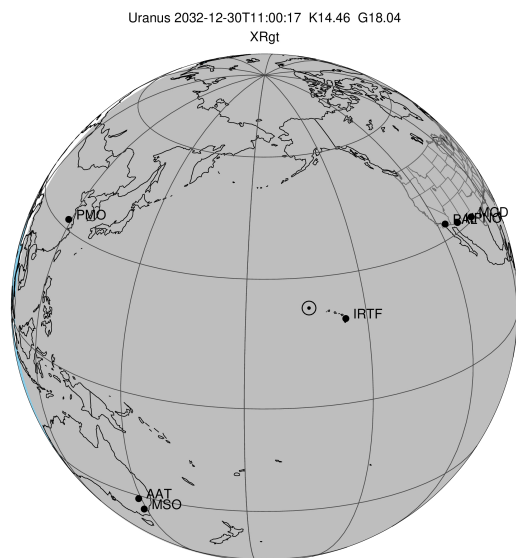


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-30T11:00:17.970  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427816976649514240  
 2Mass ID (if available) : 05543381+2338488

ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s

RUWE (>1.4 is poor) : 1.61  
 K magnitude : 14.455  
 G magnitude : 18.041  
 RP magnitude : 16.894  
 BP magnitude : 18.823  
 DUPflag : 0  
 Distance (au) : 18.049  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.98  
 Sun-Target sep (deg) : 169.91  
 Sun-Moon sep (deg) : 164.16  
 B (ring opening deg) : 76.38  
 PA of pole (deg) : 53.60

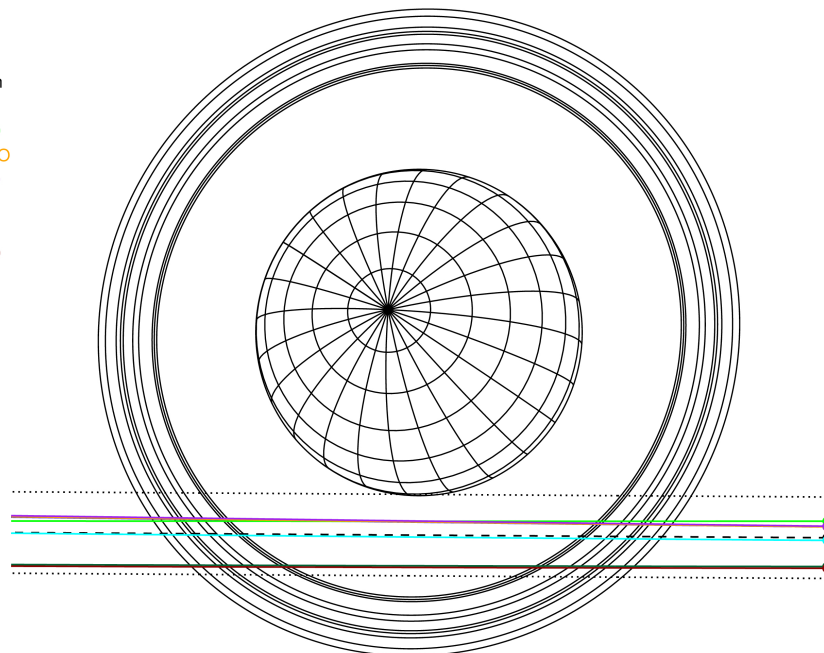
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2032-12-30T11:00:17.9700 ra: 05 54 33.8148 s: +23 38 48.894 C/A 2.417" PA 359.63 deg v\_sky -22.98 km/s D 18.05 AU  
 Credit: Styled after SORA/Lucky Star

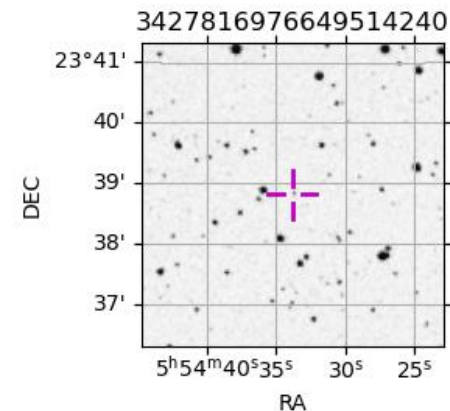
Uranus 2032-12-30T11:00:17 K14.46 G18.04 XRgt

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 AAT  
 MSO

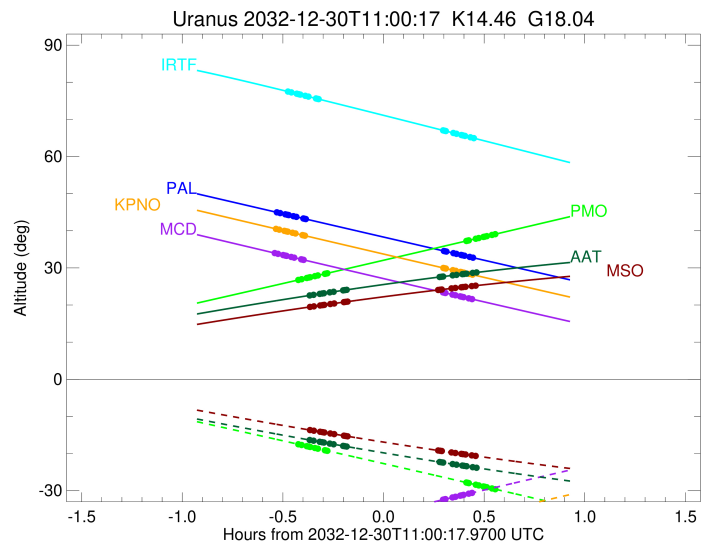
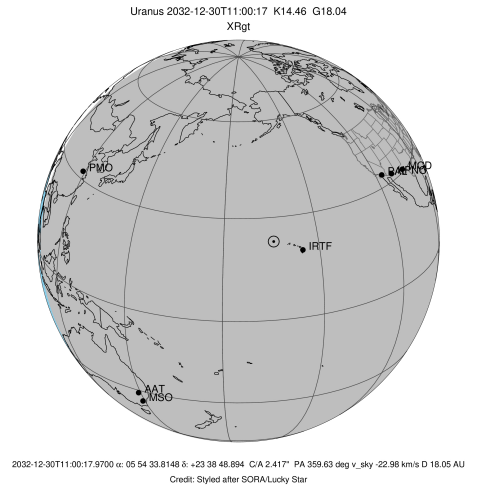


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 30 10:28 - DEC 30 11:26	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	DEC 30 10:35 - DEC 30 11:33	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 30 10:28 - DEC 30 11:26	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 30 10:28 - DEC 30 11:26	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 30 10:32 - DEC 30 11:27	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 30 10:38 - DEC 30 11:27	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 30 10:38 - DEC 30 11:27	PnnRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-30T10:57:08.740  
 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 : 3427816976649514240  
 2Mass ID (if available) : 05543381+2338488  
 ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s  
 RUWE (>1.4 is poor) : 1.61  
 K magnitude : 14.455  
 G magnitude : 18.041  
 RP magnitude : 16.894  
 BP magnitude : 18.823  
 DUPflag : 0  
 Distance (au) : 18.049  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.98  
 Sun-Target sep (deg) : 169.91  
 Sun-Moon sep (deg) : 165.03  
 B (ring opening deg) : 76.38  
 PA of pole (deg) : 53.60  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.268  
 C/A sky separation (km) : 29695.2  
 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

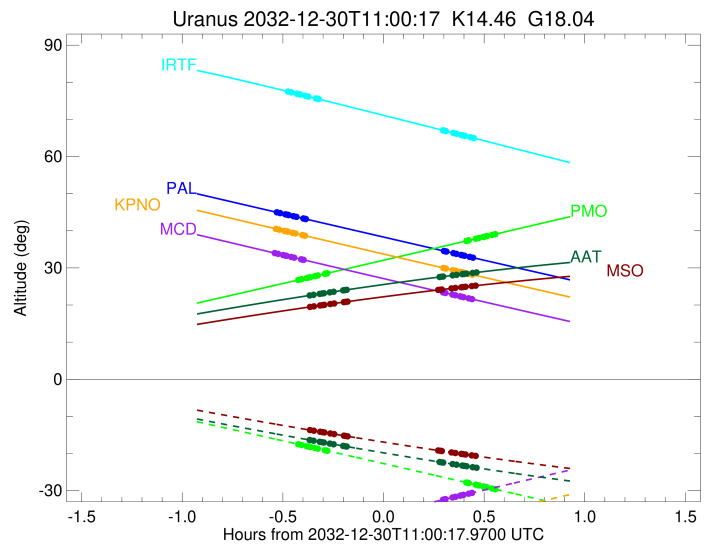
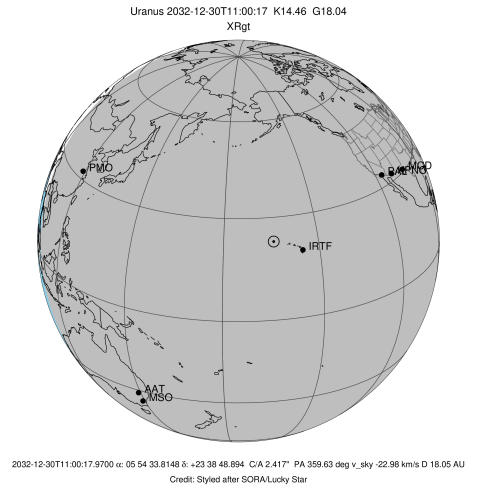


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-30T10:28:49.065		44.90	-53.84	50808.54	-19.04		
lambda	I	2032-12-30T10:29:30.174		44.76	-53.70	50026.71	-18.94		
delta	I	2032-12-30T10:31:02.277		44.44	-53.38	48300.35	-18.54		
gamma	I	2032-12-30T10:31:38.663		44.31	-53.25	47628.62	-18.38		
eta	I	2032-12-30T10:32:03.365		44.22	-53.16	47176.12	-18.26		
beta	I	2032-12-30T10:33:27.164		43.93	-52.87	45662.53	-17.83		
alpha	I	2032-12-30T10:34:21.214		43.74	-52.69	44710.14	-17.53		
4	I	2032-12-30T10:36:23.533		43.32	-52.26	42608.42	-16.78		
5	I	2032-12-30T10:36:49.379		43.22	-52.17	42176.73	-16.61		
6	I	2032-12-30T10:37:10.169		43.15	-52.10	41824.24	-16.50		

No planet occultations

6	E	2032-12-30T11:18:20.439		34.55	-43.49	41877.37	16.46		
5	E	2032-12-30T11:18:38.702		34.49	-43.43	42179.25	16.56		
4	E	2032-12-30T11:19:00.816		34.41	-43.35	42544.97	16.74		
alpha	E	2032-12-30T11:21:05.893		33.98	-42.92	44686.67	17.48		
beta	E	2032-12-30T11:22:00.042		33.79	-42.73	45641.10	17.77		
eta	E	2032-12-30T11:23:25.364		33.49	-42.43	47176.12	18.20		
gamma	E	2032-12-30T11:23:49.736		33.41	-42.35	47621.12	18.32		
delta	E	2032-12-30T11:24:26.653		33.28	-42.22	48300.35	18.48		
lambda	E	2032-12-30T11:25:59.075		32.96	-41.89	50026.71	18.87		
epsilon	E	2032-12-30T11:26:52.478		32.78	-41.71	51039.96	18.97		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-30T11:03:43.020  
 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 : 3427816976649514240  
 2Mass ID (if available) : 05543381+2338488  
 ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s  
 RUWE (>1.4 is poor) : 1.61  
 K magnitude : 14.455  
 G magnitude : 18.041  
 RP magnitude : 16.894  
 BP magnitude : 18.823  
 DUPflag : 0  
 Distance (au) : 18.049  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.98  
 Sun-Target sep (deg) : 169.91  
 Sun-Moon sep (deg) : 163.68  
 B (ring opening deg) : 76.38  
 PA of pole (deg) : 53.60  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.258  
 C/A sky separation (km) : 29555.5  
 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



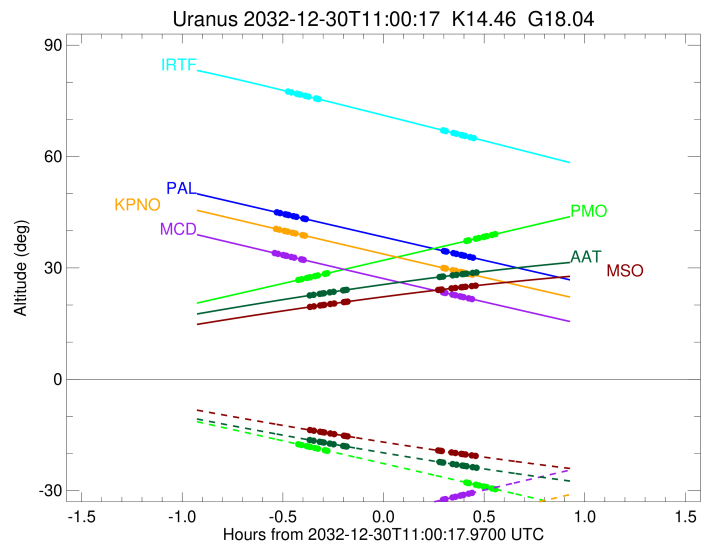
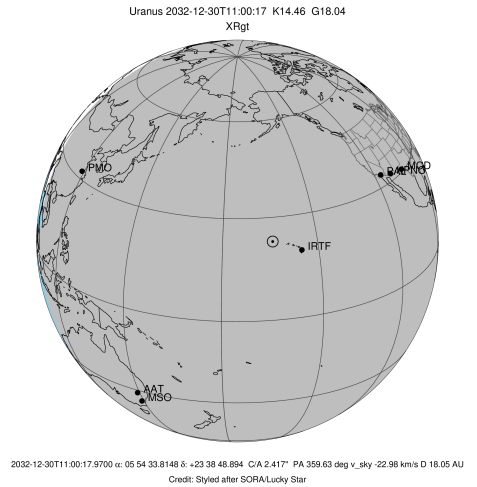
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-30T10:35:12.580		26.81	-17.57	50811.83	-18.97		
lambda	I	2032-12-30T10:35:53.996		26.96	-17.71	50026.71	-18.88		
delta	I	2032-12-30T10:37:26.369		27.28	-18.02	48300.35	-18.49		
gamma	I	2032-12-30T10:38:02.845		27.40	-18.15	47628.69	-18.33		
eta	I	2032-12-30T10:38:27.610		27.49	-18.23	47176.12	-18.22		
beta	I	2032-12-30T10:39:51.565		27.78	-18.52	45662.84	-17.80		
alpha	I	2032-12-30T10:40:45.692		27.97	-18.70	44710.66	-17.50		
4	I	2032-12-30T10:42:48.128		28.40	-19.12	42608.82	-16.78		
5	I	2032-12-30T10:43:13.968		28.49	-19.20	42177.62	-16.60		
6	I	2032-12-30T10:43:34.851		28.56	-19.28	41823.59	-16.50		

No planet occultations

6	E	2032-12-30T11:25:01.447		37.26	-27.82	41877.27	16.54		
5	E	2032-12-30T11:25:19.598		37.33	-27.89	42178.84	16.65		
4	E	2032-12-30T11:25:41.634		37.41	-27.96	42545.24	16.82		
alpha	E	2032-12-30T11:27:46.097		37.84	-28.40	44686.58	17.56		
beta	E	2032-12-30T11:28:40.007		38.03	-28.58	45641.09	17.85		
eta	E	2032-12-30T11:30:04.961		38.33	-28.88	47176.12	18.28		
gamma	E	2032-12-30T11:30:29.232		38.42	-28.96	47621.13	18.39		
delta	E	2032-12-30T11:31:05.994		38.55	-29.09	48300.35	18.56		
lambda	E	2032-12-30T11:32:38.038		38.87	-29.41	50026.71	18.95		
epsilon	E	2032-12-30T11:33:31.052		39.06	-29.59	51036.64	19.05		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2032-12-30T10:56:55.560
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         : 3427816976649514240
2Mass ID (if available) : 05543381+2338488
ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s
RUWE (>1.4 is poor)  : 1.61
K magnitude             : 14.455
G magnitude             : 18.041
RP magnitude           : 16.894
BP magnitude           : 18.823
DUPflag                : 0
Distance (au)          : 18.049
f0 (km)                : 0.000
g0 (km)                : 0.000
skyplane vel. (km/s)   : -22.98
Sun-Target sep (deg)   : 169.91
Sun-Moon sep (deg)     : 165.06
B (ring opening deg)   : 76.38
PA of pole (deg)       : 53.60
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  : 2.266
C/A sky separation (km) : 29661.4
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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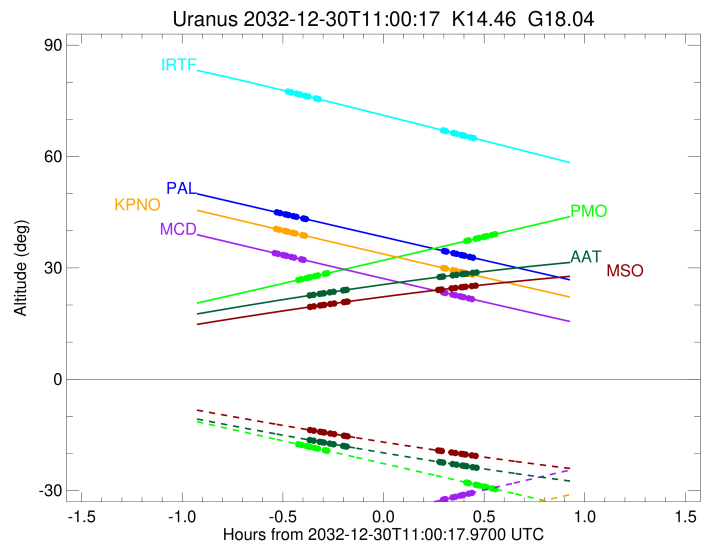
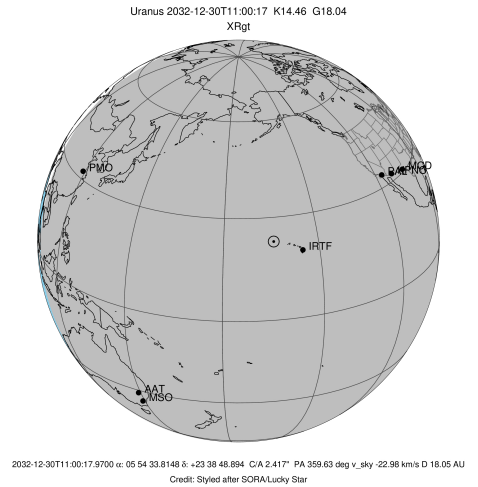


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-30T10:28:32.896		40.45	-49.54	50808.63	-19.03		
lambda	I	2032-12-30T10:29:14.027		40.30	-49.40	50026.71	-18.93		
delta	I	2032-12-30T10:30:46.163		39.98	-49.07	48300.35	-18.54		
gamma	I	2032-12-30T10:31:22.560		39.85	-48.94	47628.62	-18.37		
eta	I	2032-12-30T10:31:47.269		39.76	-48.85	47176.12	-18.25		
beta	I	2032-12-30T10:33:11.087		39.46	-48.56	45662.55	-17.83		
alpha	I	2032-12-30T10:34:05.144		39.27	-48.37	44710.17	-17.53		
4	I	2032-12-30T10:36:07.469		38.84	-47.93	42608.44	-16.78		
5	I	2032-12-30T10:36:33.311		38.75	-47.84	42176.78	-16.61		
6	I	2032-12-30T10:36:54.103		38.68	-47.77	41824.21	-16.50		

No planet occultations

6	E	2032-12-30T11:18:10.257		29.98	-39.01	41877.40	16.46		
5	E	2032-12-30T11:18:28.525		29.92	-38.95	42179.33	16.56		
4	E	2032-12-30T11:18:50.634		29.84	-38.87	42544.92	16.74		
alpha	E	2032-12-30T11:20:55.744		29.40	-38.43	44686.69	17.47		
beta	E	2032-12-30T11:21:49.912		29.21	-38.24	45641.11	17.77		
eta	E	2032-12-30T11:23:15.273		28.92	-37.94	47176.12	18.19		
gamma	E	2032-12-30T11:23:39.658		28.83	-37.85	47621.12	18.31		
delta	E	2032-12-30T11:24:16.595		28.70	-37.72	48300.35	18.47		
lambda	E	2032-12-30T11:25:49.073		28.38	-37.40	50026.71	18.86		
epsilon	E	2032-12-30T11:26:42.537		28.20	-37.21	51040.43	18.96		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-30T10:56:40.820  
 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 : 3427816976649514240  
 2Mass ID (if available) : 05543381+2338488  
 ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s  
 RUWE (>1.4 is poor) : 1.61  
 K magnitude : 14.455  
 G magnitude : 18.041  
 RP magnitude : 16.894  
 BP magnitude : 18.823  
 DUPflag : 0  
 Distance (au) : 18.049  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.98  
 Sun-Target sep (deg) : 169.91  
 Sun-Moon sep (deg) : 165.09  
 B (ring opening deg) : 76.38  
 PA of pole (deg) : 53.60  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.255  
 C/A sky separation (km) : 29523.0  
 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



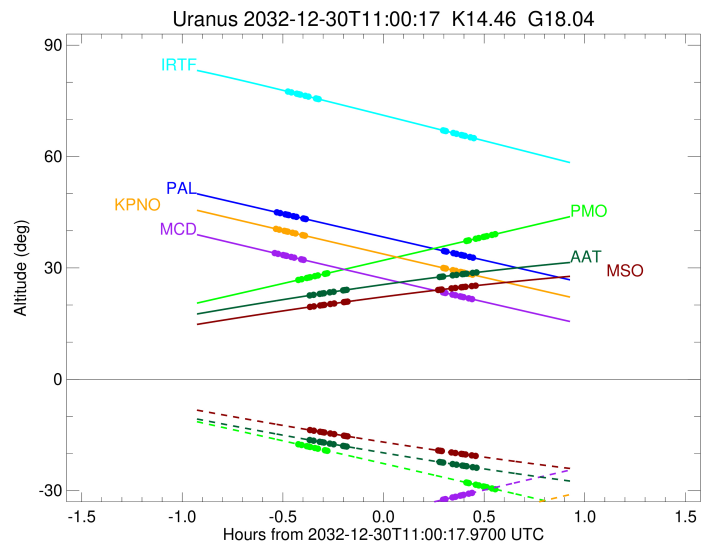
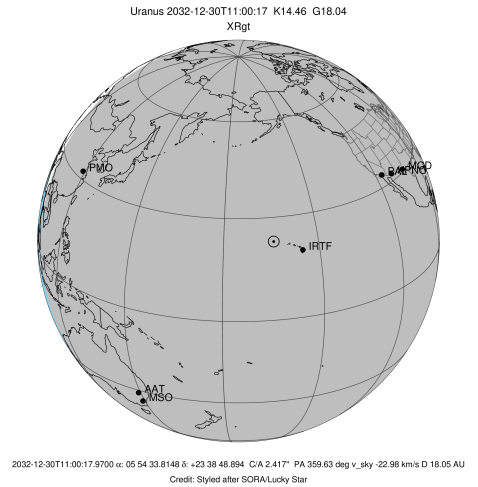
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-30T10:28:10.480		33.93	-43.10	50809.28	-19.04		
lambda	I	2032-12-30T10:28:51.612		33.78	-42.96	50026.71	-18.94		
delta	I	2032-12-30T10:30:23.657		33.46	-42.63	48300.35	-18.56		
gamma	I	2032-12-30T10:31:00.010		33.33	-42.50	47628.64	-18.39		
eta	I	2032-12-30T10:31:24.687		33.24	-42.41	47176.12	-18.28		
beta	I	2032-12-30T10:32:48.371		32.94	-42.11	45662.62	-17.86		
alpha	I	2032-12-30T10:33:42.326		32.75	-41.92	44710.29	-17.56		
4	I	2032-12-30T10:35:44.362		32.32	-41.48	42608.54	-16.83		
5	I	2032-12-30T10:36:10.127		32.23	-41.39	42177.01	-16.66		
6	I	2032-12-30T10:36:30.881		32.16	-41.31	41824.03	-16.55		

No planet occultations

6	E	2032-12-30T11:18:03.935		23.39	-32.44	41877.47	16.50		
5	E	2032-12-30T11:18:22.166		23.33	-32.38	42179.63	16.61		
4	E	2032-12-30T11:18:44.192		23.25	-32.30	42544.73	16.78		
alpha	E	2032-12-30T11:20:49.049		22.82	-31.86	44686.74	17.50		
beta	E	2032-12-30T11:21:43.129		22.63	-31.66	45641.11	17.79		
eta	E	2032-12-30T11:23:08.380		22.33	-31.36	47176.12	18.21		
gamma	E	2032-12-30T11:23:32.739		22.25	-31.28	47621.11	18.32		
delta	E	2032-12-30T11:24:09.643		22.12	-31.15	48300.35	18.49		
lambda	E	2032-12-30T11:25:42.057		21.80	-30.82	50026.71	18.87		
epsilon	E	2032-12-30T11:26:35.575		21.61	-30.63	51041.92	18.96		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-30T10:58:53.940  
 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 : 3427816976649514240  
 2Mass ID (if available) : 05543381+2338488  
 ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s  
 RUWE (>1.4 is poor) : 1.61  
 K magnitude : 14.455  
 G magnitude : 18.041  
 RP magnitude : 16.894  
 BP magnitude : 18.823  
 DUPflag : 0  
 Distance (au) : 18.049  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.98  
 Sun-Target sep (deg) : 169.91  
 Sun-Moon sep (deg) : 164.68  
 B (ring opening deg) : 76.38  
 PA of pole (deg) : 53.60  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.448  
 C/A sky separation (km) : 32039.9  
 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

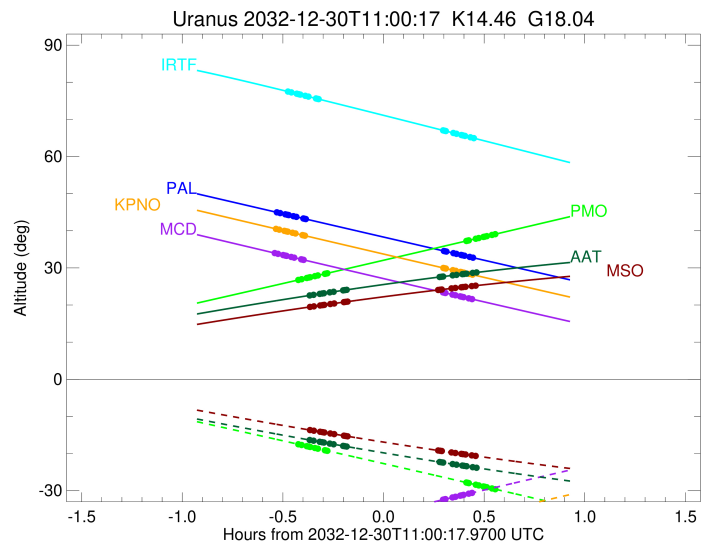
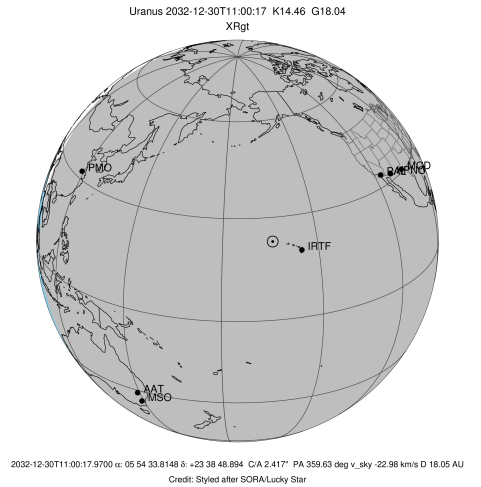


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-30T10:32:08.503		77.43	-86.17	50796.82	-18.31		
lambda	I	2032-12-30T10:32:50.638		77.28	-86.09	50026.71	-18.18		
delta	I	2032-12-30T10:34:26.865		76.92	-85.89	48300.35	-17.69		
gamma	I	2032-12-30T10:35:05.066		76.78	-85.81	47628.32	-17.49		
eta	I	2032-12-30T10:35:31.031		76.68	-85.75	47176.12	-17.34		
beta	I	2032-12-30T10:36:59.660		76.36	-85.54	45661.17	-16.81		
alpha	I	2032-12-30T10:37:57.205		76.14	-85.39	44707.84	-16.43		
4	I	2032-12-30T10:40:08.690		75.65	-85.03	42606.26	-15.48		
5	I	2032-12-30T10:40:36.815		75.55	-84.95	42172.50	-15.26		
6	I	2032-12-30T10:40:58.989		75.46	-84.89	41827.59	-15.12		

No planet occultations

6	E	2032-12-30T11:18:05.930		67.04	-77.10	41875.99	15.10		
5	E	2032-12-30T11:18:25.582		66.97	-77.02	42174.47	15.25		
4	E	2032-12-30T11:18:50.000		66.87	-76.93	42548.20	15.47		
alpha	E	2032-12-30T11:21:04.018		66.36	-76.43	44685.87	16.41		
beta	E	2032-12-30T11:22:01.559		66.14	-76.21	45641.06	16.79		
eta	E	2032-12-30T11:23:31.561		65.80	-75.88	47176.12	17.32		
gamma	E	2032-12-30T11:23:57.155		65.70	-75.78	47621.22	17.46		
delta	E	2032-12-30T11:24:35.816		65.55	-75.64	48300.35	17.67		
lambda	E	2032-12-30T11:26:12.184		65.19	-75.27	50026.71	18.15		
epsilon	E	2032-12-30T11:27:06.315		64.98	-75.07	51016.00	18.29		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-30T11:02:28.520  
 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 : 3427816976649514240  
 2Mass ID (if available) : 05543381+2338488  
 ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s  
 RUWE (>1.4 is poor) : 1.61  
 K magnitude : 14.455  
 G magnitude : 18.041  
 RP magnitude : 16.894  
 BP magnitude : 18.823  
 DUPflag : 0  
 Distance (au) : 18.049  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.98  
 Sun-Target sep (deg) : 169.91  
 Sun-Moon sep (deg) : 163.65  
 B (ring opening deg) : 76.38  
 PA of pole (deg) : 53.60  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.791  
 C/A sky separation (km) : 36534.5  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl1.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

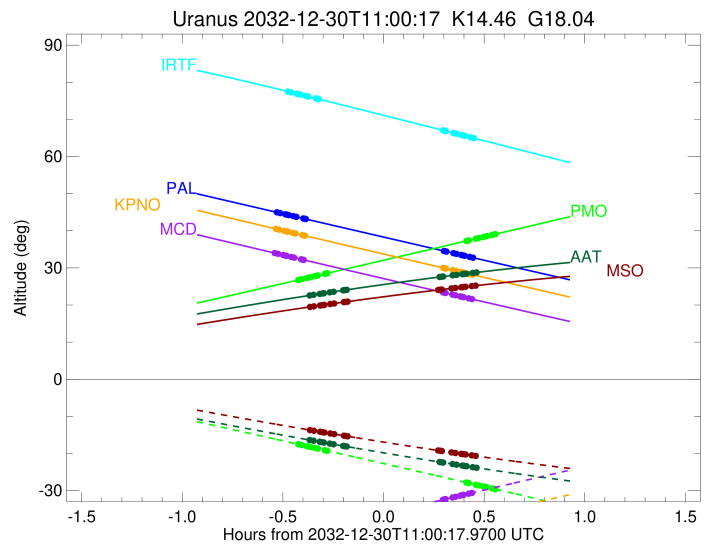
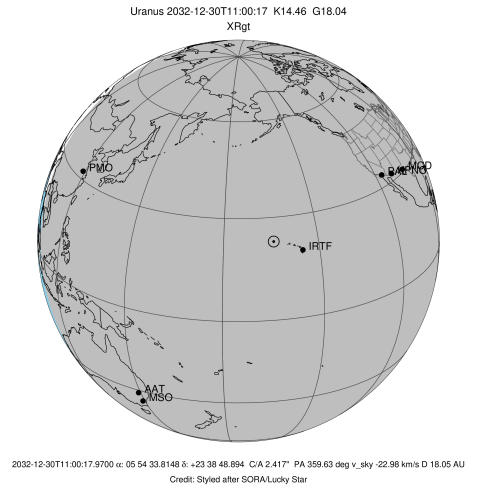


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-30T10:38:41.277		22.64	-16.43	50775.90	-16.23		
lambda	I	2032-12-30T10:39:27.685		22.75	-16.55	50026.71	-16.00		
delta	I	2032-12-30T10:41:17.961		23.00	-16.85	48300.35	-15.29		
gamma	I	2032-12-30T10:42:02.391		23.10	-16.97	47627.65	-14.98		
eta	I	2032-12-30T10:42:32.742		23.17	-17.05	47176.12	-14.77		
beta	I	2032-12-30T10:44:18.311		23.42	-17.33	45658.22	-13.95		
alpha	I	2032-12-30T10:45:28.430		23.57	-17.52	44702.97	-13.36		
4	I	2032-12-30T10:48:14.999		23.95	-17.95	42600.57	-11.82		
5	I	2032-12-30T10:48:52.150		24.03	-18.05	42164.32	-11.45		
6	I	2032-12-30T10:49:20.561		24.10	-18.13	41835.57	-11.19		

No planet occultations

6	E	2032-12-30T11:17:03.449		27.55	-22.29	41871.69	11.20		
5	E	2032-12-30T11:17:29.300		27.60	-22.36	42165.33	11.46		
4	E	2032-12-30T11:18:02.712		27.67	-22.43	42556.07	11.84		
alpha	E	2032-12-30T11:20:51.427		27.98	-22.83	44684.80	13.38		
beta	E	2032-12-30T11:22:01.344		28.12	-23.00	45641.33	13.97		
eta	E	2032-12-30T11:23:48.017		28.31	-23.25	47176.12	14.79		
gamma	E	2032-12-30T11:24:17.909		28.37	-23.32	47621.52	15.01		
delta	E	2032-12-30T11:25:02.670		28.45	-23.42	48300.35	15.32		
lambda	E	2032-12-30T11:26:52.742		28.65	-23.67	50026.71	16.03		
epsilon	E	2032-12-30T11:27:50.805		28.75	-23.81	50967.91	16.26		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-30T11:02:22.890  
 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 : 3427816976649514240  
 2Mass ID (if available) : 05543381+2338488  
 ICRS Star Coord at Epoch: 05h 54m 33.81478s +23:38:48.89402s  
 RUWE (>1.4 is poor) : 1.61  
 K magnitude : 14.455  
 G magnitude : 18.041  
 RP magnitude : 16.894  
 BP magnitude : 18.823  
 DUPflag : 0  
 Distance (au) : 18.049  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.98  
 Sun-Target sep (deg) : 169.91  
 Sun-Moon sep (deg) : 163.64  
 B (ring opening deg) : 76.38  
 PA of pole (deg) : 53.60  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.811  
 C/A sky separation (km) : 36795.3  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-30T10:38:46.994		19.54	-13.74	50774.68	-16.09		
lambda	I	2032-12-30T10:39:33.742		19.64	-13.86	50026.71	-15.86		
delta	I	2032-12-30T10:41:25.118		19.88	-14.14	48300.35	-15.13		
gamma	I	2032-12-30T10:42:10.047		19.98	-14.26	47627.60	-14.81		
eta	I	2032-12-30T10:42:40.753		20.04	-14.33	47176.12	-14.59		
beta	I	2032-12-30T10:44:27.727		20.27	-14.60	45658.02	-13.75		
alpha	I	2032-12-30T10:45:38.926		20.42	-14.78	44702.65	-13.15		
4	I	2032-12-30T10:48:28.727		20.78	-15.20	42600.12	-11.56		
5	I	2032-12-30T10:49:06.758		20.86	-15.29	42163.82	-11.17		
6	I	2032-12-30T10:49:35.811		20.92	-15.37	41836.15	-10.90		

No planet occultations

6	E	2032-12-30T11:16:37.621		24.06	-19.19	41871.35	10.91		
5	E	2032-12-30T11:17:04.119		24.11	-19.24	42164.82	11.18		
4	E	2032-12-30T11:17:38.411		24.17	-19.32	42556.60	11.57		
alpha	E	2032-12-30T11:20:30.371		24.47	-19.70	44684.76	13.17		
beta	E	2032-12-30T11:21:41.370		24.60	-19.86	45641.36	13.77		
eta	E	2032-12-30T11:23:29.457		24.78	-20.10	47176.12	14.61		
gamma	E	2032-12-30T11:23:59.705		24.83	-20.16	47621.54	14.84		
delta	E	2032-12-30T11:24:44.968		24.91	-20.26	48300.35	15.16		
lambda	E	2032-12-30T11:26:36.149		25.10	-20.50	50026.71	15.89		
epsilon	E	2032-12-30T11:27:34.569		25.20	-20.63	50965.23	16.12		