

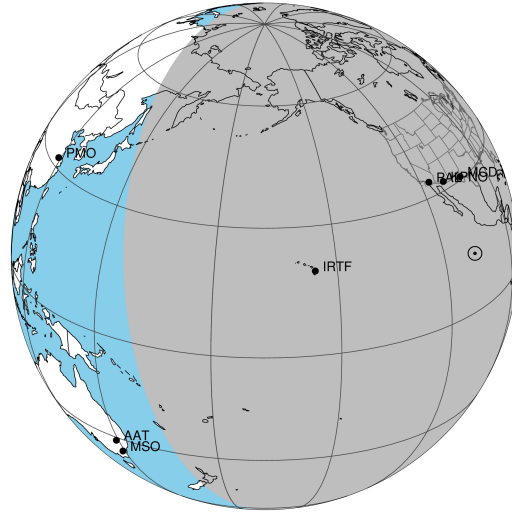
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-02-12T07:30:36.820  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427682561352622720  
 2Mass ID (if available) : 05481956+2337394

Uranus 2033-02-12T07:30:36 K13.53 G15.72 XRgt

ICRS Star Coord at Epoch: 05h 48m 19.57886s +23:37:39.23898s

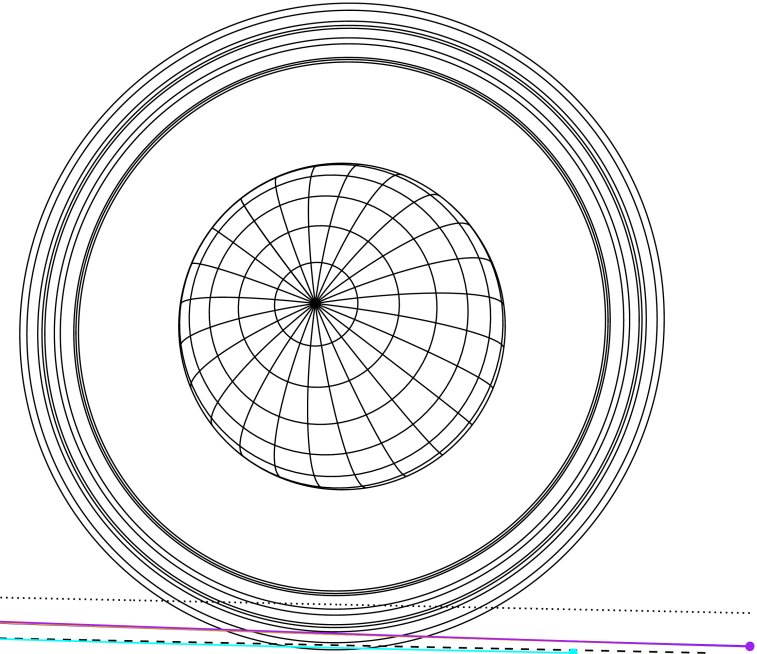
RUWE (>1.4 is poor) : 1.06  
 K magnitude : 13.529  
 G magnitude : 15.720  
 RP magnitude : 15.028  
 BP magnitude : 16.220  
 DUPflag : 0  
 Distance (au) : 18.442  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -10.25  
 Sun-Target sep (deg) : 123.89  
 Sun-Moon sep (deg) : 34.41  
 B (ring opening deg) : 77.50  
 PA of pole (deg) : 49.20

Uranus 2033-02-12T07:30:36 K13.53 G15.72 XRgt



2033-02-12T07:30:36.8200 ra: 05 48 19.57886 s: +23 37 39.239 C/A 3.726" PA 358.81 deg v\_sky -10.25 km/s D 18.44 AU  
 Credit: Styled after SORA/Lucky Star

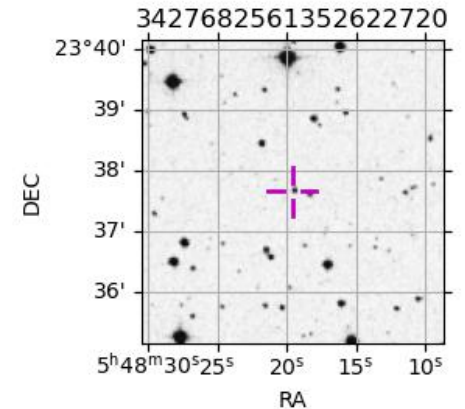
PAL  
 KPNO  
 MCD  
 IRTF



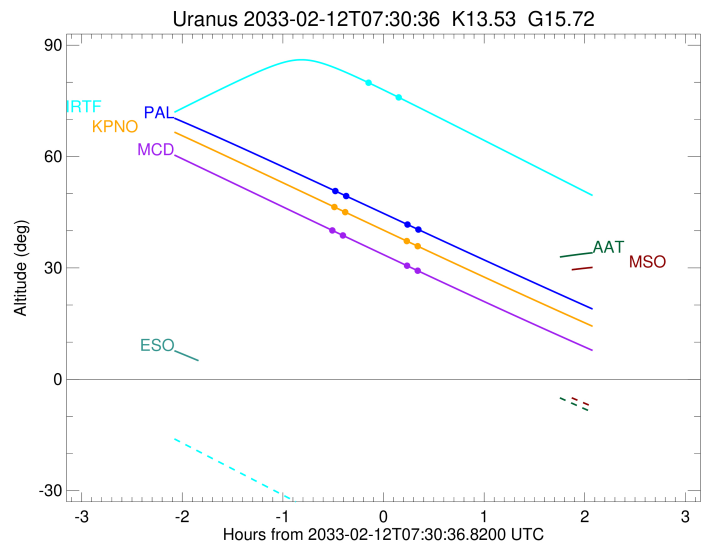
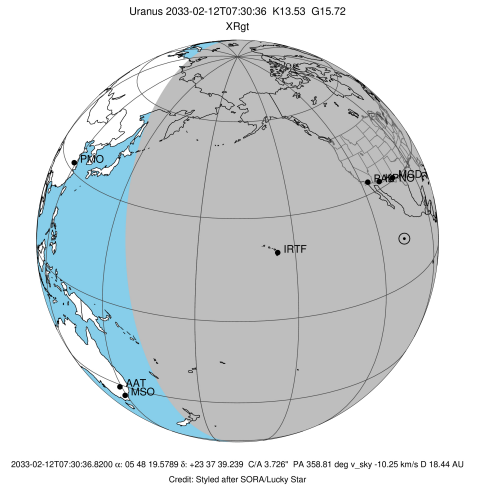
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	++		++	FEB 12 07:02 - FEB 12 07:51	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	++		++	FEB 12 07:02 - FEB 12 07:51	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	++		++	FEB 12 07:01 - FEB 12 07:51	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+		+	FEB 12 07:23 - FEB 12 07:39	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					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 : 2033-02-12T07:24:49.510  
 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 : 3427682561352622720  
 2Mass ID (if available) : 05481956+2337394  
 ICRS Star Coord at Epoch: 05h 48m 19.57886s +23:37:39.23898s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 13.529  
 G magnitude : 15.720  
 RP magnitude : 15.028  
 BP magnitude : 16.220  
 DUPflag : 0  
 Distance (au) : 18.442  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -10.25  
 Sun-Target sep (deg) : 123.89  
 Sun-Moon sep (deg) : 34.32  
 B (ring opening deg) : 77.50  
 PA of pole (deg) : 49.20  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.603  
 C/A sky separation (km) : 48194.1  
 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

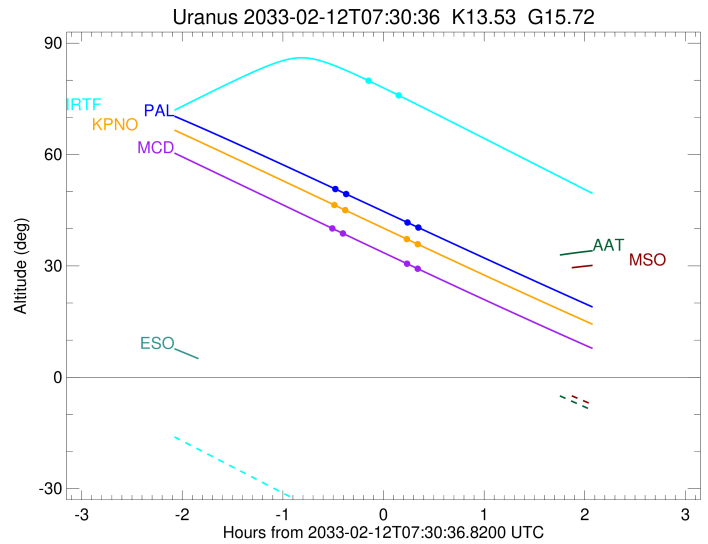
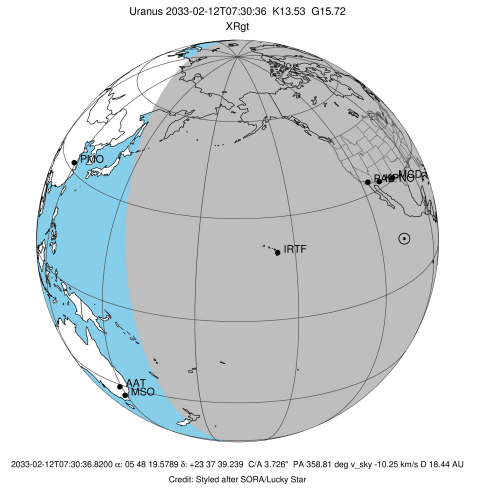


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-12T07:02:54.780		50.50	-66.26	50966.78	-3.25		
lambda	I	2033-02-12T07:08:27.337		49.33	-66.94	50026.71	-2.47		

No planet occultations

lambda	E	2033-02-12T07:44:49.574		41.71	-70.00	50026.71	2.46		
epsilon	E	2033-02-12T07:51:39.980		40.27	-70.24	51211.43	3.22		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-02-12T07:24:19.170  
 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 : 3427682561352622720  
 2Mass ID (if available) : 05481956+2337394  
 ICRS Star Coord at Epoch: 05h 48m 19.57886s +23:37:39.23898s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 13.529  
 G magnitude : 15.720  
 RP magnitude : 15.028  
 BP magnitude : 16.220  
 DUPflag : 0  
 Distance (au) : 18.442  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -10.25  
 Sun-Target sep (deg) : 123.89  
 Sun-Moon sep (deg) : 34.25  
 B (ring opening deg) : 77.50  
 PA of pole (deg) : 49.20  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.603  
 C/A sky separation (km) : 48188.4  
 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



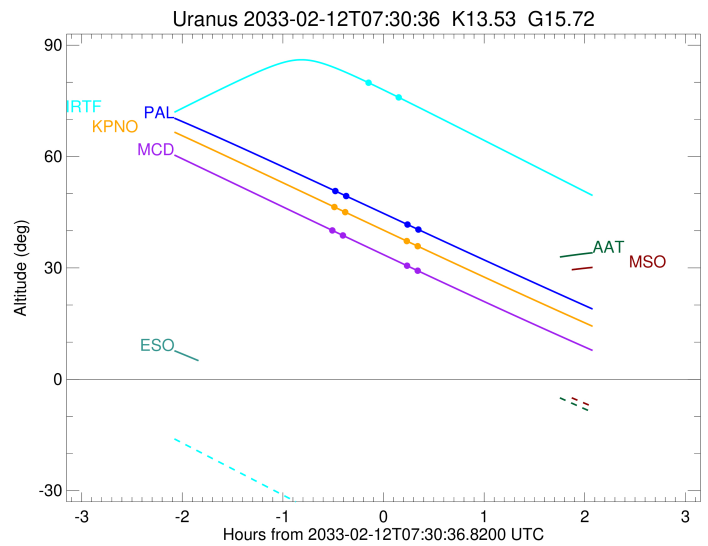
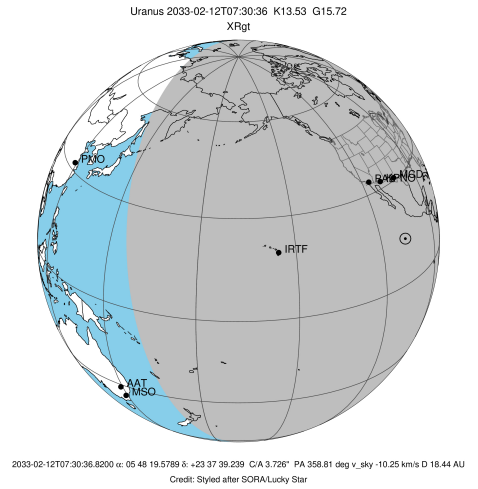
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-12T07:02:19.586		46.18	-69.77	50967.00	-3.24		
lambda	I	2033-02-12T07:07:52.185		45.00	-70.29	50026.71	-2.48		

No planet occultations

lambda	E	2033-02-12T07:44:24.561		37.25	-71.74	50026.71	2.46		
epsilon	E	2033-02-12T07:51:15.356		35.80	-71.59	51212.03	3.22		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-02-12T07:23:42.690
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      : 3427682561352622720
2Mass ID (if available) : 05481956+2337394
ICRS Star Coord at Epoch: 05h 48m 19.57886s +23:37:39.23898s
RUWE (>1.4 is poor) : 1.06
K magnitude         : 13.529
G magnitude         : 15.720
RP magnitude        : 15.028
BP magnitude        : 16.220
DUPflag            : 0
Distance (au)       : 18.442
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -10.25
Sun-Target sep (deg) : 123.89
Sun-Moon sep (deg)  : 34.15
B (ring opening deg) : 77.50
PA of pole (deg)    : 49.20
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.595
C/A sky separation (km) : 48083.6
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_itrff93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



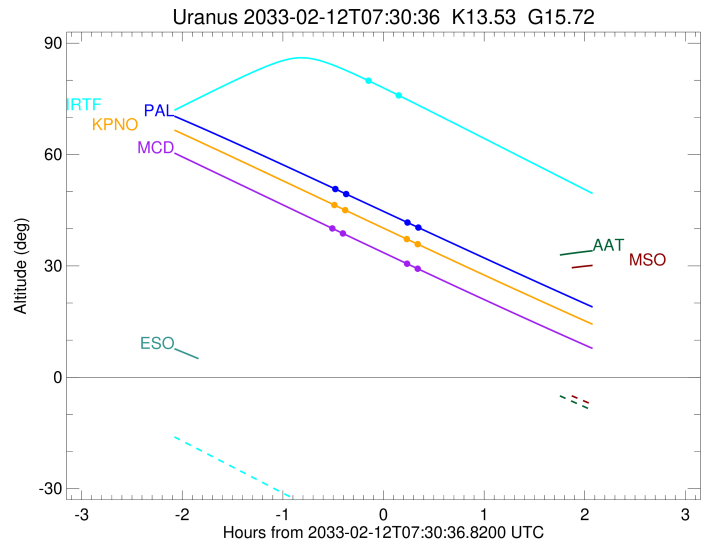
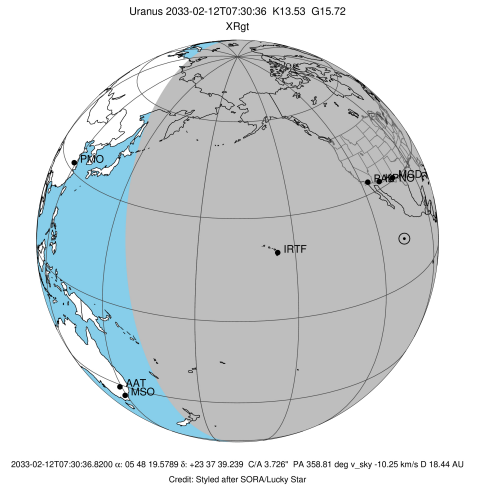
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-12T07:01:06.860		39.88	-72.92	50965.01	-3.30		
lambda	I	2033-02-12T07:06:30.489		38.72	-73.03	50026.71	-2.56		

No planet occultations

lambda	E	2033-02-12T07:44:33.983		30.61	-71.29	50026.71	2.54		
epsilon	E	2033-02-12T07:51:16.314		29.19	-70.59	51215.27	3.28		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-02-12T07:28:50.530
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      : 3427682561352622720
2Mass ID (if available) : 05481956+2337394
ICRS Star Coord at Epoch: 05h 48m 19.57886s +23:37:39.23898s
RUWE (>1.4 is poor) : 1.06
K magnitude          : 13.529
G magnitude          : 15.720
RP magnitude         : 15.028
BP magnitude         : 16.220
DUPflag             : 0
Distance (au)        : 18.442
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -10.25
Sun-Target sep (deg) : 123.89
Sun-Moon sep (deg)  : 34.76
B (ring opening deg) : 77.50
PA of pole (deg)    : 49.20
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.763
C/A sky separation (km) : 50333.2
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	2033-02-12T07:23:30.005		79.50	-43.61	51043.50	-1.07		

No planet occultations

epsilon	E	2033-02-12T07:39:07.813		76.06	-47.29	51123.03	1.07		
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