

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-12-19T13:03:48.840
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 675683331591285248
 2Mass ID (if available) : 08181212+2015075

ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s

RUWE (>1.4 is poor) : 0.91
 K magnitude : 13.316
 G magnitude : 14.739
 RP magnitude : 14.260
 BP magnitude : 15.035
 DUPflag : 0
 Distance (au) : 17.781
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.79
 Sun-Target sep (deg) : 144.77
 Sun-Moon sep (deg) : 161.09
 B (ring opening deg) : 44.86
 PA of pole (deg) : 91.52

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

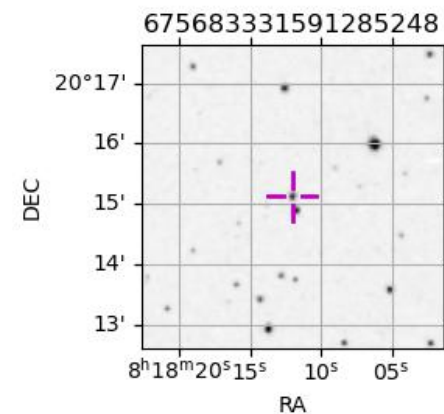
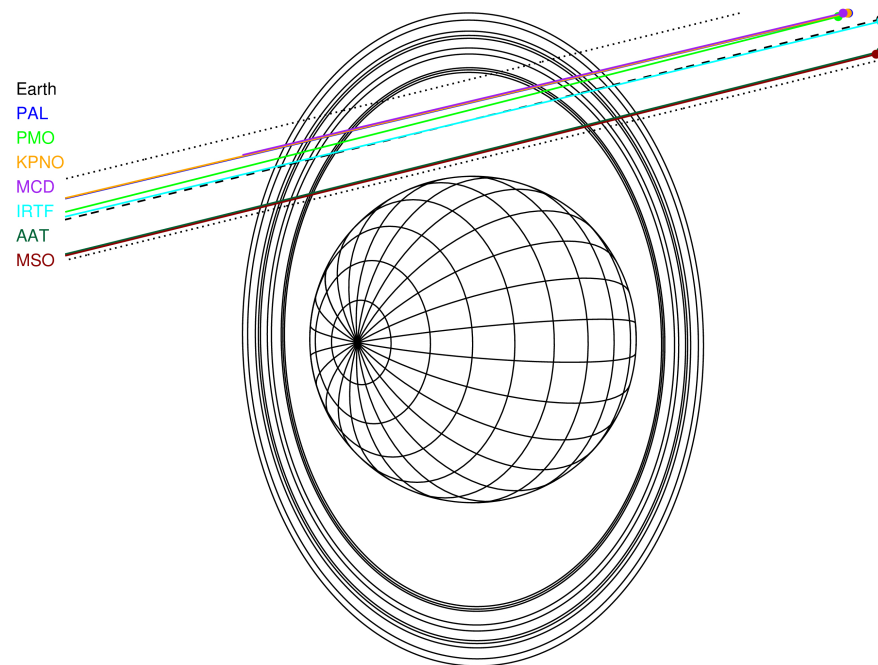
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 19 12:33 - DEC 19 13:20	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	DEC 19 12:41 - DEC 19 13:30	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 19 12:33 - DEC 19 13:20	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 19 12:32 - DEC 19 13:19	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 19 12:34 - DEC 19 13:24	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 19 12:35 - DEC 19 13:31	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 19 12:35 - DEC 19 13:31	PnnRie

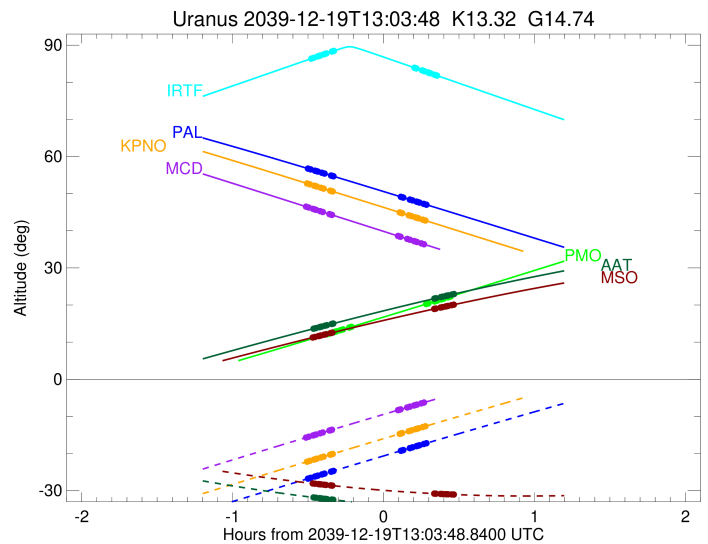
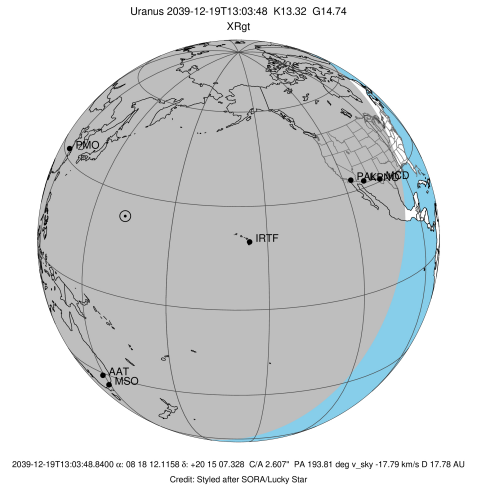


2039-12-19T13:03:48.8400 ex: 08 18 12.1158 s : +20 15 07.328 C/A 2.607'' PA 193.81 deg v_sky -17.79 km/s D 17.78 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2039-12-19T13:03:48 K13.32 G14.74 XRgt



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-12-19T13:00:45.290
 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 : 675683331591285248
 2Mass ID (if available) : 08181212+2015075
 ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 13.316
 G magnitude : 14.739
 RP magnitude : 14.260
 BP magnitude : 15.035
 DUPflag : 0
 Distance (au) : 17.781
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.79
 Sun-Target sep (deg) : 144.77
 Sun-Moon sep (deg) : 160.81
 B (ring opening deg) : 44.86
 PA of pole (deg) : 91.52
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.804
 C/A sky separation (km) : 36163.6
 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

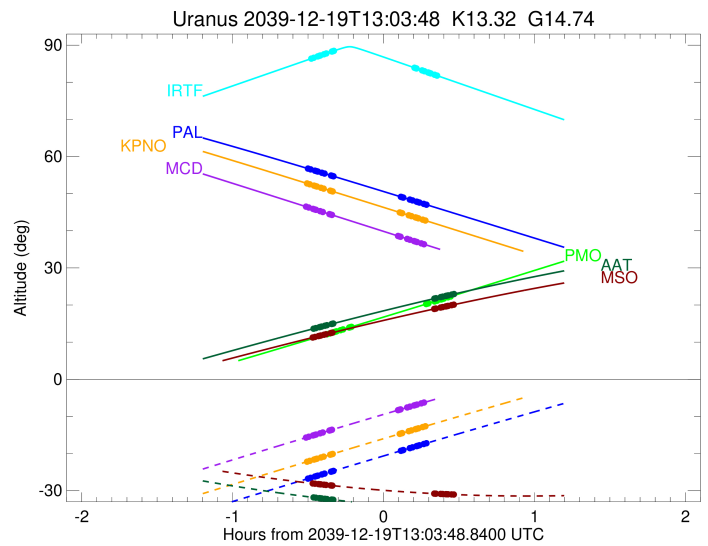
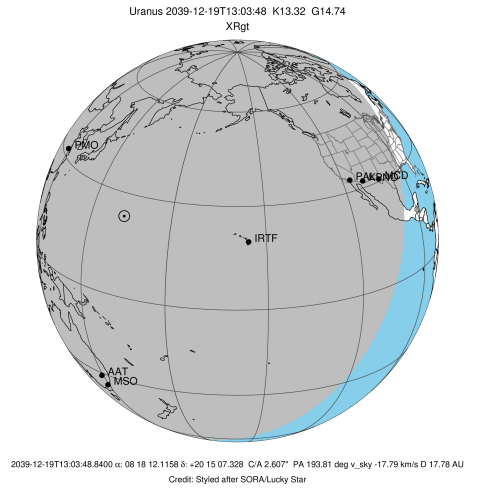


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-12-19T12:33:38.806		56.78	-26.80	51320.46	-17.66		
lambda	I	2039-12-19T12:34:52.521		56.53	-26.54	50026.71	-17.30		
delta	I	2039-12-19T12:36:34.429		56.19	-26.20	48300.35	-16.56		
gamma	I	2039-12-19T12:37:15.641		56.05	-26.06	47624.28	-16.24		
eta	I	2039-12-19T12:37:43.424		55.95	-25.96	47176.12	-16.02		
beta	I	2039-12-19T12:39:21.240		55.62	-25.63	45650.99	-15.18		
alpha	I	2039-12-19T12:40:25.858		55.40	-25.41	44685.24	-14.57		
4	I	2039-12-19T12:42:58.046		54.88	-24.89	42591.51	-13.01		
5	I	2039-12-19T12:43:20.412		54.81	-24.81	42314.24	-12.75		
6	I	2039-12-19T12:43:53.058		54.69	-24.70	41875.80	-12.33		

No planet occultations

6	E	2039-12-19T13:10:40.670		49.15	-19.28	41842.36	12.32		
5	E	2039-12-19T13:11:17.798		49.03	-19.15	42263.15	12.73		
4	E	2039-12-19T13:11:44.809		48.93	-19.06	42616.55	12.99		
alpha	E	2039-12-19T13:14:15.941		48.41	-18.55	44713.29	14.54		
beta	E	2039-12-19T13:15:20.208		48.18	-18.34	45674.89	15.16		
eta	E	2039-12-19T13:16:56.681		47.85	-18.02	47176.12	15.98		
gamma	E	2039-12-19T13:17:24.923		47.75	-17.92	47630.76	16.21		
delta	E	2039-12-19T13:18:05.827		47.61	-17.79	48300.35	16.53		
lambda	E	2039-12-19T13:19:47.974		47.25	-17.45	50026.71	17.26		
epsilon	E	2039-12-19T13:20:31.632		47.10	-17.30	50786.69	17.62		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-12-19T13:09:31.900
 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 : 675683331591285248
 2Mass ID (if available) : 08181212+2015075
 ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 13.316
 G magnitude : 14.739
 RP magnitude : 14.260
 BP magnitude : 15.035
 DUPflag : 0
 Distance (au) : 17.781
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.79
 Sun-Target sep (deg) : 144.77
 Sun-Moon sep (deg) : 161.96
 B (ring opening deg) : 44.86
 PA of pole (deg) : 91.52
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.711
 C/A sky separation (km) : 34963.6
 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



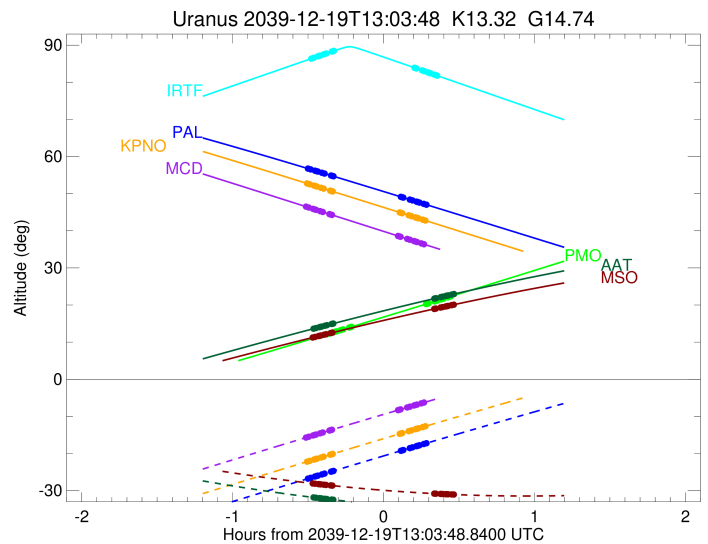
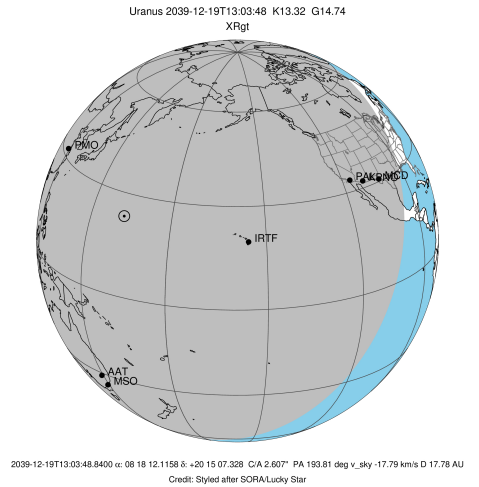
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-12-19T12:41:11.005		12.09	-45.20	51328.09	-17.96		
lambda	I	2039-12-19T12:42:23.857		12.34	-45.45	50026.71	-17.64		
delta	I	2039-12-19T12:44:03.520		12.68	-45.81	48300.35	-16.99		
gamma	I	2039-12-19T12:44:43.654		12.81	-45.95	47624.15	-16.71		
eta	I	2039-12-19T12:45:10.632		12.91	-46.04	47176.12	-16.51		
beta	I	2039-12-19T12:46:45.206		13.23	-46.38	45650.48	-15.78		
alpha	I	2039-12-19T12:47:47.134		13.44	-46.60	44685.04	-15.24		
4	I	2039-12-19T12:50:11.290		13.93	-47.11	42589.88	-13.91		
5	I	2039-12-19T12:50:32.105		14.01	-47.18	42314.69	-13.69		
6	I	2039-12-19T12:51:02.223		14.11	-47.29	41876.54	-13.33		

No planet occultations

6	E	2039-12-19T13:20:43.726		20.26	-53.58	41839.62	13.37		
5	E	2039-12-19T13:21:17.974		20.37	-53.70	42258.39	13.73		
4	E	2039-12-19T13:21:43.465		20.46	-53.79	42616.54	13.95		
alpha	E	2039-12-19T13:24:05.874		20.96	-54.30	44715.11	15.30		
beta	E	2039-12-19T13:25:07.039		21.17	-54.51	45675.63	15.84		
eta	E	2039-12-19T13:26:39.665		21.49	-54.84	47176.12	16.58		
gamma	E	2039-12-19T13:27:06.925		21.59	-54.94	47630.89	16.78		
delta	E	2039-12-19T13:27:46.476		21.73	-55.08	48300.35	17.07		
lambda	E	2039-12-19T13:29:25.663		22.07	-55.43	50026.71	17.73		
epsilon	E	2039-12-19T13:30:07.795		22.22	-55.57	50779.29	18.05		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2039-12-19T13:00:22.050
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      : 675683331591285248
2Mass ID (if available) : 08181212+2015075
ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s
RUWE (>1.4 is poor) : 0.91
K magnitude         : 13.316
G magnitude         : 14.739
RP magnitude        : 14.260
BP magnitude        : 15.035
DUPflag            : 0
Distance (au)       : 17.781
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -17.79
Sun-Target sep (deg) : 144.77
Sun-Moon sep (deg)  : 160.74
B (ring opening deg) : 44.86
PA of pole (deg)    : 91.52
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.810
C/A sky separation (km) : 36235.9
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

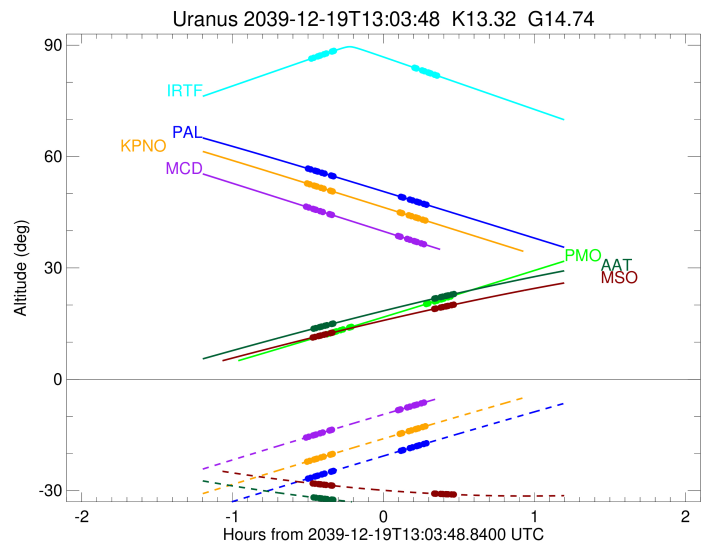
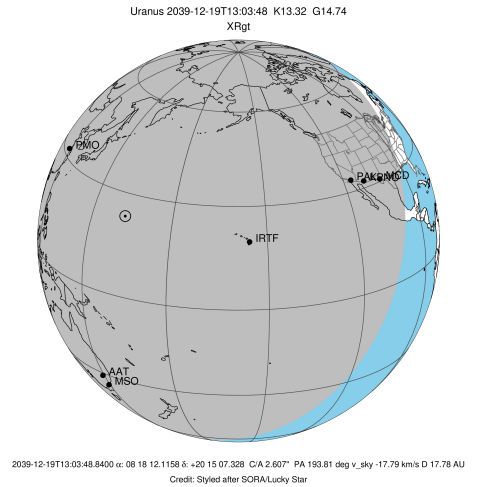


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-12-19T12:33:16.533		52.78	-22.23	51319.80	-17.61		
lambda	I	2039-12-19T12:34:30.445		52.52	-21.98	50026.71	-17.25		
delta	I	2039-12-19T12:36:12.709		52.16	-21.63	48300.35	-16.50		
gamma	I	2039-12-19T12:36:54.077		52.02	-21.49	47624.29	-16.18		
eta	I	2039-12-19T12:37:21.971		51.92	-21.39	47176.12	-15.95		
beta	I	2039-12-19T12:39:00.205		51.57	-21.06	45651.04	-15.12		
alpha	I	2039-12-19T12:40:05.140		51.34	-20.84	44685.25	-14.49		
4	I	2039-12-19T12:42:38.202		50.80	-20.31	42591.64	-12.93		
5	I	2039-12-19T12:43:00.727		50.72	-20.24	42314.20	-12.66		
6	I	2039-12-19T12:43:33.625		50.61	-20.12	41875.74	-12.24		

No planet occultations

6	E	2039-12-19T13:10:12.906		44.95	-14.72	41842.52	12.22		
5	E	2039-12-19T13:10:50.312		44.82	-14.59	42263.41	12.64		
4	E	2039-12-19T13:11:17.489		44.72	-14.50	42616.54	12.91		
alpha	E	2039-12-19T13:13:49.524		44.18	-13.99	44713.19	14.47		
beta	E	2039-12-19T13:14:54.124		43.95	-13.78	45674.85	15.08		
eta	E	2039-12-19T13:16:31.039		43.61	-13.45	47176.12	15.92		
gamma	E	2039-12-19T13:16:59.401		43.51	-13.36	47630.75	16.14		
delta	E	2039-12-19T13:17:40.472		43.36	-13.22	48300.35	16.46		
lambda	E	2039-12-19T13:19:23.007		43.00	-12.88	50026.71	17.20		
epsilon	E	2039-12-19T13:20:06.842		42.84	-12.73	50787.09	17.56		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-12-19T12:59:54.320
 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 : 675683331591285248
 2Mass ID (if available) : 08181212+2015075
 ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 13.316
 G magnitude : 14.739
 RP magnitude : 14.260
 BP magnitude : 15.035
 DUPflag : 0
 Distance (au) : 17.781
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.79
 Sun-Target sep (deg) : 144.77
 Sun-Moon sep (deg) : 160.64
 B (ring opening deg) : 44.86
 PA of pole (deg) : 91.52
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.824
 C/A sky separation (km) : 36414.5
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

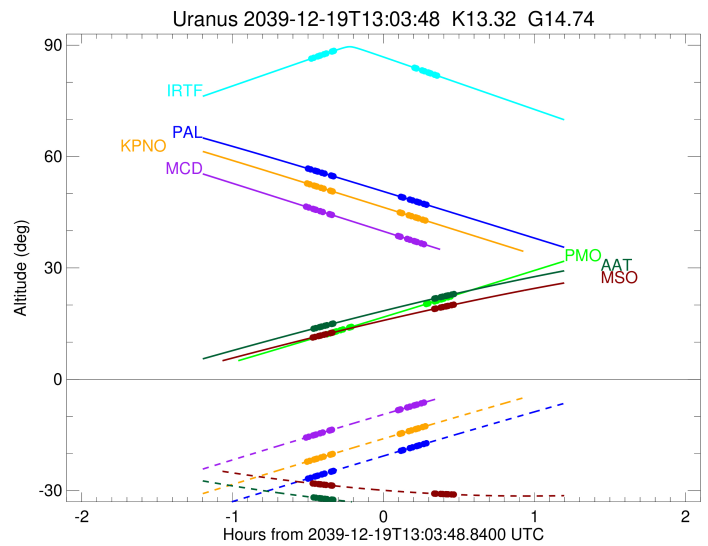
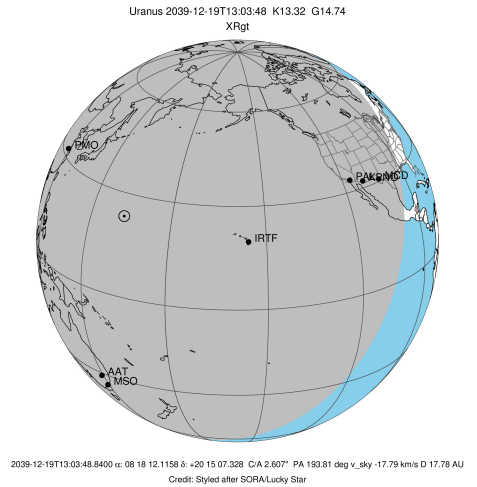


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-12-19T12:32:52.070		46.53	-15.73	51318.01	-17.48		
lambda	I	2039-12-19T12:34:06.423		46.26	-15.48	50026.71	-17.12		
delta	I	2039-12-19T12:35:49.520		45.89	-15.13	48300.35	-16.36		
gamma	I	2039-12-19T12:36:31.254		45.74	-14.99	47624.32	-16.03		
eta	I	2039-12-19T12:36:59.410		45.64	-14.89	47176.12	-15.80		
beta	I	2039-12-19T12:38:38.638		45.28	-14.55	45651.15	-14.95		
alpha	I	2039-12-19T12:39:44.336		45.05	-14.33	44685.30	-14.32		
4	I	2039-12-19T12:42:19.528		44.49	-13.81	42591.97	-12.72		
5	I	2039-12-19T12:42:42.445		44.41	-13.73	42314.09	-12.45		
6	I	2039-12-19T12:43:15.976		44.29	-13.61	41875.58	-12.02		

No planet occultations

6	E	2039-12-19T13:09:32.634		38.61	-8.33	41842.90	12.00		
5	E	2039-12-19T13:10:10.718		38.47	-8.20	42264.07	12.43		
4	E	2039-12-19T13:10:38.296		38.37	-8.11	42616.53	12.70		
alpha	E	2039-12-19T13:13:12.495		37.82	-7.60	44712.95	14.29		
beta	E	2039-12-19T13:14:17.878		37.59	-7.38	45674.75	14.91		
eta	E	2039-12-19T13:15:55.818		37.23	-7.06	47176.12	15.76		
gamma	E	2039-12-19T13:16:24.453		37.13	-6.96	47630.73	15.99		
delta	E	2039-12-19T13:17:05.905		36.98	-6.83	48300.35	16.31		
lambda	E	2039-12-19T13:18:49.314		36.61	-6.49	50026.71	17.06		
epsilon	E	2039-12-19T13:19:33.548		36.45	-6.34	50788.04	17.42		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-12-19T13:03:17.930
 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 : 675683331591285248
 2Mass ID (if available) : 08181212+2015075
 ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 13.316
 G magnitude : 14.739
 RP magnitude : 14.260
 BP magnitude : 15.035
 DUPflag : 0
 Distance (au) : 17.781
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.79
 Sun-Target sep (deg) : 144.77
 Sun-Moon sep (deg) : 161.35
 B (ring opening deg) : 44.86
 PA of pole (deg) : 91.52
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.599
 C/A sky separation (km) : 33514.3
 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

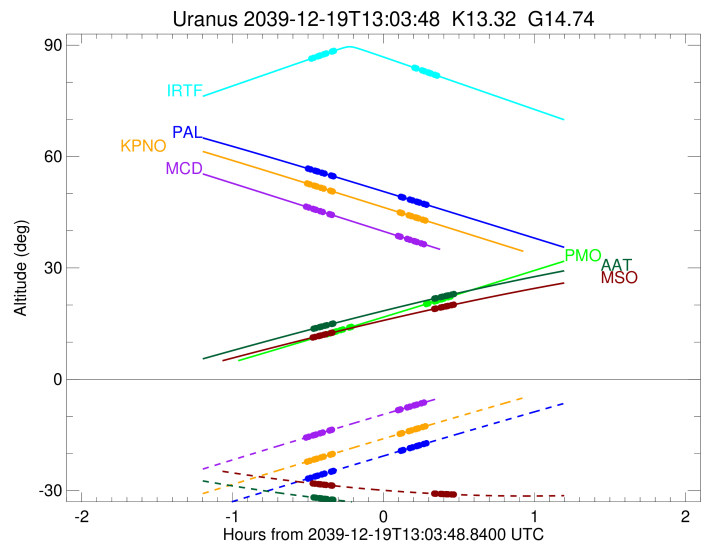
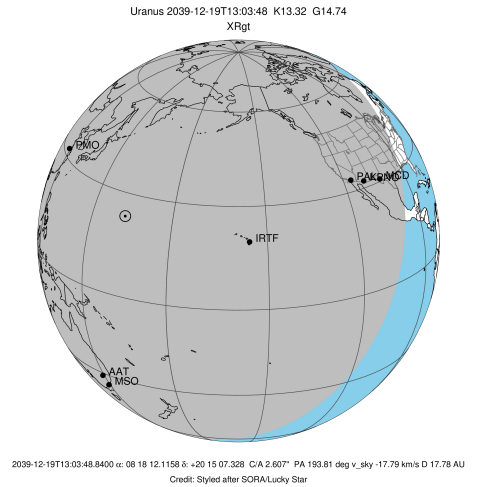


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-12-19T12:34:57.216		86.34	-58.21	51345.89	-19.07		
lambda	I	2039-12-19T12:36:06.700		86.61	-57.94	50026.71	-18.78		
delta	I	2039-12-19T12:37:40.050		86.98	-57.58	48300.35	-18.19		
gamma	I	2039-12-19T12:38:17.491		87.12	-57.44	47623.89	-17.94		
eta	I	2039-12-19T12:38:42.573		87.22	-57.34	47176.12	-17.76		
beta	I	2039-12-19T12:40:10.197		87.56	-57.01	45649.47	-17.10		
alpha	I	2039-12-19T12:41:07.009		87.78	-56.79	44684.77	-16.64		
4	I	2039-12-19T12:43:18.048		88.28	-56.29	42586.95	-15.48		
5	I	2039-12-19T12:43:36.616		88.35	-56.22	42315.17	-15.29		
6	I	2039-12-19T12:44:03.214		88.45	-56.12	41877.62	-14.98		

No planet occultations

6	E	2039-12-19T13:16:04.711		83.93	-48.78	41837.26	14.99		
5	E	2039-12-19T13:16:35.277		83.81	-48.66	42254.26	15.29		
4	E	2039-12-19T13:16:58.516		83.72	-48.58	42616.41	15.48		
alpha	E	2039-12-19T13:19:08.355		83.21	-48.08	44716.62	16.64		
beta	E	2039-12-19T13:20:04.699		82.99	-47.87	45676.20	17.12		
eta	E	2039-12-19T13:21:30.791		82.65	-47.54	47176.12	17.76		
gamma	E	2039-12-19T13:21:56.269		82.55	-47.44	47630.98	17.94		
delta	E	2039-12-19T13:22:33.313		82.40	-47.30	48300.35	18.19		
lambda	E	2039-12-19T13:24:06.661		82.04	-46.94	50026.71	18.78		
epsilon	E	2039-12-19T13:24:46.214		81.88	-46.79	50774.25	19.07		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-12-19T13:06:47.140
 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 : 675683331591285248
 2Mass ID (if available) : 08181212+2015075
 ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 13.316
 G magnitude : 14.739
 RP magnitude : 14.260
 BP magnitude : 15.035
 DUPflag : 0
 Distance (au) : 17.781
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.79
 Sun-Target sep (deg) : 144.77
 Sun-Moon sep (deg) : 161.81
 B (ring opening deg) : 44.86
 PA of pole (deg) : 91.52
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.195
 C/A sky separation (km) : 28304.9
 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

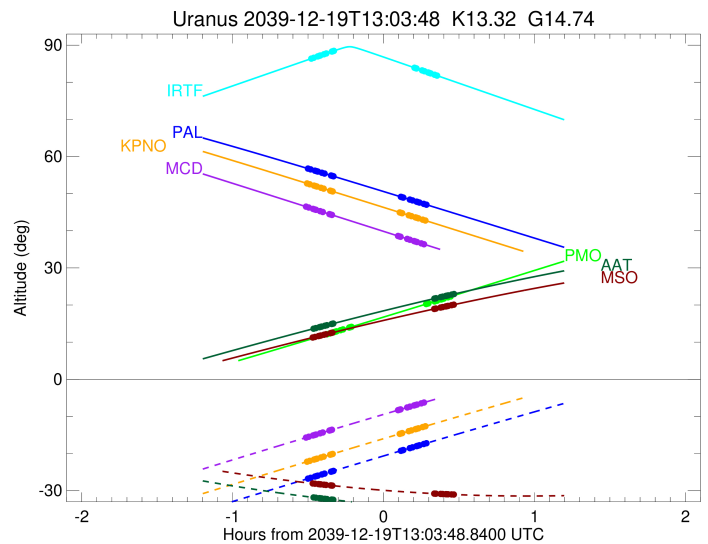
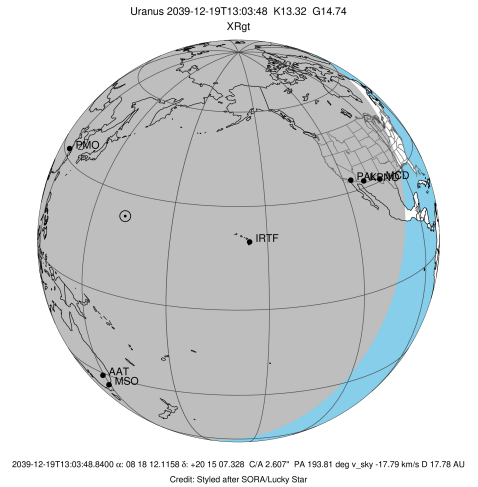


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-12-19T12:35:49.850		13.59	-31.82	51388.21	-20.85		
lambda	I	2039-12-19T12:36:55.256		13.78	-31.91	50026.71	-20.68		
delta	I	2039-12-19T12:38:19.455		14.03	-32.03	48300.35	-20.32		
gamma	I	2039-12-19T12:38:52.912		14.13	-32.07	47623.25	-20.16		
eta	I	2039-12-19T12:39:15.153		14.20	-32.10	47176.12	-20.05		
beta	I	2039-12-19T12:40:32.278		14.42	-32.20	45647.14	-19.65		
alpha	I	2039-12-19T12:41:21.176		14.57	-32.27	44684.68	-19.36		
4	I	2039-12-19T12:43:12.211		14.89	-32.41	42579.26	-18.69		
5	I	2039-12-19T12:43:27.377		14.94	-32.43	42314.55	-18.59		
6	I	2039-12-19T12:43:48.721		15.00	-32.46	41879.36	-18.40		

No planet occultations

6	E	2039-12-19T13:23:59.193		21.72	-34.78	41828.99	18.47		
5	E	2039-12-19T13:24:23.613		21.79	-34.80	42239.10	18.65		
4	E	2039-12-19T13:24:43.652		21.84	-34.81	42614.90	18.75		
alpha	E	2039-12-19T13:26:33.301		22.13	-34.87	44722.40	19.44		
beta	E	2039-12-19T13:27:21.538		22.26	-34.90	45678.17	19.73		
eta	E	2039-12-19T13:28:36.814		22.45	-34.95	47176.12	20.13		
gamma	E	2039-12-19T13:28:59.361		22.51	-34.96	47631.30	20.24		
delta	E	2039-12-19T13:29:32.280		22.60	-34.98	48300.35	20.40		
lambda	E	2039-12-19T13:30:56.113		22.82	-35.02	50026.71	20.78		
epsilon	E	2039-12-19T13:31:31.124		22.91	-35.04	50756.70	20.95		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-12-19T13:06:32.800
 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 : 675683331591285248
 2Mass ID (if available) : 08181212+2015075
 ICRS Star Coord at Epoch: 08h 18m 12.11583s +20:15:07.32826s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 13.316
 G magnitude : 14.739
 RP magnitude : 14.260
 BP magnitude : 15.035
 DUPflag : 0
 Distance (au) : 17.781
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.79
 Sun-Target sep (deg) : 144.77
 Sun-Moon sep (deg) : 161.77
 B (ring opening deg) : 44.86
 PA of pole (deg) : 91.52
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.176
 C/A sky separation (km) : 28062.9
 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_itrf93_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	2039-12-19T12:35:29.234		11.22	-28.05	51390.13	-20.92		
lambda	I	2039-12-19T12:36:34.511		11.40	-28.14	50026.71	-20.76		
delta	I	2039-12-19T12:37:58.395		11.63	-28.24	48300.35	-20.40		
gamma	I	2039-12-19T12:38:31.718		11.73	-28.28	47623.22	-20.24		
eta	I	2039-12-19T12:38:53.863		11.79	-28.31	47176.12	-20.14		
beta	I	2039-12-19T12:40:10.640		12.00	-28.41	45647.04	-19.75		
alpha	I	2039-12-19T12:40:59.280		12.14	-28.47	44684.70	-19.47		
4	I	2039-12-19T12:42:49.691		12.45	-28.60	42578.91	-18.81		
5	I	2039-12-19T12:43:04.754		12.49	-28.62	42314.46	-18.71		
6	I	2039-12-19T12:43:25.943		12.55	-28.64	41879.41	-18.53		

No planet occultations

6	E	2039-12-19T13:23:56.151		18.94	-30.80	41828.66	18.59		
5	E	2039-12-19T13:24:20.382		19.00	-30.81	42238.48	18.77		
4	E	2039-12-19T13:24:40.332		19.05	-30.83	42614.80	18.87		
alpha	E	2039-12-19T13:26:29.380		19.32	-30.89	44722.64	19.54		
beta	E	2039-12-19T13:27:17.366		19.44	-30.91	45678.24	19.83		
eta	E	2039-12-19T13:28:32.304		19.62	-30.95	47176.12	20.22		
gamma	E	2039-12-19T13:28:54.758		19.68	-30.96	47631.31	20.33		
delta	E	2039-12-19T13:29:27.548		19.76	-30.98	48300.35	20.48		
lambda	E	2039-12-19T13:30:51.080		19.96	-31.02	50026.71	20.85		
epsilon	E	2039-12-19T13:31:25.948		20.04	-31.04	50756.12	21.02		