

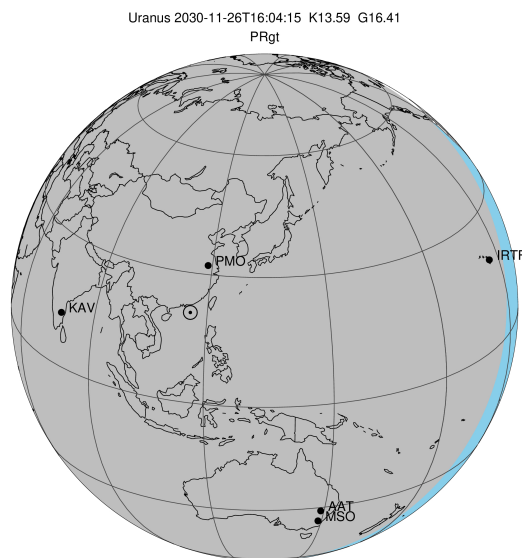
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-26T16:04:15.460
 Event type : PRgt
 : Uranus occs: not geocentric or topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3416350994513210240
 2Mass ID (if available) : 05211267+2313391

ICRS Star Coord at Epoch: 05h 21m 12.67301s +23:13:39.17041s

RUWE (>1.4 is poor) : 1.32
 K magnitude : 13.586
 G magnitude : 16.411
 RP magnitude : 15.496
 BP magnitude : 17.181
 DUPflag : 0
 Distance (au) : 18.213
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.15
 Sun-Target sep (deg) : 162.91
 Sun-Moon sep (deg) : 176.97
 B (ring opening deg) : 81.47
 PA of pole (deg) : 19.85

a(km) ring

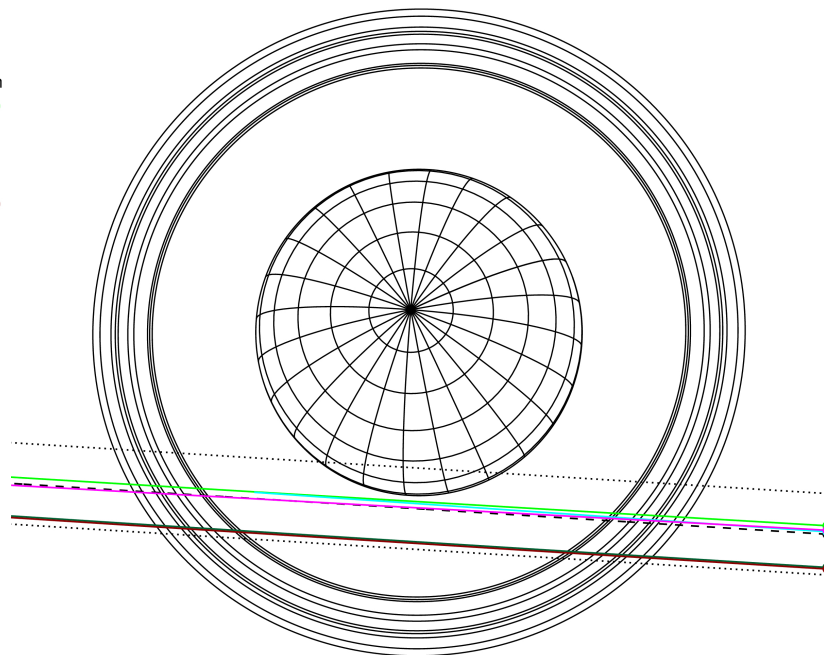
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2030-11-26T16:04:15.4600 ra: 05 21 12.6730 s: +23 13 39.170 C/A 2.080° PA 356.43 deg v_sky -22.15 km/s D 18.21 AU
 Credit: Styled after SORA/Lucky Star

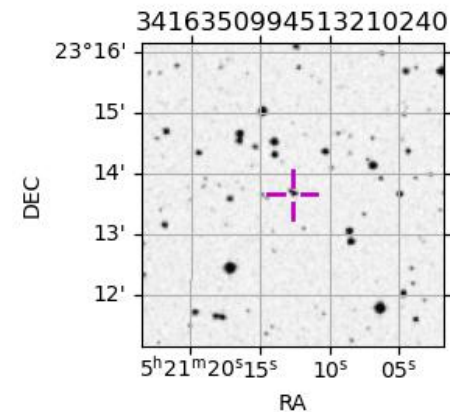
Uranus 2030-11-26T16:04:15 K13.59 G16.41 PRgt

Earth
 PMO
 IRTF
 KAV
 AAT
 MSO

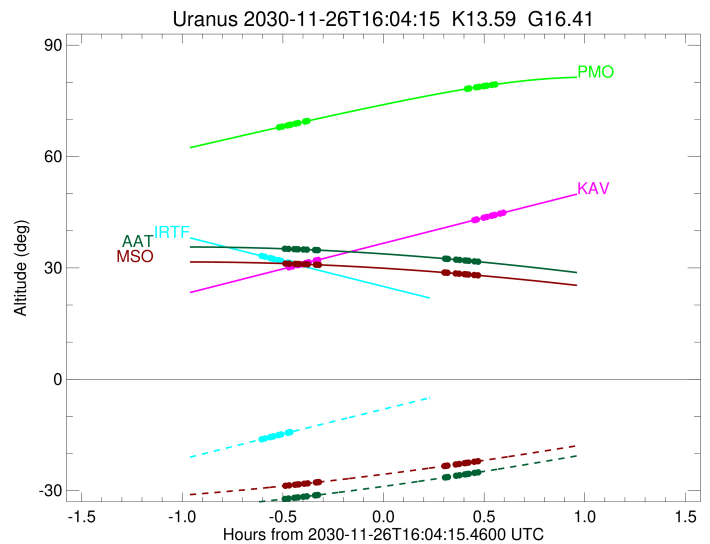
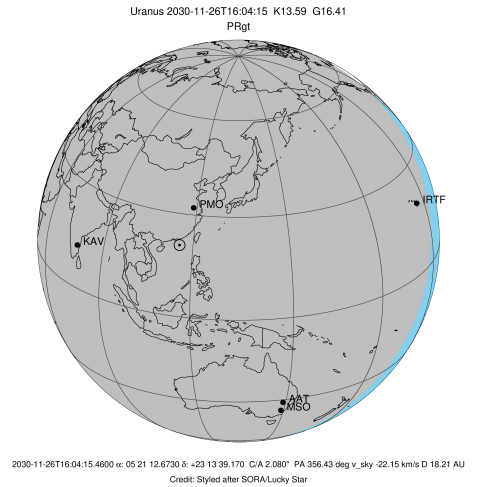


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 26 15:33 - NOV 26 16:37	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	+++++			NOV 26 15:28 - NOV 26 15:36	PnnRin
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	NOV 26 15:36 - NOV 26 16:40	PnnRie
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 26 15:35 - NOV 26 16:32	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	NOV 26 15:35 - NOV 26 16:32	PnnRie



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-26T16:05:12.570
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3416350994513210240
 2Mass ID (if available) : 05211267+2313391
 ICRS Star Coord at Epoch: 05h 21m 12.67301s +23:13:39.17041s
 RUWE (>1.4 is poor) : 1.32
 K magnitude : 13.586
 G magnitude : 16.411
 RP magnitude : 15.496
 BP magnitude : 17.181
 DUPflag : 0
 Distance (au) : 18.213
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.15
 Sun-Target sep (deg) : 162.91
 Sun-Moon sep (deg) : 177.30
 B (ring opening deg) : 81.47
 PA of pole (deg) : 19.85
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.003
 C/A sky separation (km) : 26451.7
 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



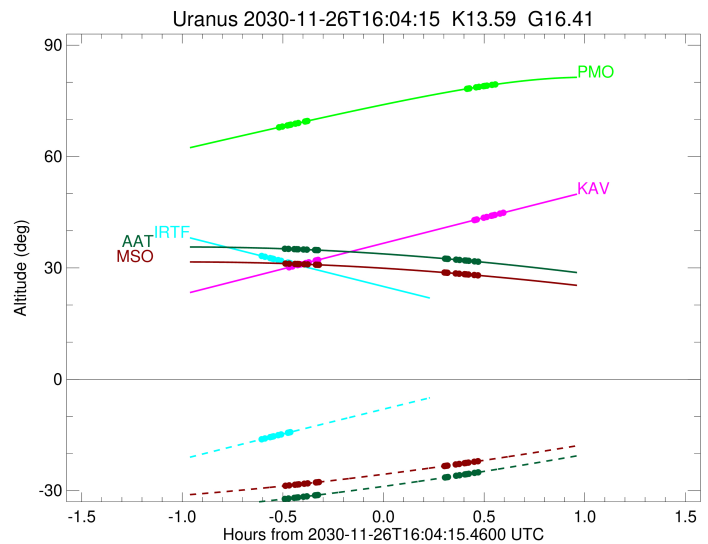
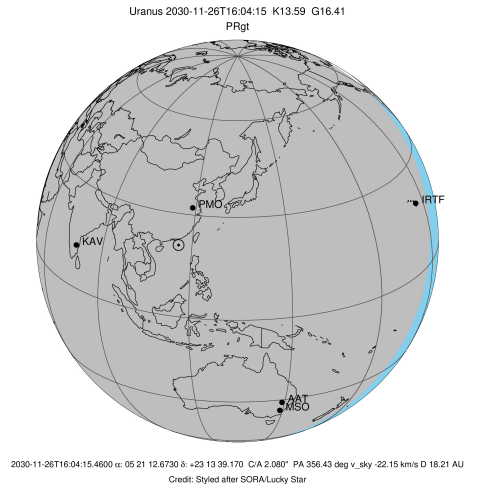
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-26T15:33:29.239		67.94	-78.37	50743.56	-19.16		
lambda	I	2030-11-26T15:34:06.761		68.07	-78.41	50026.71	-19.05		
delta	I	2030-11-26T15:35:38.030		68.38	-78.53	48300.35	-18.77		
gamma	I	2030-11-26T15:36:14.314		68.50	-78.57	47621.32	-18.65		
eta	I	2030-11-26T15:36:38.231		68.58	-78.60	47176.12	-18.57		
beta	I	2030-11-26T15:37:59.523		68.86	-78.69	45677.98	-18.28		
alpha	I	2030-11-26T15:38:53.547		69.04	-78.74	44695.34	-18.07		
4	I	2030-11-26T15:40:55.186		69.45	-78.85	42529.05	-17.54		
5	I	2030-11-26T15:41:14.074		69.51	-78.86	42203.14	-17.47		
6	I	2030-11-26T15:41:34.091		69.58	-78.88	41853.89	-17.36		

No planet occultations

6	E	2030-11-26T16:29:10.618		78.25	-76.34	41872.49	17.39		
5	E	2030-11-26T16:29:35.751		78.31	-76.28	42313.60	17.49		
4	E	2030-11-26T16:29:51.983		78.35	-76.24	42596.42	17.56		
alpha	E	2030-11-26T16:31:52.528		78.65	-75.97	44748.91	18.10		
beta	E	2030-11-26T16:32:42.929		78.77	-75.85	45666.16	18.31		
eta	E	2030-11-26T16:34:04.756		78.96	-75.65	47176.12	18.60		
gamma	E	2030-11-26T16:34:28.906		79.01	-75.59	47626.32	18.68		
delta	E	2030-11-26T16:35:04.865		79.09	-75.50	48300.35	18.80		
lambda	E	2030-11-26T16:36:35.990		79.30	-75.28	50026.71	19.08		
epsilon	E	2030-11-26T16:37:43.697		79.44	-75.11	51325.26	19.19		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-11-26T16:00:07.240
Event type          : PRgt
: Uranus occs: not geocentric or 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      : 3416350994513210240
2Mass ID (if available) : 05211267+2313391
ICRS Star Coord at Epoch: 05h 21m 12.67301s +23:13:39.17041s
RUWE (>1.4 is poor) : 1.32
K magnitude          : 13.586
G magnitude          : 16.411
RP magnitude         : 15.496
BP magnitude         : 17.181
DUPflag             : 0
Distance (au)       : 18.213
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -22.15
Sun-Target sep (deg) : 162.91
Sun-Moon sep (deg)  : 176.25
B (ring opening deg) : 81.47
PA of pole (deg)    : 19.85
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.025
C/A sky separation (km) : 26754.2
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.bsp
ural161.bsp
vgr2.ural161.bsp
peph.ural160.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
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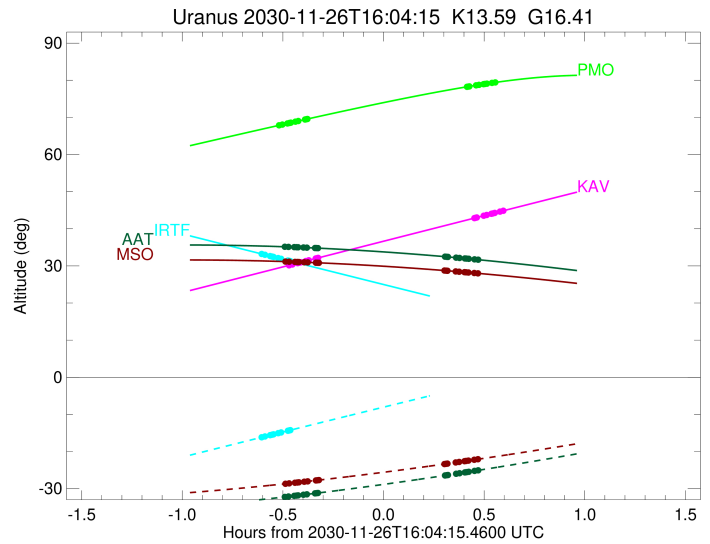
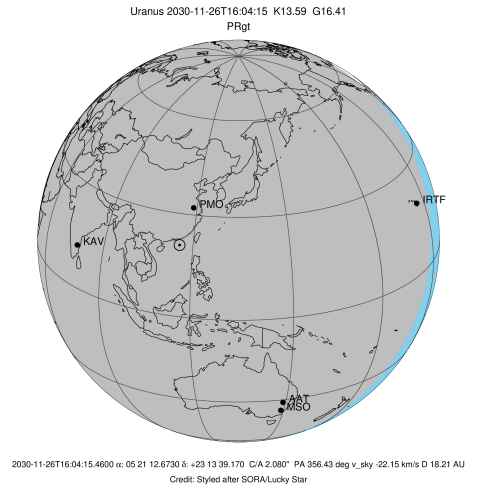


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-26T15:28:17.774		33.14	-16.09	50743.51	-18.96		
lambda	I	2030-11-26T15:28:55.695		32.99	-15.94	50026.71	-18.85		
delta	I	2030-11-26T15:30:27.984		32.64	-15.60	48300.35	-18.56		
gamma	I	2030-11-26T15:31:04.692		32.51	-15.46	47621.29	-18.44		
eta	I	2030-11-26T15:31:28.892		32.41	-15.37	47176.12	-18.35		
beta	I	2030-11-26T15:32:51.175		32.10	-15.06	45678.18	-18.05		
alpha	I	2030-11-26T15:33:45.883		31.89	-14.86	44695.80	-17.84		
4	I	2030-11-26T15:35:49.207		31.43	-14.40	42529.37	-17.29		
5	I	2030-11-26T15:36:08.319		31.36	-14.32	42204.54	-17.22		
6	I	2030-11-26T15:36:28.660		31.28	-14.25	41854.63	-17.11		

No planet occultations

6	E	2030-11-26T16:24:09.514		20.52	-3.66x	41872.49	17.05		
5	E	2030-11-26T16:24:35.142		20.42	-3.57x	42313.60	17.16		
4	E	2030-11-26T16:24:51.692		20.36	-3.51x	42596.43	17.23		
alpha	E	2030-11-26T16:26:54.524		19.90	-3.06x	44748.93	17.77		
beta	E	2030-11-26T16:27:45.850		19.71	-2.87x	45666.14	17.98		
eta	E	2030-11-26T16:29:09.151		19.40	-2.56x	47176.12	18.28		
gamma	E	2030-11-26T16:29:33.728		19.31	-2.48x	47626.33	18.36		
delta	E	2030-11-26T16:30:10.320		19.17	-2.34x	48300.35	18.48		
lambda	E	2030-11-26T16:31:43.025		18.83	-2.00x	50026.71	18.76		
epsilon	E	2030-11-26T16:32:51.936		18.57	-1.75x	51326.17	18.87		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-26T16:07:54.990
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3416350994513210240
 2Mass ID (if available) : 05211267+2313391
 ICRS Star Coord at Epoch: 05h 21m 12.67301s +23:13:39.17041s
 RUWE (>1.4 is poor) : 1.32
 K magnitude : 13.586
 G magnitude : 16.411
 RP magnitude : 15.496
 BP magnitude : 17.181
 DUPflag : 0
 Distance (au) : 18.213
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.15
 Sun-Target sep (deg) : 162.91
 Sun-Moon sep (deg) : 177.67
 B (ring opening deg) : 81.47
 PA of pole (deg) : 19.85
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.077
 C/A sky separation (km) : 27430.8
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

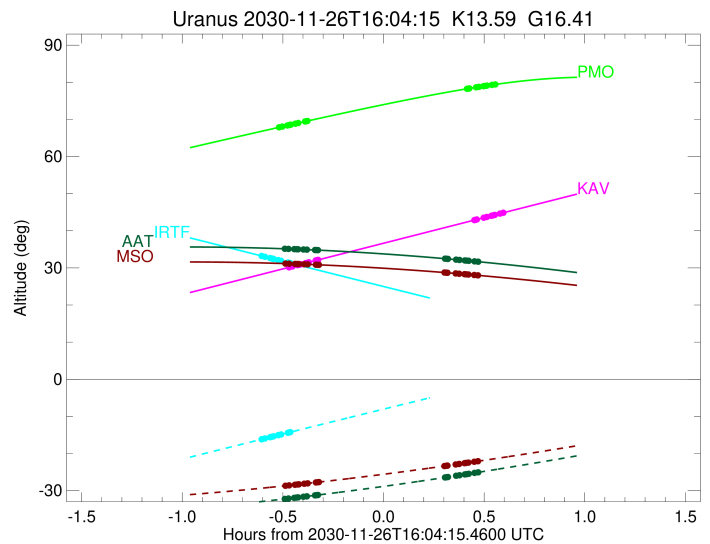
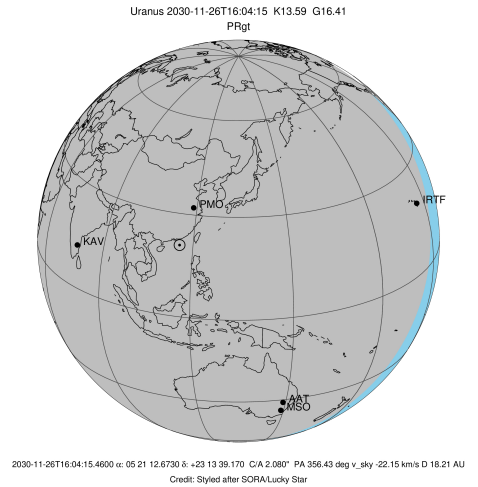


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-26T15:36:28.294		30.24	-47.26	50743.51	-18.75		
lambda	I	2030-11-26T15:37:06.642		30.39	-47.41	50026.71	-18.63		
delta	I	2030-11-26T15:38:40.024		30.75	-47.77	48300.35	-18.33		
gamma	I	2030-11-26T15:39:17.191		30.89	-47.92	47621.28	-18.20		
eta	I	2030-11-26T15:39:41.702		30.98	-48.01	47176.12	-18.12		
beta	I	2030-11-26T15:41:05.100		31.30	-48.34	45678.23	-17.80		
alpha	I	2030-11-26T15:42:00.601		31.52	-48.55	44695.94	-17.58		
4	I	2030-11-26T15:44:05.920		32.00	-49.04	42529.49	-16.99		
5	I	2030-11-26T15:44:25.347		32.07	-49.11	42205.09	-16.92		
6	I	2030-11-26T15:44:46.067		32.15	-49.19	41854.93	-16.80		

No planet occultations

6	E	2030-11-26T16:31:22.545		42.88	-59.95	41873.31	16.86		
5	E	2030-11-26T16:31:48.342		42.98	-60.05	42312.98	16.98		
4	E	2030-11-26T16:32:05.036		43.04	-60.11	42595.10	17.06		
alpha	E	2030-11-26T16:34:08.940		43.52	-60.58	44748.41	17.65		
beta	E	2030-11-26T16:35:00.662		43.71	-60.78	45666.77	17.88		
eta	E	2030-11-26T16:36:24.355		44.03	-61.09	47176.12	18.20		
gamma	E	2030-11-26T16:36:49.026		44.13	-61.19	47626.17	18.29		
delta	E	2030-11-26T16:37:25.760		44.27	-61.33	48300.35	18.42		
lambda	E	2030-11-26T16:38:58.710		44.62	-61.68	50026.71	18.72		
epsilon	E	2030-11-26T16:40:07.141		44.89	-61.94	51315.13	18.84		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-26T16:03:27.410
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3416350994513210240
 2Mass ID (if available) : 05211267+2313391
 ICRS Star Coord at Epoch: 05h 21m 12.67301s +23:13:39.17041s
 RUWE (>1.4 is poor) : 1.32
 K magnitude : 13.586
 G magnitude : 16.411
 RP magnitude : 15.496
 BP magnitude : 17.181
 DUPflag : 0
 Distance (au) : 18.213
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.15
 Sun-Target sep (deg) : 162.91
 Sun-Moon sep (deg) : 176.37
 B (ring opening deg) : 81.47
 PA of pole (deg) : 19.85
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.479
 C/A sky separation (km) : 32744.3
 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



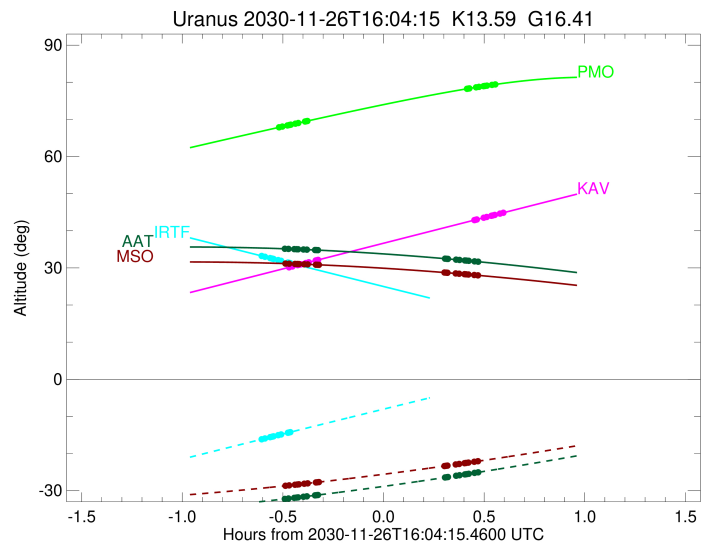
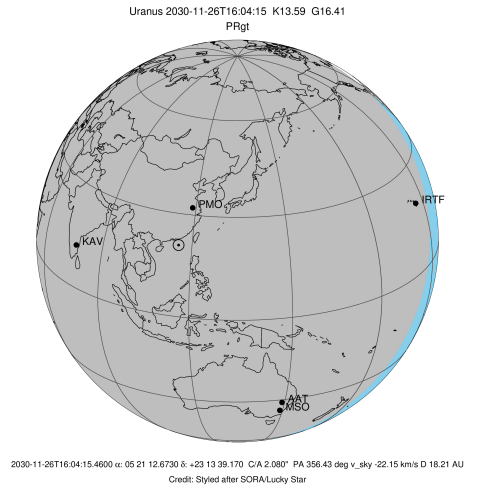
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-11-26T15:35:13.921		35.14	-32.19	50747.59	-17.14		
lambda	I	2030-11-26T15:35:56.256		35.11	-32.12	50026.71	-16.93		
delta	I	2030-11-26T15:37:39.654		35.06	-31.94	48300.35	-16.45		
gamma	I	2030-11-26T15:38:21.213		35.03	-31.87	47621.06	-16.24		
eta	I	2030-11-26T15:38:48.733		35.01	-31.82	47176.12	-16.10		
beta	I	2030-11-26T15:40:23.229		34.96	-31.65	45679.74	-15.57		
alpha	I	2030-11-26T15:41:26.856		34.92	-31.53	44700.60	-15.19		
4	I	2030-11-26T15:43:54.191		34.82	-31.26	42533.54	-14.20		
5	I	2030-11-26T15:44:16.879		34.80	-31.22	42219.81	-14.06		
6	I	2030-11-26T15:44:42.312		34.78	-31.18	41862.10	-13.85		

No planet occultations

6	E	2030-11-26T16:22:37.990		32.48	-26.45	41876.75	13.85		
5	E	2030-11-26T16:23:08.563		32.44	-26.38	42308.46	14.05		
4	E	2030-11-26T16:23:28.605		32.42	-26.33	42588.10	14.20		
alpha	E	2030-11-26T16:25:55.068		32.22	-25.99	44745.55	15.19		
beta	E	2030-11-26T16:26:55.191		32.14	-25.85	45669.59	15.56		
eta	E	2030-11-26T16:28:30.407		32.01	-25.63	47176.12	16.09		
gamma	E	2030-11-26T16:28:58.214		31.97	-25.57	47625.43	16.23		
delta	E	2030-11-26T16:29:39.531		31.91	-25.47	48300.35	16.44		
lambda	E	2030-11-26T16:31:22.999		31.76	-25.23	50026.71	16.92		
epsilon	E	2030-11-26T16:32:35.697		31.66	-25.05	51268.42	17.12		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-26T16:03:31.030
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3416350994513210240
 2Mass ID (if available) : 05211267+2313391
 ICRS Star Coord at Epoch: 05h 21m 12.67301s +23:13:39.17041s
 RUWE (>1.4 is poor) : 1.32
 K magnitude : 13.586
 G magnitude : 16.411
 RP magnitude : 15.496
 BP magnitude : 17.181
 DUPflag : 0
 Distance (au) : 18.213
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.15
 Sun-Target sep (deg) : 162.91
 Sun-Moon sep (deg) : 176.35
 B (ring opening deg) : 81.47
 PA of pole (deg) : 19.85
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.498
 C/A sky separation (km) : 32990.4
 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	2030-11-26T15:35:25.826		31.15	-28.65	50747.96	-17.03		
lambda	I	2030-11-26T15:36:08.460		31.13	-28.58	50026.71	-16.82		
delta	I	2030-11-26T15:37:52.590		31.07	-28.41	48300.35	-16.33		
gamma	I	2030-11-26T15:38:34.469		31.05	-28.35	47621.05	-16.11		
eta	I	2030-11-26T15:39:02.209		31.04	-28.30	47176.12	-15.97		
beta	I	2030-11-26T15:40:37.519		30.98	-28.14	45679.80	-15.43		
alpha	I	2030-11-26T15:41:41.744		30.95	-28.04	44700.84	-15.04		
4	I	2030-11-26T15:44:10.723		30.86	-27.79	42533.78	-14.03		
5	I	2030-11-26T15:44:33.669		30.84	-27.75	42220.56	-13.88		
6	I	2030-11-26T15:44:59.461		30.82	-27.70	41862.43	-13.67		

No planet occultations

6	E	2030-11-26T16:22:28.260		28.75	-23.37	41876.90	13.66		
5	E	2030-11-26T16:22:59.193		28.71	-23.31	42308.15	13.87		
4	E	2030-11-26T16:23:19.489		28.69	-23.26	42587.71	14.02		
alpha	E	2030-11-26T16:25:47.590		28.51	-22.95	44745.38	15.04		
beta	E	2030-11-26T16:26:48.307		28.43	-22.82	45669.73	15.42		
eta	E	2030-11-26T16:28:24.334		28.31	-22.61	47176.12	15.96		
gamma	E	2030-11-26T16:28:52.360		28.27	-22.55	47625.39	16.10		
delta	E	2030-11-26T16:29:33.995		28.22	-22.45	48300.35	16.32		
lambda	E	2030-11-26T16:31:18.190		28.08	-22.22	50026.71	16.81		
epsilon	E	2030-11-26T16:32:31.205		27.99	-22.06	51265.91	17.02		