

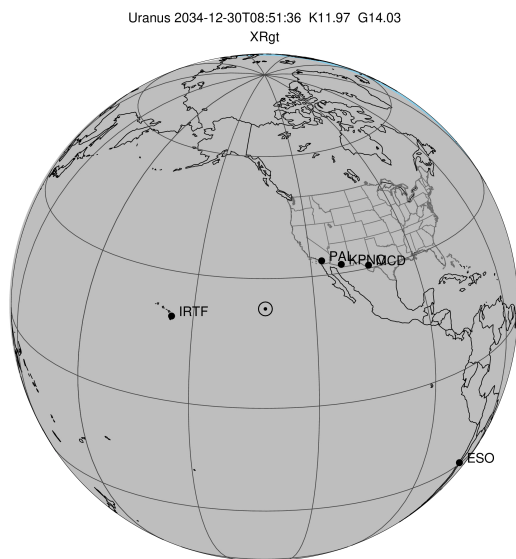
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-30T08:51:36.440  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3382447793992286336  
 2Mass ID (if available) : 06350351+2331350

ICRS Star Coord at Epoch: 06h 35m 03.48677s +23:31:33.76611s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.974  
 G magnitude : 14.030  
 RP magnitude : 13.346  
 BP magnitude : 14.569  
 DUPflag : 0  
 Distance (au) : 17.906  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 179.61  
 Sun-Moon sep (deg) : 66.31  
 B (ring opening deg) : 68.14  
 PA of pole (deg) : 71.44

# a(km) ring

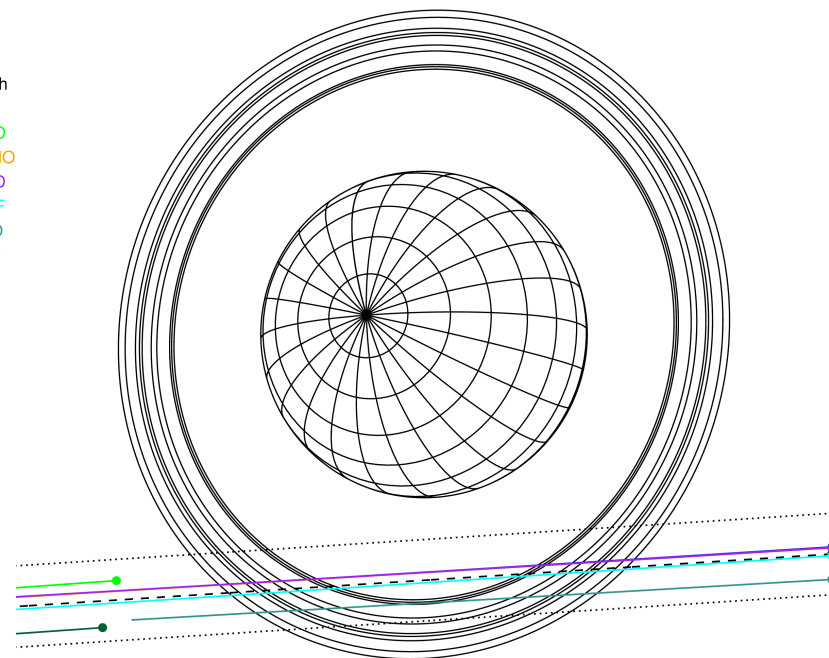
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2034-12-30T08:51:36.4400 α: 06 35 03.4868 δ: +23 31 33.766 C/A 2.950° PA 3.68 deg v\_sky -23.37 km/s D 17.91 AU  
 Credit: Styled after SORA/Lucky Star

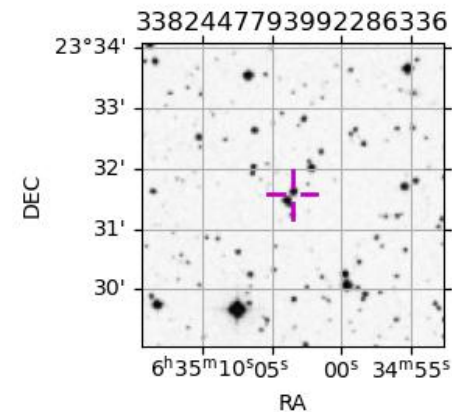
Uranus 2034-12-30T08:51:36 K11.97 G14.03 XRgt

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 ESO  
 AAT

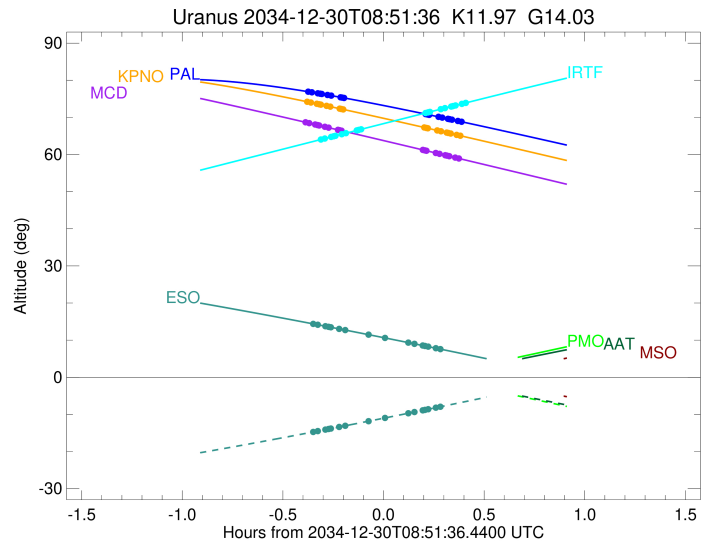
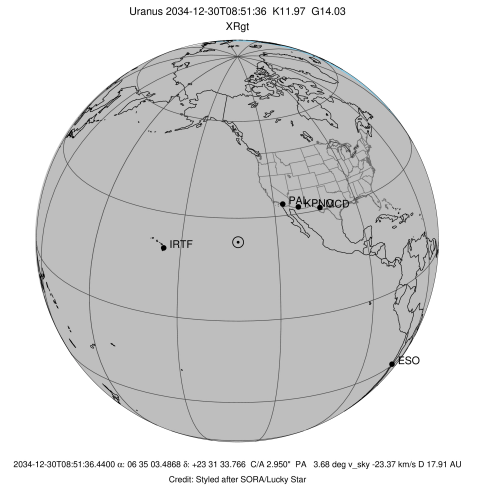


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 30 08:29 - DEC 30 09:14	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 30 08:28 - DEC 30 09:14	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 30 08:28 - DEC 30 09:13	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 30 08:32 - DEC 30 09:15	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	+++++		+++++	DEC 30 08:30 - DEC 30 09:08	PnnRie
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 : 2034-12-30T08:50:43.730  
 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 : 3382447793992286336  
 2Mass ID (if available) : 06350351+2331350  
 ICRS Star Coord at Epoch: 06h 35m 03.48677s +23:31:33.76611s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.974  
 G magnitude : 14.030  
 RP magnitude : 13.346  
 BP magnitude : 14.569  
 DUPflag : 0  
 Distance (au) : 17.906  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 179.61  
 Sun-Moon sep (deg) : 67.07  
 B (ring opening deg) : 68.14  
 PA of pole (deg) : 71.44  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.862  
 C/A sky separation (km) : 37173.0  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



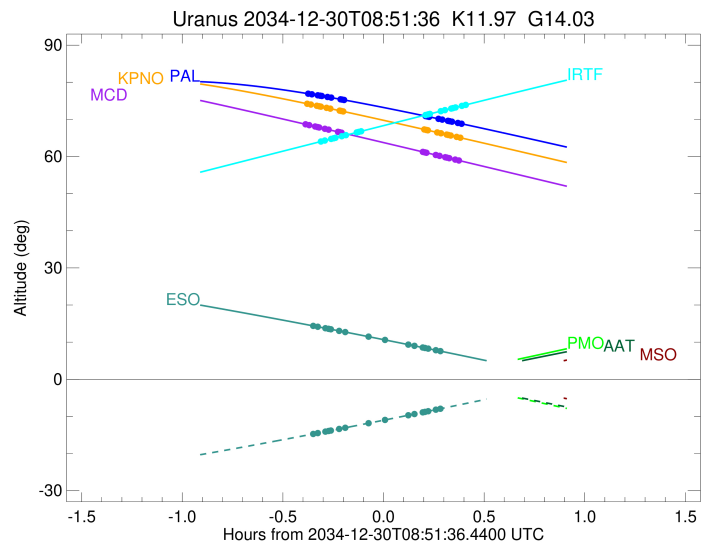
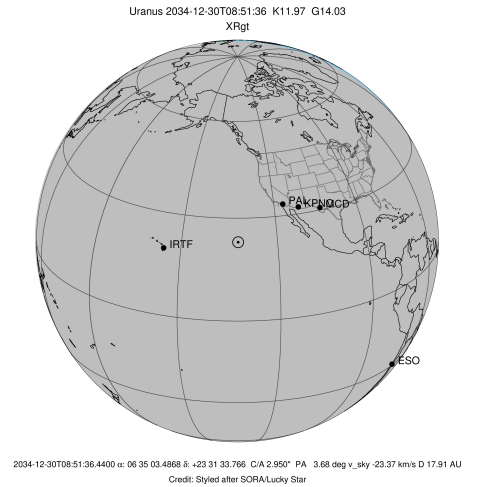
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-30T08:29:03.279		76.94	-76.77	51266.05	-17.10		
lambda	I	2034-12-30T08:30:16.239		76.76	-76.60	50026.71	-16.73		
delta	I	2034-12-30T08:32:01.938		76.49	-76.34	48300.35	-15.92		
gamma	I	2034-12-30T08:32:44.712		76.38	-76.23	47626.73	-15.57		
eta	I	2034-12-30T08:33:13.880		76.31	-76.16	47176.12	-15.32		
beta	I	2034-12-30T08:34:56.805		76.04	-75.90	45645.20	-14.38		
alpha	I	2034-12-30T08:36:02.406		75.87	-75.73	44720.99	-13.76		
4	I	2034-12-30T08:38:52.551		75.41	-75.28	42532.64	-11.87		
5	I	2034-12-30T08:39:15.200		75.34	-75.22	42279.58	-11.65		
6	I	2034-12-30T08:39:56.069		75.23	-75.11	41812.07	-11.10		

No planet occultations

6	E	2034-12-30T09:04:05.096		70.91	-70.86	41794.76	11.09		
5	E	2034-12-30T09:04:50.850		70.76	-70.71	42315.23	11.65		
4	E	2034-12-30T09:05:08.941		70.70	-70.66	42529.99	11.86		
alpha	E	2034-12-30T09:08:01.908		70.15	-70.12	44750.40	13.75		
beta	E	2034-12-30T09:09:05.344		69.95	-69.91	45644.08	14.38		
eta	E	2034-12-30T09:10:48.504		69.62	-69.59	47176.12	15.31		
gamma	E	2034-12-30T09:11:18.000		69.53	-69.49	47631.51	15.56		
delta	E	2034-12-30T09:12:00.497		69.39	-69.36	48300.35	15.91		
lambda	E	2034-12-30T09:13:46.275		69.05	-69.02	50026.71	16.72		
epsilon	E	2034-12-30T09:14:30.462		68.90	-68.88	50772.26	17.08		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2034-12-30T08:50:23.570
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      : 3382447793992286336
2Mass ID (if available) : 06350351+2331350
ICRS Star Coord at Epoch: 06h 35m 03.48677s +23:31:33.76611s
RUWE (>1.4 is poor) : 1.06
K magnitude         : 11.974
G magnitude         : 14.030
RP magnitude        : 13.346
BP magnitude        : 14.569
DUPflag            : 0
Distance (au)       : 17.906
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.37
Sun-Target sep (deg) : 179.61
Sun-Moon sep (deg)  : 67.03
B (ring opening deg) : 68.14
PA of pole (deg)    : 71.44
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.867
C/A sky separation (km) : 37230.7
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_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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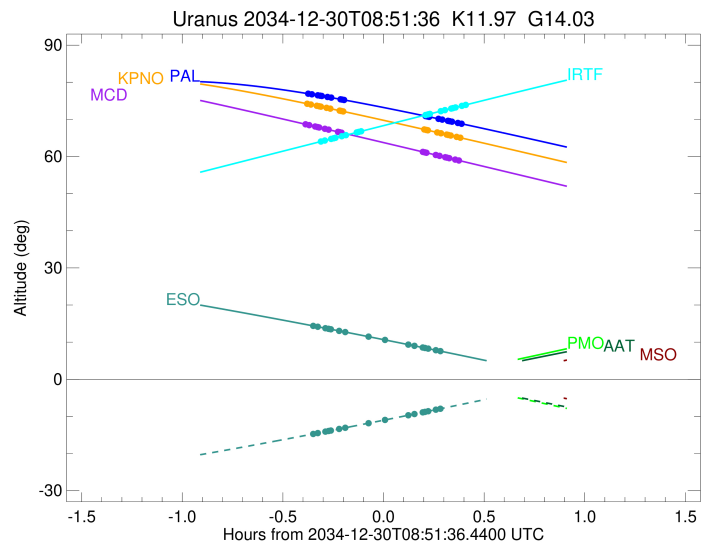
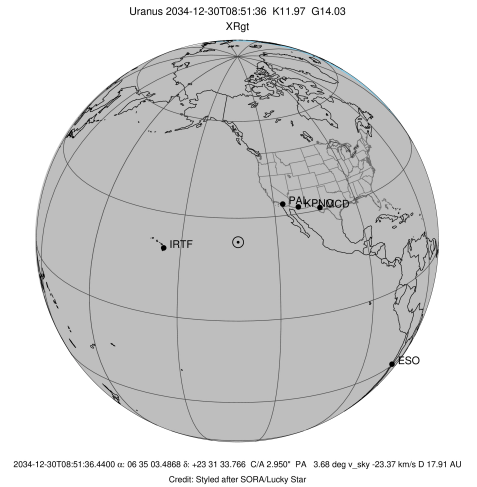


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-30T08:28:45.435		74.24	-74.16	51265.19	-17.06		
lambda	I	2034-12-30T08:29:58.487		74.01	-73.94	50026.71	-16.69		
delta	I	2034-12-30T08:31:44.422		73.67	-73.61	48300.35	-15.88		
gamma	I	2034-12-30T08:32:27.303		73.54	-73.47	47626.74	-15.53		
eta	I	2034-12-30T08:32:56.551		73.44	-73.38	47176.12	-15.28		
beta	I	2034-12-30T08:34:39.790		73.11	-73.06	45645.17	-14.34		
alpha	I	2034-12-30T08:35:45.615		72.90	-72.85	44721.08	-13.71		
4	I	2034-12-30T08:38:36.558		72.35	-72.30	42532.56	-11.80		
5	I	2034-12-30T08:38:59.308		72.27	-72.23	42279.81	-11.59		
6	I	2034-12-30T08:39:40.465		72.14	-72.10	41811.95	-11.02		

No planet occultations

6	E	2034-12-30T09:03:40.517		67.31	-67.31	41794.77	11.02		
5	E	2034-12-30T09:04:26.562		67.15	-67.16	42315.22	11.58		
4	E	2034-12-30T09:04:44.760		67.09	-67.10	42529.94	11.80		
alpha	E	2034-12-30T09:07:38.555		66.49	-66.50	44750.38	13.70		
beta	E	2034-12-30T09:08:42.230		66.27	-66.29	45644.06	14.33		
eta	E	2034-12-30T09:10:25.727		65.92	-65.93	47176.12	15.27		
gamma	E	2034-12-30T09:10:55.309		65.81	-65.83	47631.51	15.52		
delta	E	2034-12-30T09:11:37.924		65.67	-65.69	48300.35	15.87		
lambda	E	2034-12-30T09:13:23.968		65.30	-65.32	50026.71	16.68		
epsilon	E	2034-12-30T09:14:08.265		65.15	-65.17	50772.43	17.05		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-30T08:49:55.820  
 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 : 3382447793992286336  
 2Mass ID (if available) : 06350351+2331350  
 ICRS Star Coord at Epoch: 06h 35m 03.48677s +23:31:33.76611s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.974  
 G magnitude : 14.030  
 RP magnitude : 13.346  
 BP magnitude : 14.569  
 DUPflag : 0  
 Distance (au) : 17.906  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 179.61  
 Sun-Moon sep (deg) : 66.95  
 B (ring opening deg) : 68.14  
 PA of pole (deg) : 71.44  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.865  
 C/A sky separation (km) : 37207.4  
 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



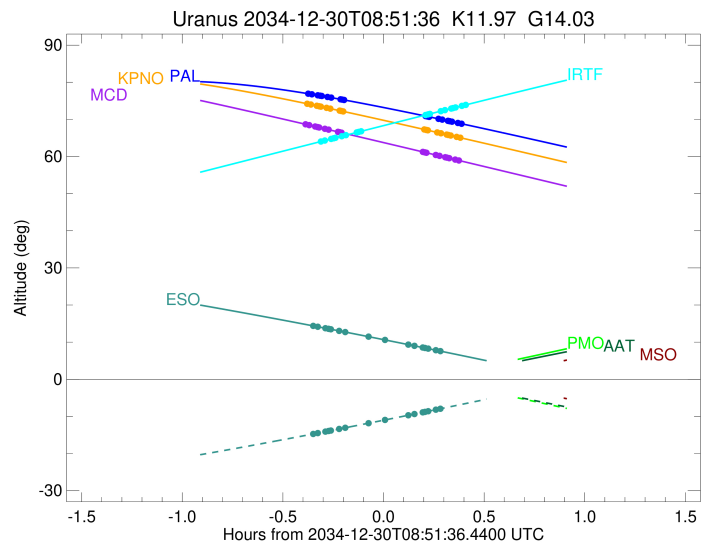
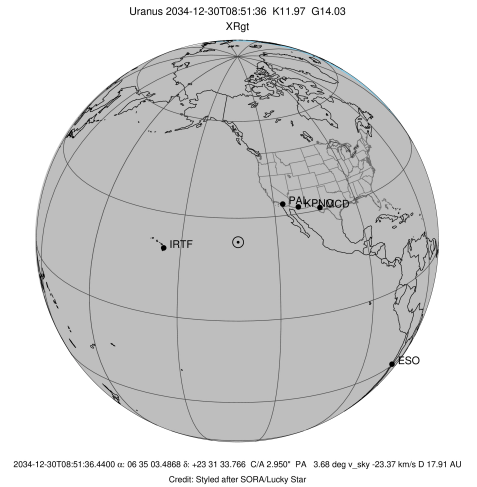
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-30T08:28:15.686		68.71	-68.71	51265.18	-17.07		
lambda	I	2034-12-30T08:29:28.714		68.45	-68.46	50026.71	-16.70		
delta	I	2034-12-30T08:31:14.603		68.08	-68.09	48300.35	-15.89		
gamma	I	2034-12-30T08:31:57.461		67.93	-67.94	47626.74	-15.54		
eta	I	2034-12-30T08:32:26.691		67.83	-67.84	47176.12	-15.29		
beta	I	2034-12-30T08:34:09.853		67.47	-67.48	45645.17	-14.35		
alpha	I	2034-12-30T08:35:15.617		67.24	-67.25	44721.08	-13.72		
4	I	2034-12-30T08:38:06.321		66.63	-66.65	42532.57	-11.82		
5	I	2034-12-30T08:38:29.034		66.55	-66.57	42279.77	-11.61		
6	I	2034-12-30T08:39:10.100		66.41	-66.43	41811.97	-11.05		

No planet occultations

6	E	2034-12-30T09:03:15.214		61.27	-61.31	41794.76	11.04		
5	E	2034-12-30T09:04:01.175		61.10	-61.15	42315.23	11.60		
4	E	2034-12-30T09:04:19.344		61.04	-61.09	42529.98	11.81		
alpha	E	2034-12-30T09:07:12.943		60.42	-60.47	44750.40	13.71		
beta	E	2034-12-30T09:08:16.576		60.19	-60.24	45644.08	14.33		
eta	E	2034-12-30T09:10:00.028		59.82	-59.87	47176.12	15.27		
gamma	E	2034-12-30T09:10:29.603		59.71	-59.77	47631.51	15.52		
delta	E	2034-12-30T09:11:12.210		59.56	-59.61	48300.35	15.87		
lambda	E	2034-12-30T09:12:58.248		59.18	-59.23	50026.71	16.68		
epsilon	E	2034-12-30T09:13:42.535		59.02	-59.08	50772.21	17.04		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2034-12-30T08:53:11.470
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      : 3382447793992286336
2Mass ID (if available) : 06350351+2331350
ICRS Star Coord at Epoch: 06h 35m 03.48677s +23:31:33.76611s
RUWE (>1.4 is poor) : 1.06
K magnitude         : 11.974
G magnitude         : 14.030
RP magnitude        : 13.346
BP magnitude        : 14.569
DUPflag            : 0
Distance (au)       : 17.906
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.37
Sun-Target sep (deg) : 179.61
Sun-Moon sep (deg)  : 67.26
B (ring opening deg) : 68.14
PA of pole (deg)    : 71.44
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.988
C/A sky separation (km) : 38809.3
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_itrfr93_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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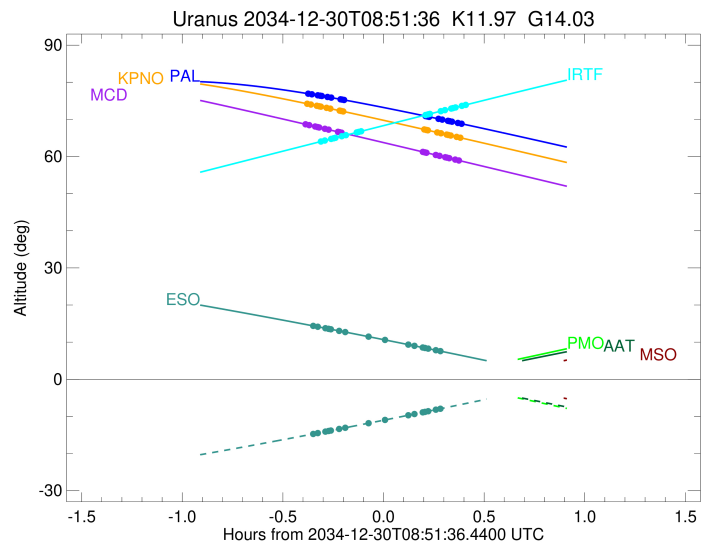
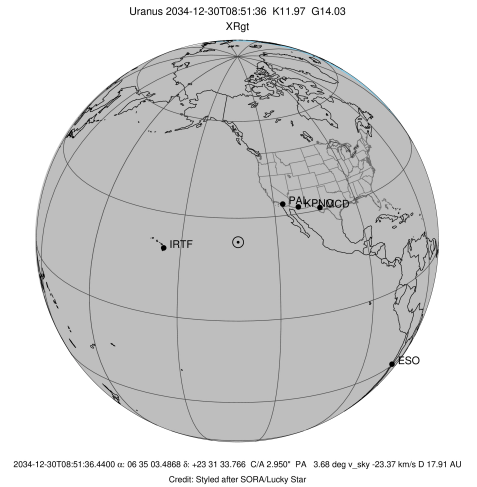
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2034-12-30T08:32:51.292	64.03	-63.88	51248.35	-16.16		
lambda	I	2034-12-30T08:34:07.551	64.32	-64.17	50026.71	-15.73		
delta	I	2034-12-30T08:36:00.646	64.75	-64.61	48300.35	-14.79		
gamma	I	2034-12-30T08:36:46.823	64.93	-64.78	47627.01	-14.38		
eta	I	2034-12-30T08:37:18.515	65.05	-64.90	47176.12	-14.08		
beta	I	2034-12-30T08:39:11.649	65.48	-65.34	45644.46	-12.96		
alpha	I	2034-12-30T08:40:24.850	65.76	-65.62	44723.29	-12.19		
4	I	2034-12-30T08:43:43.478	66.52	-66.38	42530.72	-9.79		
5	I	2034-12-30T08:44:10.234	66.62	-66.48	42285.40	-9.50		
6	I	2034-12-30T08:45:02.247	66.82	-66.68	41808.87	-8.75		

No planet occultations

6	E	2034-12-30T09:04:02.190	71.16	-71.02	41795.12	8.76		
5	E	2034-12-30T09:04:59.077	71.38	-71.24	42314.65	9.50		
4	E	2034-12-30T09:05:21.165	71.46	-71.32	42528.39	9.80		
alpha	E	2034-12-30T09:08:42.405	72.23	-72.09	44749.43	12.20		
beta	E	2034-12-30T09:09:53.330	72.49	-72.36	45643.37	12.97		
eta	E	2034-12-30T09:11:46.526	72.92	-72.79	47176.12	14.10		
gamma	E	2034-12-30T09:12:18.491	73.04	-72.91	47631.45	14.39		
delta	E	2034-12-30T09:13:04.308	73.22	-73.08	48300.35	14.80		
lambda	E	2034-12-30T09:14:57.267	73.64	-73.51	50026.71	15.75		
epsilon	E	2034-12-30T09:15:44.604	73.82	-73.69	50780.83	16.18		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2034-12-30T08:48:09.030  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 3382447793992286336  
 2Mass ID (if available) : 06350351+2331350  
 ICRS Star Coord at Epoch: 06h 35m 03.48677s +23:31:33.76611s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.974  
 G magnitude : 14.030  
 RP magnitude : 13.346  
 BP magnitude : 14.569  
 DUPflag : 0  
 Distance (au) : 17.906  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 179.61  
 Sun-Moon sep (deg) : 66.16  
 B (ring opening deg) : 68.14  
 PA of pole (deg) : 71.44  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.234  
 C/A sky separation (km) : 42000.3  
 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	2034-12-30T08:30:36.311		14.39	-14.74	51203.25	-13.92		
lambda	I	2034-12-30T08:32:02.109		14.14	-14.49	50026.71	-13.33		
delta	I	2034-12-30T08:34:18.170		13.75	-14.10	48300.35	-12.02		
gamma	I	2034-12-30T08:35:15.519		13.58	-13.93	47627.74	-11.43		
eta	I	2034-12-30T08:35:55.787		13.46	-13.82	47176.12	-11.00		
beta	I	2034-12-30T08:38:26.749		13.02	-13.38	45642.83	-9.27		
alpha	I	2034-12-30T08:40:12.635		12.71	-13.07	44729.45	-7.98		
4	I	2034-12-30T08:47:39.482		11.39	-11.74	42526.37	-1.73		

No planet occultations

4	E	2034-12-30T08:51:32.306		10.69	-11.05	42526.01	1.73		
alpha	E	2034-12-30T08:59:02.260		9.33	-9.69	44746.59	7.97		
beta	E	2034-12-30T09:00:46.075		9.02	-9.38	45642.16	9.26		
eta	E	2034-12-30T09:03:17.452		8.55	-8.91	47176.12	10.98		
gamma	E	2034-12-30T09:03:58.101		8.43	-8.79	47631.26	11.41		
delta	E	2034-12-30T09:04:55.250		8.25	-8.61	48300.35	12.00		
lambda	E	2034-12-30T09:07:11.598		7.83	-8.20	50026.71	13.30		
epsilon	E	2034-12-30T09:08:08.589		7.66	-8.02	50799.20	13.89		