

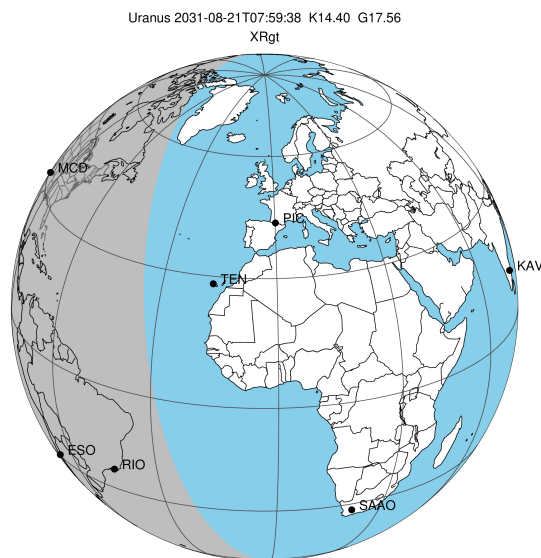
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-08-21T07:59:38.520
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3428371332369303552
 2Mass ID (if available) : 05424562+2330127

ICRS Star Coord at Epoch: 05h 42m 45.63324s +23:30:12.62634s

RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.401
 G magnitude : 17.559
 RP magnitude : 16.604
 BP magnitude : 18.499
 DUPflag : 0
 Distance (au) : 19.569
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 20.51
 Sun-Target sep (deg) : 61.61
 Sun-Moon sep (deg) : 97.50
 B (ring opening deg) : 78.52
 PA of pole (deg) : 44.98

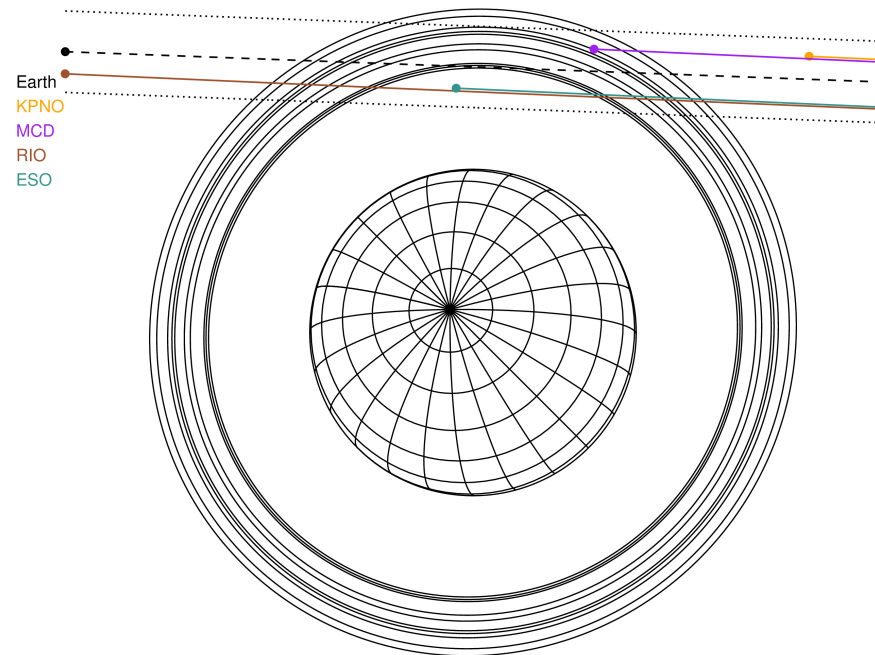
a(km) ring

- 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



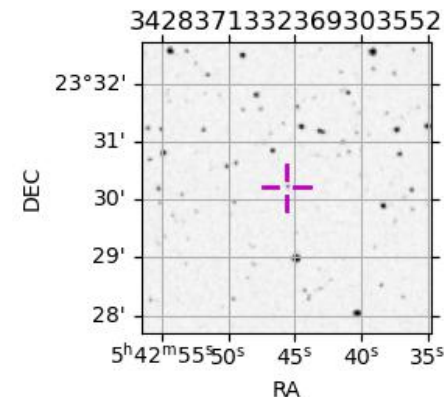
2031-08-21T07:59:38.5200 ex: 05 42 45.6332 s: +23 30 12.626 C/A 2.934° PA 177.87 deg v_sky +20.51 km/s D 19.57 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-08-21T07:59:38 K14.40 G17.56 XRgt



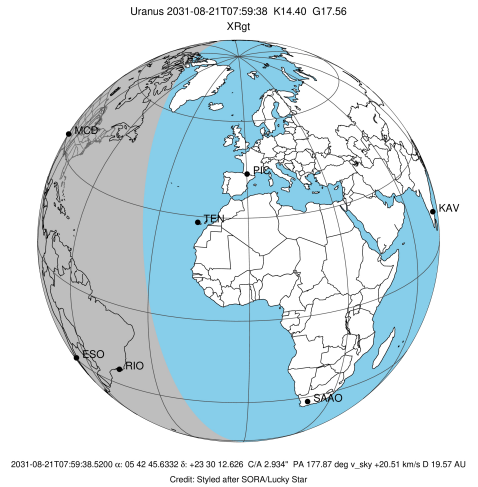
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0			++	AUG 21 08:12 - AUG 21 08:14	PnnRne
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++			AUG 21 07:28 - AUG 21 08:25	PnnRie
ESO	European Southern Obs	-29.3	289.3				AUG 21 08:09 - AUG 21 08:23	PnnRne
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

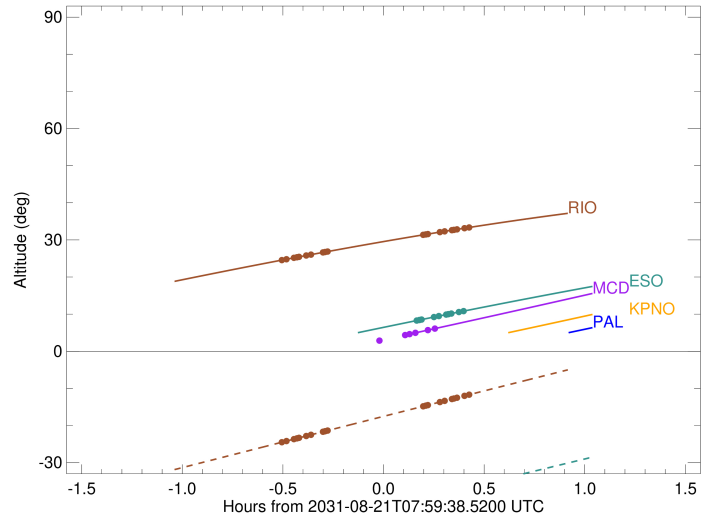


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-08-21T07:55:38.590
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       : 3428371332369303552
2Mass ID (if available) : 05424562+2330127
ICRS Star Coord at Epoch: 05h 42m 45.63324s +23:30:12.62634s
RUWE (>1.4 is poor) : 0.97
K magnitude           : 14.401
G magnitude           : 17.559
RP magnitude          : 16.604
BP magnitude          : 18.499
DUPflag              : 0
Distance (au)        : 19.569
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 20.51
Sun-Target sep (deg) : 61.61
Sun-Moon sep (deg)   : 97.45
B (ring opening deg) : 78.52
PA of pole (deg)     : 44.98
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.183
C/A sky separation (km) : 45175.9
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



Uranus 2031-08-21T07:59:38 K14.40 G17.56

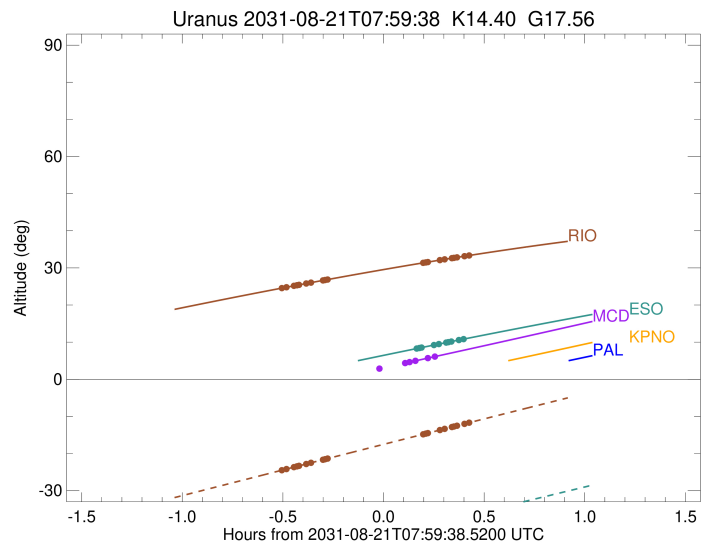
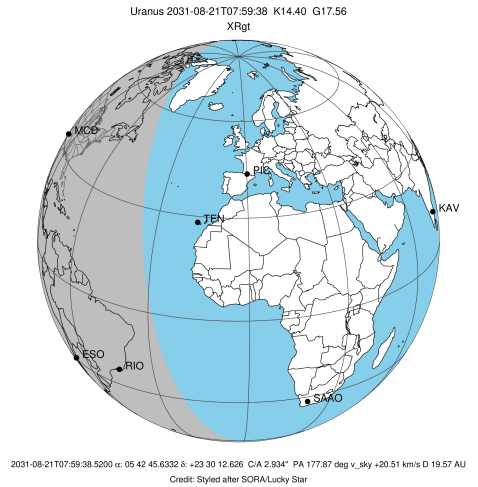


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-21T07:37:17.169		-1.20x	-46.40	51476.94	-9.59		
lambda	I	2031-08-21T07:39:55.996		-0.70x	-46.26	50026.71	-8.57		
delta	I	2031-08-21T07:43:39.229		0.01x	-46.05	48300.35	-6.87		
gamma	I	2031-08-21T07:45:24.458		0.35x	-45.95	47623.00	-6.00		
eta	I	2031-08-21T07:46:43.290		0.60x	-45.87	47176.12	-5.33		
beta	I	2031-08-21T07:54:17.754		2.06x	-45.37	45679.66	-1.18		

No planet occultations

beta	E	2031-08-21T07:58:26.786		2.87x	-45.06	45678.65	1.18		
eta	E	2031-08-21T08:06:02.619		4.35x	-44.45	47176.12	5.32		
gamma	E	2031-08-21T08:07:21.311		4.61x	-44.34	47621.23	5.99		
delta	E	2031-08-21T08:09:07.072		4.96x	-44.19	48300.35	6.85		
lambda	E	2031-08-21T08:12:50.928		5.69	-43.85	50026.71	8.55		
epsilon	E	2031-08-21T08:14:55.164		6.10	-43.66	51142.38	9.55		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-08-21T07:56:35.880
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 3428371332369303552
 2Mass ID (if available) : 05424562+2330127
 ICRS Star Coord at Epoch: 05h 42m 45.63324s +23:30:12.62634s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.401
 G magnitude : 17.559
 RP magnitude : 16.604
 BP magnitude : 18.499
 DUPflag : 0
 Distance (au) : 19.569
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 20.51
 Sun-Target sep (deg) : 61.61
 Sun-Moon sep (deg) : 97.88
 B (ring opening deg) : 78.52
 PA of pole (deg) : 44.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.654
 C/A sky separation (km) : 37674.6
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

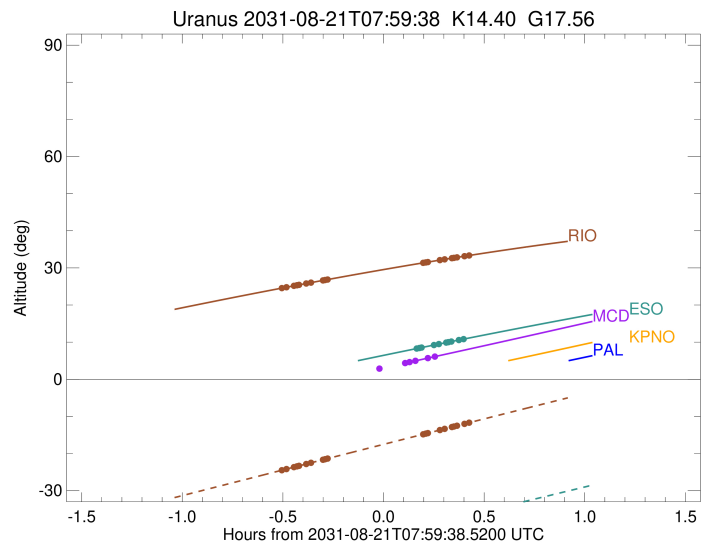
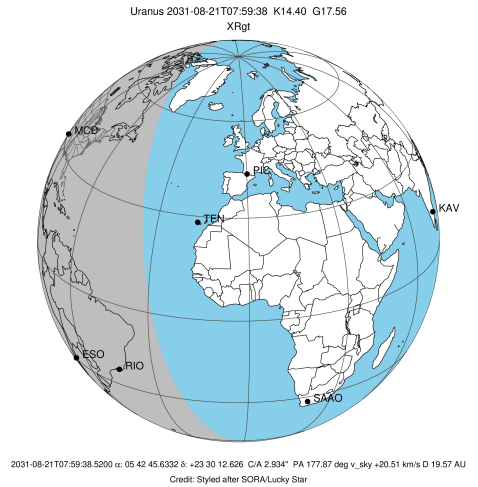


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-21T07:28:53.282		24.48	-24.61	51527.71	-13.76		
lambda	I	2031-08-21T07:30:44.040		24.80	-24.18	50026.71	-13.29		
delta	I	2031-08-21T07:32:57.295		25.18	-23.67	48300.35	-12.61		
gamma	I	2031-08-21T07:33:51.525		25.33	-23.46	47624.66	-12.31		
eta	I	2031-08-21T07:34:28.275		25.43	-23.32	47176.12	-12.10		
beta	I	2031-08-21T07:36:35.838		25.79	-22.83	45681.05	-11.33		
alpha	I	2031-08-21T07:38:01.895		26.04	-22.50	44732.62	-10.77		
4	I	2031-08-21T07:41:33.081		26.62	-21.69	42613.16	-9.21		
5	I	2031-08-21T07:42:15.836		26.74	-21.53	42237.75	-8.85		
6	I	2031-08-21T07:43:05.991		26.88	-21.34	41797.44	-8.47		

No planet occultations

6	E	2031-08-21T08:11:22.370		31.35	-14.85	41799.89	8.45		
5	E	2031-08-21T08:12:05.319		31.45	-14.69	42174.14	8.83		
4	E	2031-08-21T08:12:51.062		31.57	-14.51	42582.25	9.19		
alpha	E	2031-08-21T08:16:28.537		32.10	-13.68	44752.41	10.74		
beta	E	2031-08-21T08:17:51.953		32.30	-13.36	45671.29	11.29		
eta	E	2031-08-21T08:20:00.807		32.61	-12.87	47176.12	12.06		
gamma	E	2031-08-21T08:20:37.384		32.70	-12.73	47620.96	12.26		
delta	E	2031-08-21T08:21:32.110		32.83	-12.53	48300.35	12.56		
lambda	E	2031-08-21T08:23:45.877		33.15	-12.02	50026.71	13.24		
epsilon	E	2031-08-21T08:25:01.335		33.33	-11.73	51038.95	13.70		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-08-21T07:55:34.040
 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 : 3428371332369303552
 2Mass ID (if available) : 05424562+2330127
 ICRS Star Coord at Epoch: 05h 42m 45.63324s +23:30:12.62634s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.401
 G magnitude : 17.559
 RP magnitude : 16.604
 BP magnitude : 18.499
 DUPflag : 0
 Distance (au) : 19.569
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 20.51
 Sun-Target sep (deg) : 61.61
 Sun-Moon sep (deg) : 97.51
 B (ring opening deg) : 78.52
 PA of pole (deg) : 44.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.685
 C/A sky separation (km) : 38101.8
 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	2031-08-21T07:28:29.598		0.50x	-48.68	51525.63	-13.69		
lambda	I	2031-08-21T07:30:20.852		0.86x	-48.29	50026.71	-13.20		
delta	I	2031-08-21T07:32:35.230		1.29x	-47.82	48300.35	-12.48		
gamma	I	2031-08-21T07:33:30.054		1.47x	-47.63	47624.58	-12.17		
eta	I	2031-08-21T07:34:07.246		1.59x	-47.50	47176.12	-11.95		
beta	I	2031-08-21T07:36:16.732		2.00x	-47.04	45681.10	-11.13		
alpha	I	2031-08-21T07:37:44.435		2.29x	-46.73	44733.23	-10.54		
4	I	2031-08-21T07:41:21.948		2.98x	-45.96	42612.73	-8.87		
5	I	2031-08-21T07:42:06.648		3.12x	-45.80	42235.70	-8.47		
6	I	2031-08-21T07:42:58.940		3.29x	-45.61	41797.05	-8.06		

No planet occultations

6	E	2031-08-21T08:09:26.024		8.25	-39.94	41799.41	8.04		
5	E	2031-08-21T08:10:11.197		8.39	-39.77	42175.33	8.45		
4	E	2031-08-21T08:10:58.864		8.54	-39.60	42583.18	8.84		
alpha	E	2031-08-21T08:14:42.757		9.22	-38.80	44752.39	10.51		
beta	E	2031-08-21T08:16:07.902		9.48	-38.49	45671.56	11.09		
eta	E	2031-08-21T08:18:18.774		9.88	-38.02	47176.12	11.90		
gamma	E	2031-08-21T08:18:55.825		9.99	-37.88	47620.96	12.11		
delta	E	2031-08-21T08:19:51.189		10.16	-37.68	48300.35	12.43		
lambda	E	2031-08-21T08:22:06.197		10.56	-37.19	50026.71	13.14		
epsilon	E	2031-08-21T08:23:22.506		10.79	-36.92	51043.19	13.62		