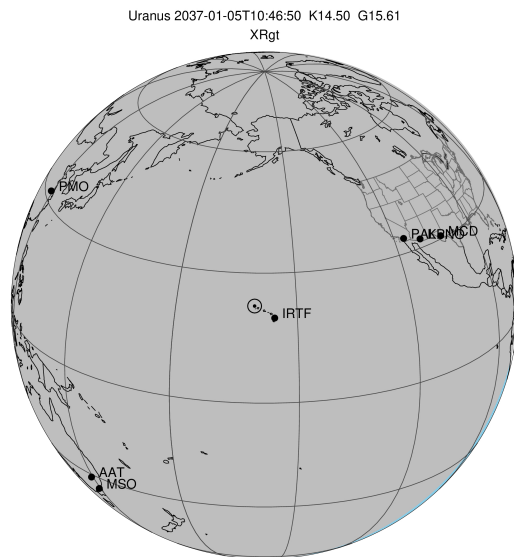


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-05T10:46:50.460  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3367489247532796672  
 2Mass ID (if available) : 07143567+2246450

ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s

RUWE (>1.4 is poor) : 1.16  
 K magnitude : 14.496  
 G magnitude : 15.614  
 RP magnitude : 15.178  
 BP magnitude : 15.882  
 DUPflag : 0  
 Distance (au) : 17.782  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 177.73  
 Sun-Moon sep (deg) : 43.79  
 B (ring opening deg) : 59.47  
 PA of pole (deg) : 81.19

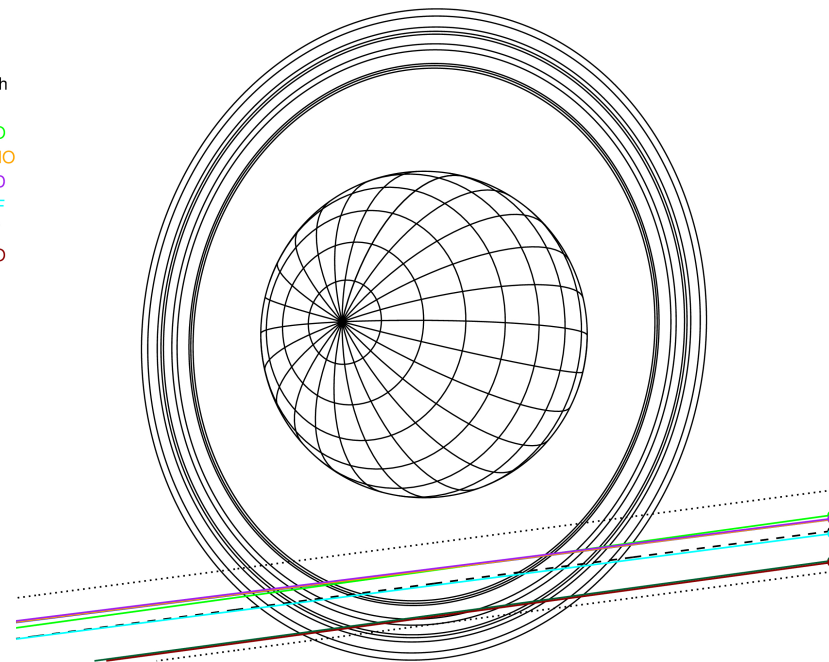
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2037-01-05T10:46:50.4600 α: 07 14 35.6675 & +22 46 45.000 C/A 3.005° PA 7.53 deg v\_sky -23.29 km/s D 17.78 AU  
 Credit: Styled after SORA/Lucky Star

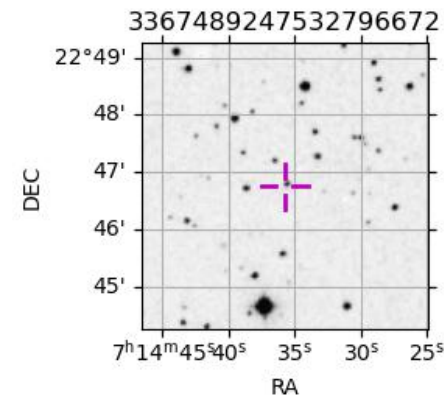
Uranus 2037-01-05T10:46:50 K14.50 G15.61 XRgt

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 AAT  
 MSO

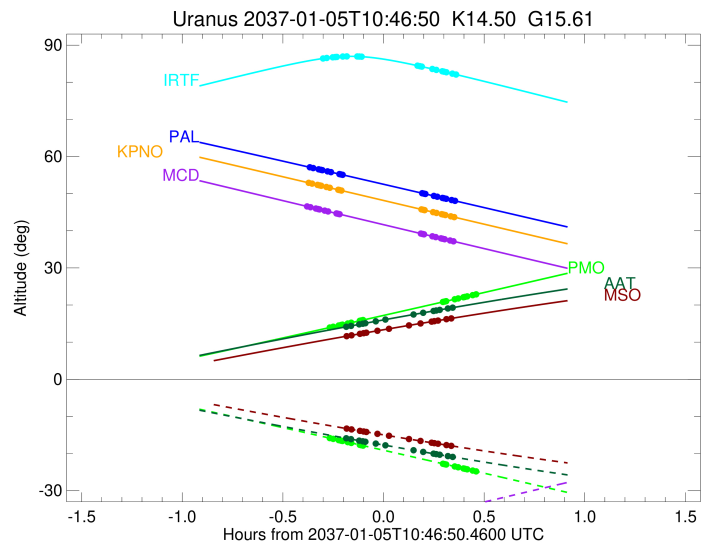
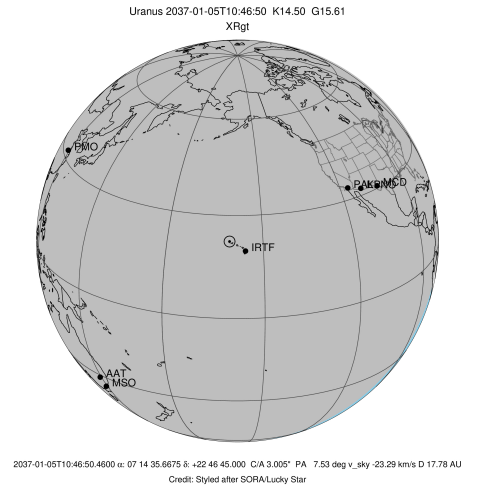


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	JAN 05 10:24 - JAN 05 11:08	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	JAN 05 10:30 - JAN 05 11:14	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	JAN 05 10:24 - JAN 05 11:07	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	JAN 05 10:23 - JAN 05 11:07	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	JAN 05 10:28 - JAN 05 11:08	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	+++++		+++++	JAN 05 10:35 - JAN 05 11:07	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	JAN 05 10:35 - JAN 05 11:07	PnnRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-05T10:44:41.740  
 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 : 3367489247532796672  
 2Mass ID (if available) : 07143567+2246450  
 ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 14.496  
 G magnitude : 15.614  
 RP magnitude : 15.178  
 BP magnitude : 15.882  
 DUPflag : 0  
 Distance (au) : 17.782  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 177.73  
 Sun-Moon sep (deg) : 43.97  
 B (ring opening deg) : 59.47  
 PA of pole (deg) : 81.19  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.851  
 C/A sky separation (km) : 36764.6  
 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

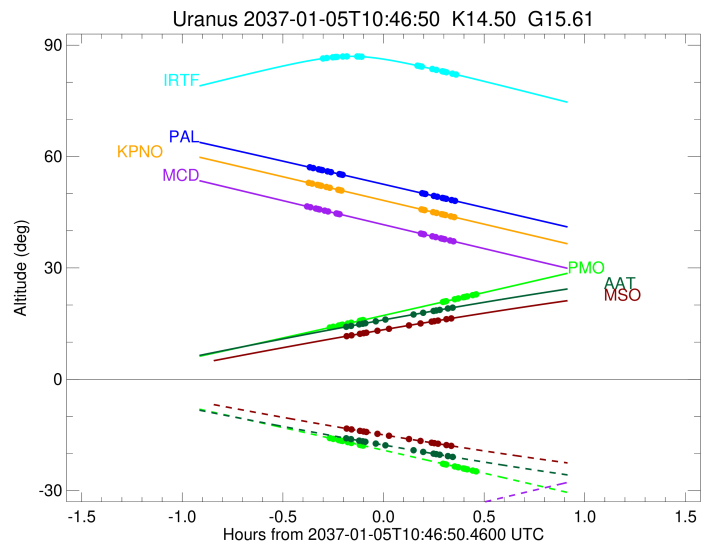
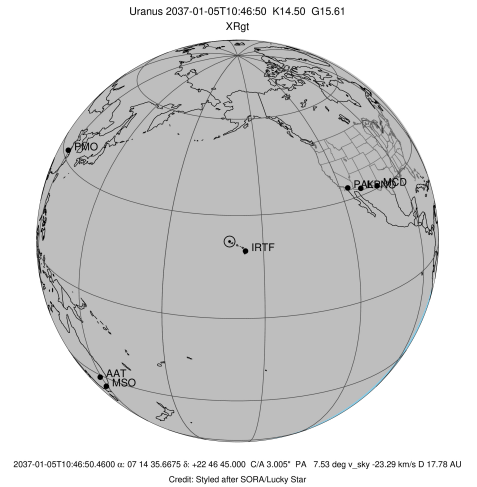


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-05T10:24:31.527		57.17	-55.06	51554.75	-18.80		
lambda	I	2037-01-05T10:25:54.209		56.89	-54.77	50026.71	-18.15		
delta	I	2037-01-05T10:27:31.488		56.55	-54.44	48300.35	-17.32		
gamma	I	2037-01-05T10:28:10.989		56.42	-54.30	47623.20	-16.96		
eta	I	2037-01-05T10:28:37.548		56.32	-54.21	47176.12	-16.71		
beta	I	2037-01-05T10:30:12.057		56.00	-53.88	45642.12	-15.75		
alpha	I	2037-01-05T10:31:11.831		55.79	-53.68	44721.90	-15.07		
4	I	2037-01-05T10:33:43.613		55.27	-53.15	42565.23	-13.26		
5	I	2037-01-05T10:34:10.446		55.17	-53.06	42204.58	-12.82		
6	I	2037-01-05T10:34:37.779		55.08	-52.96	41879.74	-12.52		

No planet occultations

6	E	2037-01-05T10:58:23.025		50.12	-48.01	41861.03	12.50		
5	E	2037-01-05T10:58:46.140		50.04	-47.93	42156.33	12.81		
4	E	2037-01-05T10:59:20.876		49.92	-47.80	42606.47	13.24		
alpha	E	2037-01-05T11:01:47.959		49.40	-47.29	44688.60	15.05		
beta	E	2037-01-05T11:02:51.206		49.18	-47.07	45661.10	15.73		
eta	E	2037-01-05T11:04:24.687		48.85	-46.75	47176.12	16.68		
gamma	E	2037-01-05T11:04:51.182		48.76	-46.65	47621.37	16.93		
delta	E	2037-01-05T11:05:30.857		48.62	-46.52	48300.35	17.29		
lambda	E	2037-01-05T11:07:08.312		48.28	-46.18	50026.71	18.12		
epsilon	E	2037-01-05T11:08:11.369		48.06	-45.96	51185.02	18.77		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-05T10:50:45.310  
 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 : 3367489247532796672  
 2Mass ID (if available) : 07143567+2246450  
 ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 14.496  
 G magnitude : 15.614  
 RP magnitude : 15.178  
 BP magnitude : 15.882  
 DUPflag : 0  
 Distance (au) : 17.782  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 177.73  
 Sun-Moon sep (deg) : 44.63  
 B (ring opening deg) : 59.47  
 PA of pole (deg) : 81.19  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.853  
 C/A sky separation (km) : 36788.6  
 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\_itrff93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

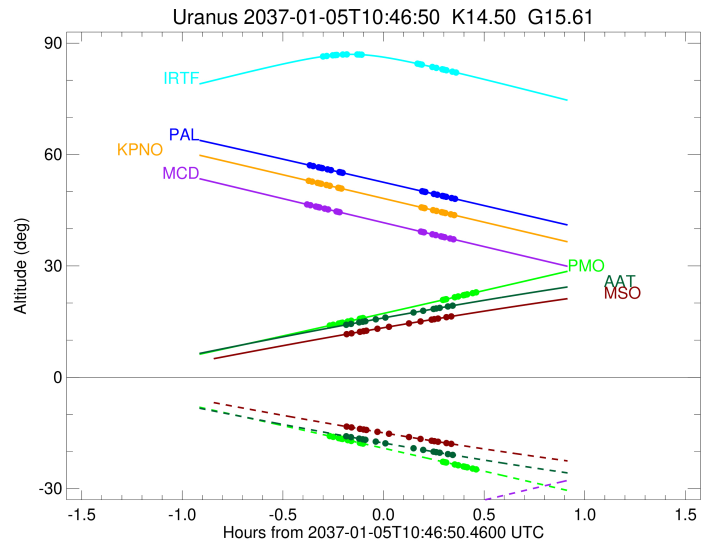
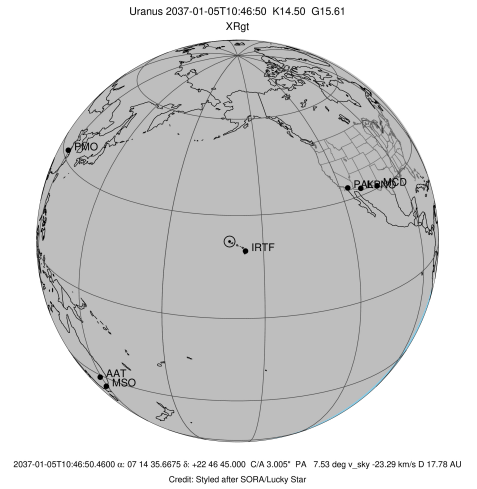


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-05T10:30:28.366		13.87	-15.78	51554.55	-18.55		
lambda	I	2037-01-05T10:31:52.178		14.15	-16.06	50026.71	-17.91		
delta	I	2037-01-05T10:33:30.809		14.48	-16.40	48300.35	-17.08		
gamma	I	2037-01-05T10:34:10.861		14.62	-16.53	47623.23	-16.72		
eta	I	2037-01-05T10:34:37.796		14.71	-16.62	47176.12	-16.47		
beta	I	2037-01-05T10:36:13.659		15.03	-16.95	45642.07	-15.53		
alpha	I	2037-01-05T10:37:14.285		15.24	-17.16	44722.17	-14.86		
4	I	2037-01-05T10:39:48.426		15.76	-17.68	42564.89	-13.05		
5	I	2037-01-05T10:40:15.614		15.85	-17.77	42205.14	-12.62		
6	I	2037-01-05T10:40:43.457		15.95	-17.87	41879.74	-12.31		

No planet occultations

6	E	2037-01-05T11:04:34.256		20.83	-22.76	41861.49	12.34		
5	E	2037-01-05T11:04:57.667		20.91	-22.84	42156.54	12.65		
4	E	2037-01-05T11:05:32.803		21.03	-22.96	42606.10	13.08		
alpha	E	2037-01-05T11:08:01.656		21.54	-23.48	44688.80	14.89		
beta	E	2037-01-05T11:09:05.548		21.76	-23.70	45660.85	15.56		
eta	E	2037-01-05T11:10:39.987		22.09	-24.02	47176.12	16.52		
gamma	E	2037-01-05T11:11:06.737		22.18	-24.12	47621.35	16.77		
delta	E	2037-01-05T11:11:46.789		22.32	-24.25	48300.35	17.13		
lambda	E	2037-01-05T11:13:25.128		22.66	-24.59	50026.71	17.96		
epsilon	E	2037-01-05T11:14:28.989		22.88	-24.81	51189.80	18.61		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-05T10:44:24.680  
 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 : 3367489247532796672  
 2Mass ID (if available) : 07143567+2246450  
 ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 14.496  
 G magnitude : 15.614  
 RP magnitude : 15.178  
 BP magnitude : 15.882  
 DUPflag : 0  
 Distance (au) : 17.782  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 177.73  
 Sun-Moon sep (deg) : 43.89  
 B (ring opening deg) : 59.47  
 PA of pole (deg) : 81.19  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.848  
 C/A sky separation (km) : 36723.9  
 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

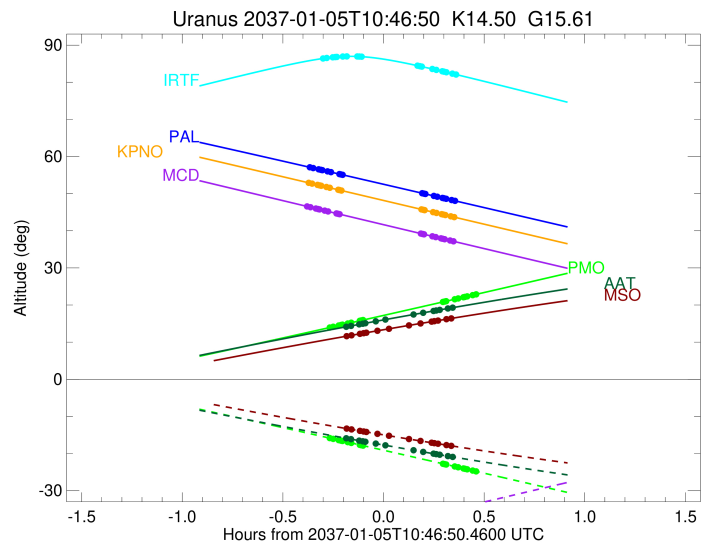
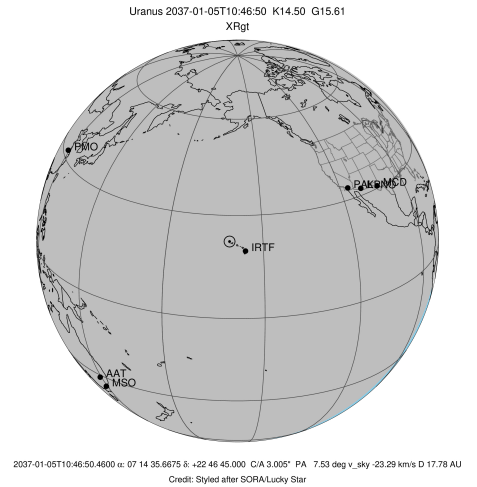


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-05T10:24:11.634		52.99	-50.83	51554.74	-18.81		
lambda	I	2037-01-05T10:25:34.269		52.70	-50.54	50026.71	-18.17		
delta	I	2037-01-05T10:27:11.474		52.35	-50.20	48300.35	-17.34		
gamma	I	2037-01-05T10:27:50.937		52.22	-50.06	47623.20	-16.97		
eta	I	2037-01-05T10:28:17.468		52.12	-49.96	47176.12	-16.72		
beta	I	2037-01-05T10:29:51.859		51.79	-49.63	45642.11	-15.77		
alpha	I	2037-01-05T10:30:51.535		51.57	-49.42	44721.94	-15.10		
4	I	2037-01-05T10:33:22.988		51.04	-48.88	42565.15	-13.30		
5	I	2037-01-05T10:33:49.725		50.94	-48.79	42204.71	-12.86		
6	I	2037-01-05T10:34:16.984		50.85	-48.69	41879.74	-12.56		

No planet occultations

6	E	2037-01-05T10:58:09.411		45.76	-43.62	41860.94	12.55		
5	E	2037-01-05T10:58:32.457		45.68	-43.54	42156.29	12.85		
4	E	2037-01-05T10:59:07.105		45.55	-43.42	42606.54	13.28		
alpha	E	2037-01-05T11:01:33.878		45.03	-42.90	44688.57	15.08		
beta	E	2037-01-05T11:02:37.041		44.81	-42.67	45661.13	15.75		
eta	E	2037-01-05T11:04:10.420		44.48	-42.34	47176.12	16.69		
gamma	E	2037-01-05T11:04:36.892		44.38	-42.25	47621.38	16.94		
delta	E	2037-01-05T11:05:16.539		44.24	-42.11	48300.35	17.31		
lambda	E	2037-01-05T11:06:53.941		43.90	-41.76	50026.71	18.13		
epsilon	E	2037-01-05T11:07:56.944		43.67	-41.54	51184.41	18.77		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-05T10:44:03.630  
 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 : 3367489247532796672  
 2Mass ID (if available) : 07143567+2246450  
 ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 14.496  
 G magnitude : 15.614  
 RP magnitude : 15.178  
 BP magnitude : 15.882  
 DUPflag : 0  
 Distance (au) : 17.782  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 177.73  
 Sun-Moon sep (deg) : 43.77  
 B (ring opening deg) : 59.47  
 PA of pole (deg) : 81.19  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.836  
 C/A sky separation (km) : 36577.3  
 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\_itrff93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



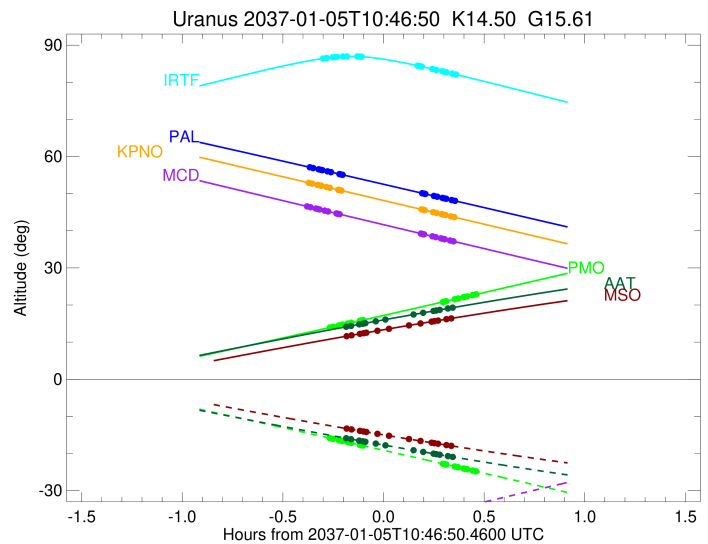
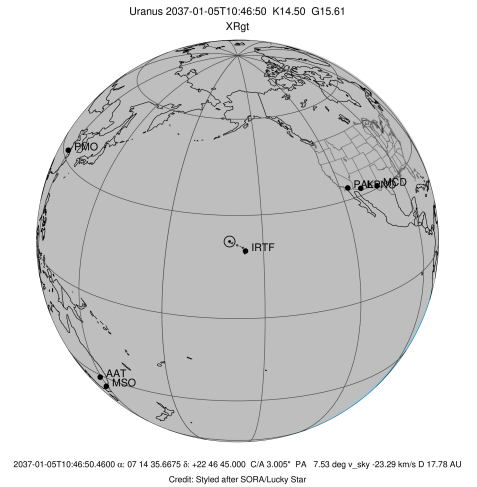
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-05T10:23:42.537		46.64	-44.45	51554.65	-18.87		
lambda	I	2037-01-05T10:25:04.905		46.34	-44.16	50026.71	-18.23		
delta	I	2037-01-05T10:26:41.731		45.99	-43.81	48300.35	-17.41		
gamma	I	2037-01-05T10:27:21.015		45.85	-43.67	47623.22	-17.06		
eta	I	2037-01-05T10:27:47.417		45.76	-43.58	47176.12	-16.81		
beta	I	2037-01-05T10:29:21.278		45.42	-43.24	45642.08	-15.87		
alpha	I	2037-01-05T10:30:20.535		45.20	-43.03	44722.13	-15.21		
4	I	2037-01-05T10:32:50.657		44.66	-42.49	42564.85	-13.44		
5	I	2037-01-05T10:33:17.020		44.57	-42.39	42205.24	-13.02		
6	I	2037-01-05T10:33:43.997		44.47	-42.30	41879.74	-12.72		

No planet occultations

6	E	2037-01-05T10:57:59.518		39.25	-37.09	41860.66	12.71		
5	E	2037-01-05T10:58:22.291		39.17	-37.01	42156.18	13.00		
4	E	2037-01-05T10:58:56.576		39.04	-36.89	42606.75	13.42		
alpha	E	2037-01-05T11:01:22.042		38.52	-36.37	44688.47	15.19		
beta	E	2037-01-05T11:02:24.805		38.30	-36.15	45661.25	15.84		
eta	E	2037-01-05T11:03:57.674		37.96	-35.82	47176.12	16.77		
gamma	E	2037-01-05T11:04:24.025		37.87	-35.72	47621.39	17.02		
delta	E	2037-01-05T11:05:03.501		37.73	-35.58	48300.35	17.38		
lambda	E	2037-01-05T11:06:40.553		37.38	-35.24	50026.71	18.19		
epsilon	E	2037-01-05T11:07:43.271		37.16	-35.01	51182.59	18.82		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2037-01-05T10:46:42.540
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      : 3367489247532796672
2Mass ID (if available) : 07143567+2246450
ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s
RUWE (>1.4 is poor) : 1.16
K magnitude         : 14.496
G magnitude         : 15.614
RP magnitude        : 15.178
BP magnitude        : 15.882
DUPflag            : 0
Distance (au)       : 17.782
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -23.29
Sun-Target sep (deg) : 177.73
Sun-Moon sep (deg)  : 44.47
B (ring opening deg) : 59.47
PA of pole (deg)    : 81.19
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.037
C/A sky separation (km) : 39162.6
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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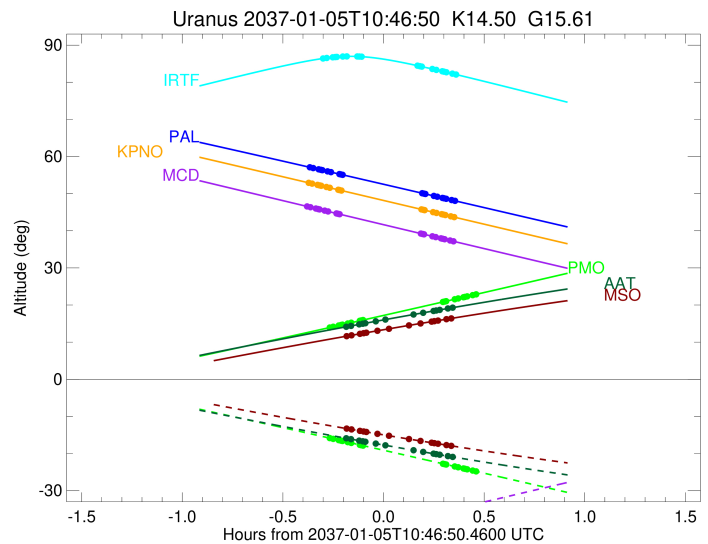
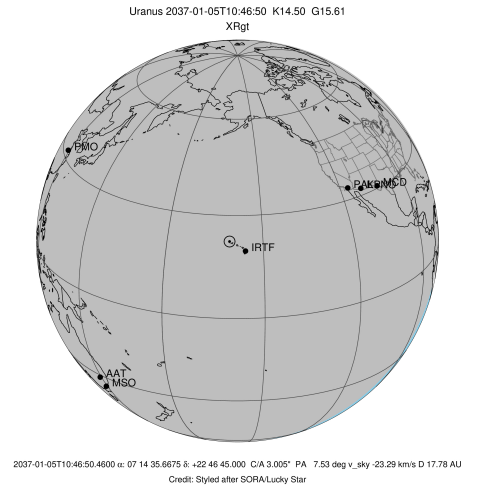


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-05T10:28:26.725		86.37	-87.15	51555.24	-17.46		
lambda	I	2037-01-05T10:29:56.264		86.55	-87.10	50026.71	-16.67		
delta	I	2037-01-05T10:31:43.141		86.73	-86.99	48300.35	-15.62		
gamma	I	2037-01-05T10:32:27.165		86.80	-86.92	47622.85	-15.15		
eta	I	2037-01-05T10:32:56.959		86.83	-86.88	47176.12	-14.83		
beta	I	2037-01-05T10:34:44.851		86.94	-86.68	45642.83	-13.58		
alpha	I	2037-01-05T10:35:55.321		86.98	-86.53	44718.38	-12.67		
4	I	2037-01-05T10:39:03.397		86.96	-86.06	42571.12	-10.07		
5	I	2037-01-05T10:39:41.088		86.93	-85.96	42194.68	-9.41		
6	I	2037-01-05T10:40:17.351		86.90	-85.86	41879.20	-8.91		

No planet occultations

6	E	2037-01-05T10:56:59.834		84.48	-82.53	41866.02	8.91		
5	E	2037-01-05T10:57:31.725		84.37	-82.41	42159.34	9.42		
4	E	2037-01-05T10:58:17.321		84.22	-82.25	42602.30	10.07		
alpha	E	2037-01-05T11:01:20.570		83.60	-81.58	44690.51	12.67		
beta	E	2037-01-05T11:02:34.407		83.34	-81.31	45659.07	13.58		
eta	E	2037-01-05T11:04:21.146		82.97	-80.92	47176.12	14.83		
gamma	E	2037-01-05T11:04:50.835		82.87	-80.81	47621.21	15.15		
delta	E	2037-01-05T11:05:34.971		82.71	-80.65	48300.35	15.62		
lambda	E	2037-01-05T11:07:21.861		82.33	-80.25	50026.71	16.67		
epsilon	E	2037-01-05T11:08:31.814		82.08	-79.99	51214.67	17.46		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-05T10:49:22.440  
 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 : 3367489247532796672  
 2Mass ID (if available) : 07143567+2246450  
 ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 14.496  
 G magnitude : 15.614  
 RP magnitude : 15.178  
 BP magnitude : 15.882  
 DUPflag : 0  
 Distance (au) : 17.782  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 177.73  
 Sun-Moon sep (deg) : 44.44  
 B (ring opening deg) : 59.47  
 PA of pole (deg) : 81.19  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.391  
 C/A sky separation (km) : 43732.4  
 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



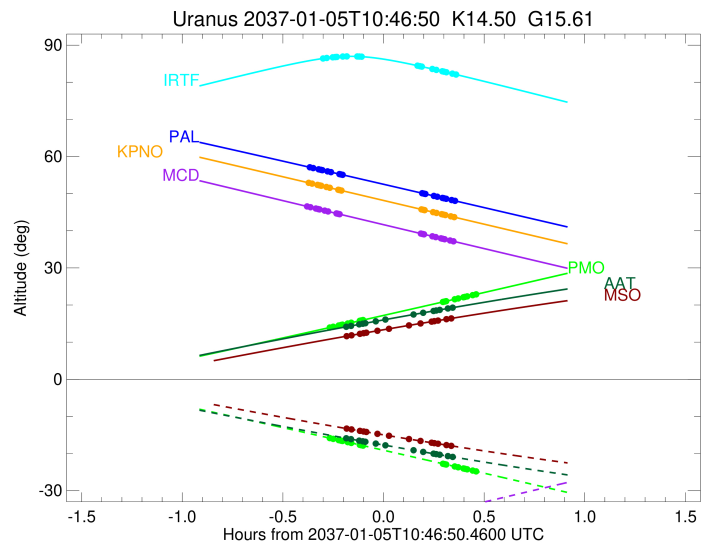
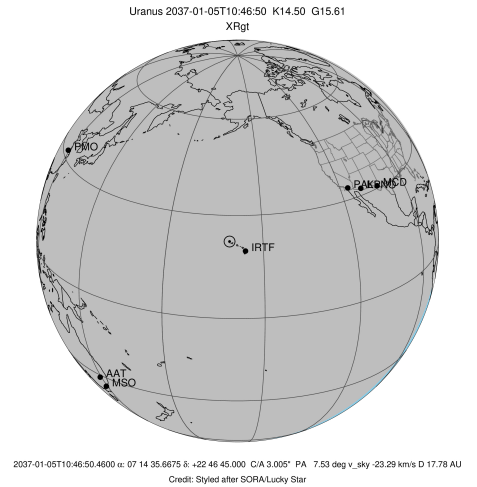
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-05T10:35:15.613		14.06	-15.82	51549.57	-13.86		
lambda	I	2037-01-05T10:37:10.329		14.38	-16.13	50026.71	-12.64		
delta	I	2037-01-05T10:39:36.937		14.79	-16.53	48300.35	-10.88		
gamma	I	2037-01-05T10:40:41.764		14.97	-16.71	47622.09	-10.04		
eta	I	2037-01-05T10:41:27.577		15.10	-16.83	47176.12	-9.43		
beta	I	2037-01-05T10:44:36.612		15.62	-17.34	45645.62	-6.73		
alpha	I	2037-01-05T10:47:31.052		16.10	-17.81	44707.40	-3.99		

No planet occultations

alpha	E	2037-01-05T10:55:39.211		17.42	-19.10	44698.52	3.99		
beta	E	2037-01-05T10:58:36.918		17.90	-19.56	45653.70	6.73		
eta	E	2037-01-05T11:01:44.597		18.39	-20.04	47176.12	9.44		
gamma	E	2037-01-05T11:02:30.242		18.51	-20.16	47620.98	10.05		
delta	E	2037-01-05T11:03:35.093		18.68	-20.32	48300.35	10.89		
lambda	E	2037-01-05T11:06:01.475		19.07	-20.70	50026.71	12.66		
epsilon	E	2037-01-05T11:07:36.373		19.31	-20.93	51278.66	13.89		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-05T10:49:12.970  
 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 : 3367489247532796672  
 2Mass ID (if available) : 07143567+2246450  
 ICRS Star Coord at Epoch: 07h 14m 35.66754s +22:46:44.99976s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 14.496  
 G magnitude : 15.614  
 RP magnitude : 15.178  
 BP magnitude : 15.882  
 DUPflag : 0  
 Distance (au) : 17.782  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 177.73  
 Sun-Moon sep (deg) : 44.38  
 B (ring opening deg) : 59.47  
 PA of pole (deg) : 81.19  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.411  
 C/A sky separation (km) : 43989.0  
 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



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	2037-01-05T10:35:22.670		11.53	-13.21	51548.86	-13.62		
lambda	I	2037-01-05T10:37:19.569		11.84	-13.52	50026.71	-12.37		
delta	I	2037-01-05T10:39:50.086		12.24	-13.90	48300.35	-10.54		
gamma	I	2037-01-05T10:40:57.224		12.42	-14.08	47622.05	-9.66		
eta	I	2037-01-05T10:41:44.972		12.55	-14.20	47176.12	-9.01		
beta	I	2037-01-05T10:45:06.921		13.07	-14.71	45645.93	-6.10		
alpha	I	2037-01-05T10:48:38.449		13.62	-15.24	44705.92	-2.74		

No planet occultations

alpha	E	2037-01-05T10:54:14.469		14.48	-16.08	44699.81	2.75		
beta	E	2037-01-05T10:57:49.270		15.02	-16.61	45653.26	6.10		
eta	E	2037-01-05T11:01:09.870		15.52	-17.09	47176.12	9.02		
gamma	E	2037-01-05T11:01:57.453		15.64	-17.21	47620.97	9.67		
delta	E	2037-01-05T11:03:04.619		15.81	-17.37	48300.35	10.55		
lambda	E	2037-01-05T11:05:34.918		16.18	-17.73	50026.71	12.39		
epsilon	E	2037-01-05T11:07:11.993		16.42	-17.96	51282.43	13.65		