E	2045-12-11T17:39:08.201		43.49	-14.11	45676.52	3.93		
eta	E	2045-12-11T17:44:57.074		44.02	-13.13	47176.12	4.63		
gamma	E	2045-12-11T17:46:31.504		44.16	-12.86	47622.00	4.81		
delta	E	2045-12-11T17:48:48.891		44.36	-12.47	48300.35	5.06		
lambda	E	2045-12-11T17:54:11.998		44.80	-11.55	50026.71	5.61		
epsilon	E	2045-12-11T17:56:22.050		44.97	-11.17	50770.40	5.80		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2045-12-11T16:14:27.840
 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 : 3880547757035438976
 2Mass ID (if available) : 10131243+1149512
 ICRS Star Coord at Epoch: 10h 13m 12.41632s +11:49:51.15258s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.857
 G magnitude : 17.714
 RP magnitude : 16.790
 BP magnitude : 18.602
 DUPflag : 0
 Distance (au) : 18.007
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -2.68
 Sun-Target sep (deg) : 108.39
 Sun-Moon sep (deg) : 145.34
 B (ring opening deg) : 16.40
 PA of pole (deg) : 102.54
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.166
 C/A sky separation (km) : 41350.0
 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_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	2045-12-11T16:25:56.419		31.26	-21.98	50864.08	-5.51		
lambda	I	2045-12-11T16:28:30.032		31.62	-21.66	50026.71	-5.34		
delta	I	2045-12-11T16:34:09.841		32.42	-20.95	48300.35	-4.81		
gamma	I	2045-12-11T16:36:33.567		32.75	-20.65	47626.30	-4.57		
eta	I	2045-12-11T16:38:14.065		32.97	-20.43	47176.12	-4.39		
beta	I	2045-12-11T16:44:24.458		33.80	-19.62	45681.20	-3.69		
alpha	I	2045-12-11T16:48:51.371		34.38	-19.02	44748.47	-3.13		

No planet occultations

alpha	E	2045-12-11T17:32:39.038		39.25	-12.63	44733.60	3.18		
beta	E	2045-12-11T17:37:14.798		39.66	-11.91	45676.72	3.76		
eta	E	2045-12-11T17:43:16.742		40.18	-10.95	47176.12	4.49		
gamma	E	2045-12-11T17:44:54.055		40.31	-10.69	47622.04	4.67		
delta	E	2045-12-11T17:47:15.251		40.50	-10.32	48300.35	4.93		
lambda	E	2045-12-11T17:52:46.016		40.91	-9.42	50026.71	5.50		
epsilon	E	2045-12-11T17:54:58.506		41.07	-9.06	50769.02	5.68		