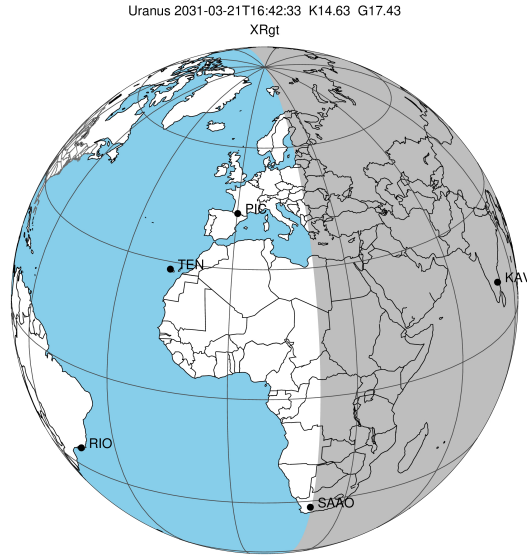


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-03-21T16:42:33.230  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415770345001699840  
 2Mass ID (if available) : 05103836+2303165

ICRS Star Coord at Epoch: 05h 10m 38.36263s +23:03:16.54966s

RUWE (>1.4 is poor) : 1.01  
 K magnitude : 14.633  
 G magnitude : 17.425  
 RP magnitude : 16.635  
 BP magnitude : 18.102  
 DUPflag : 0  
 Distance (au) : 19.315  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.40  
 Sun-Target sep (deg) : 78.22  
 Sun-Moon sep (deg) : 96.85  
 B (ring opening deg) : 82.11  
 PA of pole (deg) : 2.45

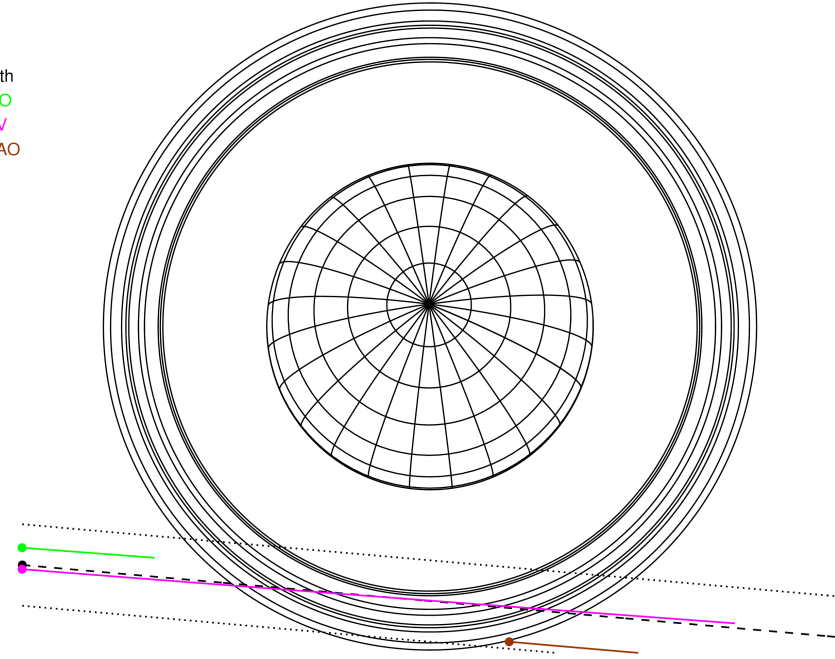
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-03-21T16:42:33.2300 ex: 05 10 38.3626 8: +23 03 16.550 C/A 3.052° PA 354.95 deg v\_sky +12.40 km/s D 19.32 AU  
 Credit: Styled after SORA/Lucky Star

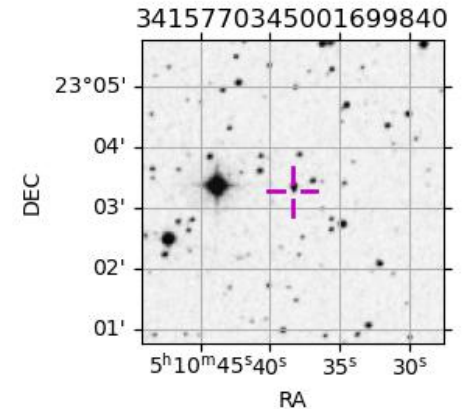
Uranus 2031-03-21T16:42:33 K14.63 G17.43 XRgt

Earth  
 PMO  
 KAV  
 SAAO

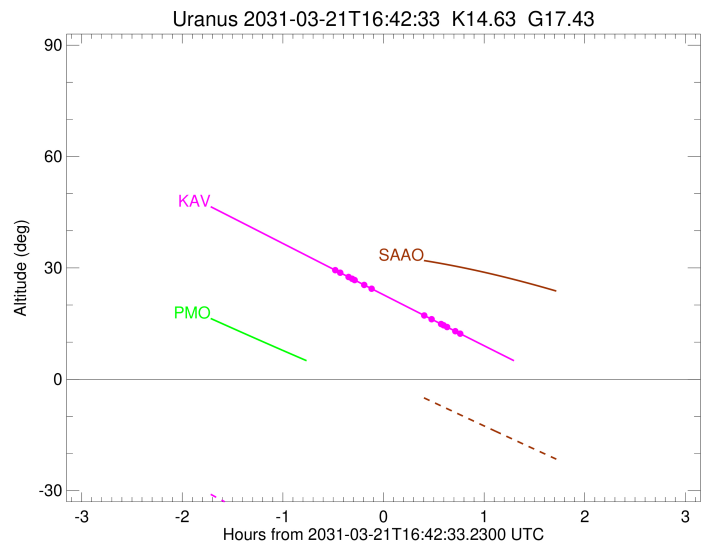
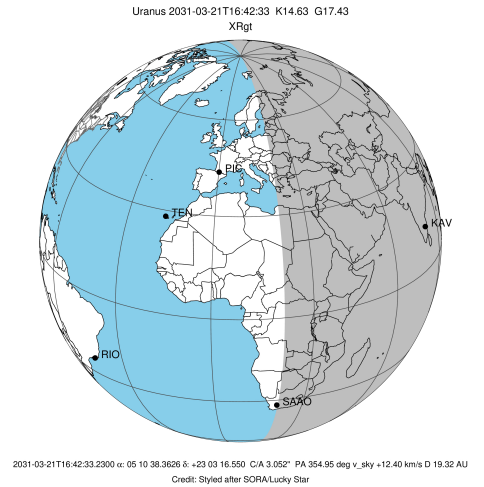


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
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	+++++++		+++++++	MAR 21 16:13 - MAR 21 17:29	PnnRie
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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8			+	MAR 21 17:07 - MAR 21 17:07	PnnRne
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-03-21T16:51:18.440  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 3415770345001699840  
 2Mass ID (if available) : 05103836+2303165  
 ICRS Star Coord at Epoch: 05h 10m 38.36263s +23:03:16.54966s  
 RUWE (>1.4 is poor) : 1.01  
 K magnitude : 14.633  
 G magnitude : 17.425  
 RP magnitude : 16.635  
 BP magnitude : 18.102  
 DUPflag : 0  
 Distance (au) : 19.315  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.40  
 Sun-Target sep (deg) : 78.22  
 Sun-Moon sep (deg) : 97.12  
 B (ring opening deg) : 82.11  
 PA of pole (deg) : 2.45  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.055  
 C/A sky separation (km) : 42803.5  
 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



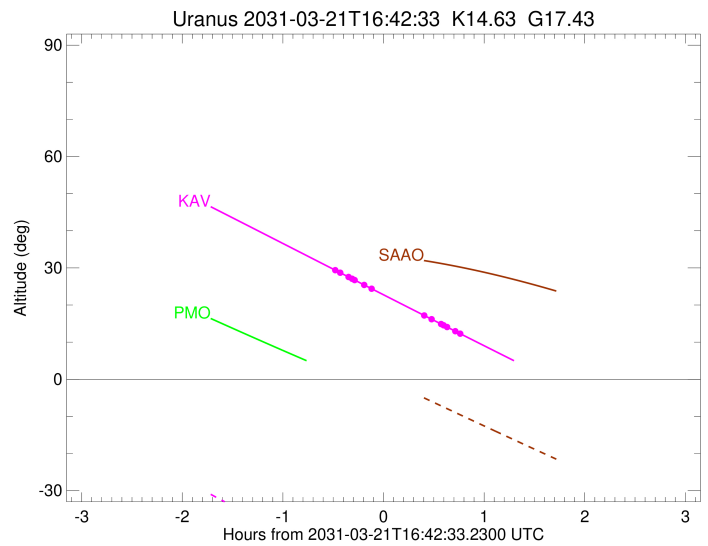
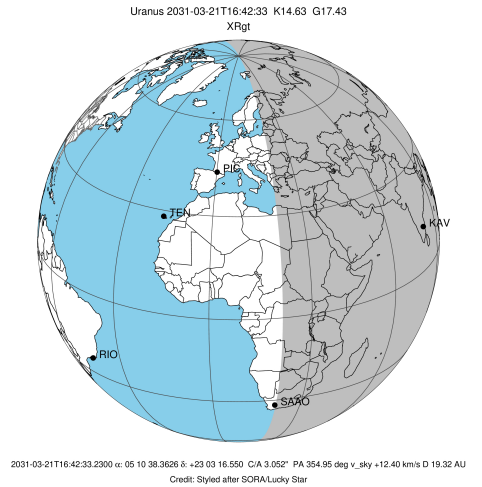
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-03-21T16:13:25.712		29.47	-48.67	51307.30	-6.63		
lambda	I	2031-03-21T16:16:47.593		28.69	-49.47	50026.71	-6.13		
delta	I	2031-03-21T16:21:45.850		27.55	-50.63	48300.35	-5.44		
gamma	I	2031-03-21T16:23:53.402		27.06	-51.13	47627.11	-5.12		
eta	I	2031-03-21T16:25:23.578		26.71	-51.48	47176.12	-4.88		
beta	I	2031-03-21T16:31:06.249		25.39	-52.81	45662.37	-3.93		
alpha	I	2031-03-21T16:35:44.255		24.33	-53.89	44684.81	-3.09		

No planet occultations

alpha	E	2031-03-21T17:06:34.840		17.25	-60.91	44687.35	3.11		
beta	E	2031-03-21T17:11:07.158		16.21	-61.91	45649.89	3.96		
eta	E	2031-03-21T17:16:50.155		14.90	-63.16	47176.12	4.93		
gamma	E	2031-03-21T17:18:20.160		14.56	-63.49	47630.81	5.17		
delta	E	2031-03-21T17:20:25.661		14.08	-63.94	48300.35	5.50		
lambda	E	2031-03-21T17:25:20.405		12.96	-64.99	50026.71	6.21		
epsilon	E	2031-03-21T17:29:16.692		12.06	-65.83	51555.23	6.72		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-03-21T16:43:32.370
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : SAAO
Location            : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)      : -32.37953
E. Longitude (deg)  : 20.81070
Altitude (km)       : 1.768
Gaia source ID      : 3415770345001699840
2Mass ID (if available) : 05103836+2303165
ICRS Star Coord at Epoch: 05h 10m 38.36263s +23:03:16.54966s
RUWE (>1.4 is poor) : 1.01
K magnitude         : 14.633
G magnitude         : 17.425
RP magnitude        : 16.635
BP magnitude        : 18.102
DUPflag            : 0
Distance (au)       : 19.315
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : 12.40
Sun-Target sep (deg) : 78.22
Sun-Moon sep (deg)  : 97.36
B (ring opening deg) : 82.11
PA of pole (deg)    : 2.45
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.434
C/A sky separation (km) : 48100.9
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl.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	2031-03-21T16:20:02.405		34.34	4.86x	51386.45	-3.99		
lambda	I	2031-03-21T16:26:42.224		34.13	3.45x	50026.71	-2.87		

No planet occultations

lambda	E	2031-03-21T17:00:01.591		32.44	-3.60x	50026.71	2.88		
epsilon	E	2031-03-21T17:07:19.374		31.93	-5.14	51540.82	4.00		