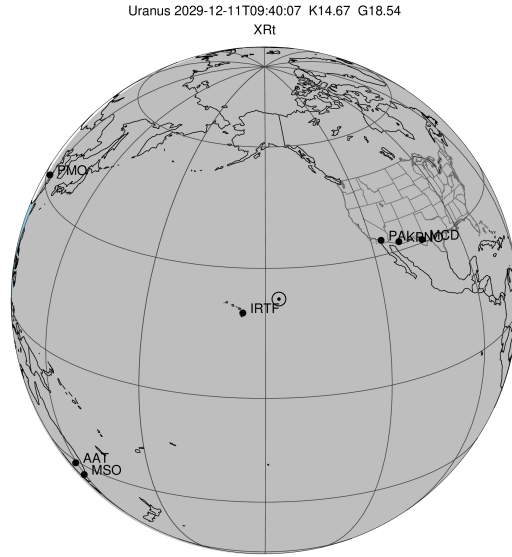


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-12-11T09:40:07.810  
 Event type : XRT  
 : No Uranus occs  
 : Ring occs: topocentric, not geocentric  
 Gaia source ID : 3412521837895996928  
 2Mass ID (if available) : 04590082+2243503

ICRS Star Coord at Epoch: 04h 59m 00.87931s +22:43:50.65910s

RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.666  
 G magnitude : 18.538  
 RP magnitude : 17.369  
 BP magnitude : 19.877  
 DUPflag : 0  
 Distance (au) : 18.241  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 176.75  
 Sun-Moon sep (deg) : 102.10  
 B (ring opening deg) : 82.07  
 PA of pole (deg) : -18.18

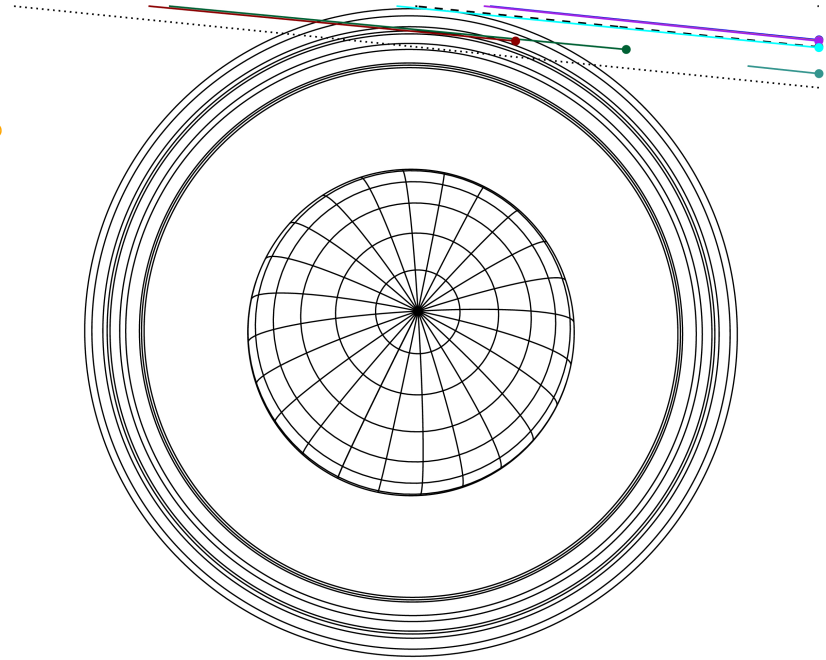
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2029-12-11T09:40:07.8100 cc: 04 59 00.8793 s: +22 43 50.659 C/A 3.855" PA 174.22 deg v\_sky -23.41 km/s D 18.24 AU  
 Credit: Styled after SORA/Lucky Star

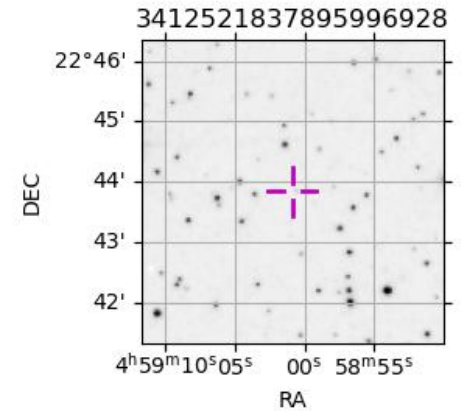
Earth  
 PAL  
 KPNO  
 MCD  
 IRTF  
 ESO  
 AAT  
 MSO

Uranus 2029-12-11T09:40:07 K14.67 G18.54 XRT



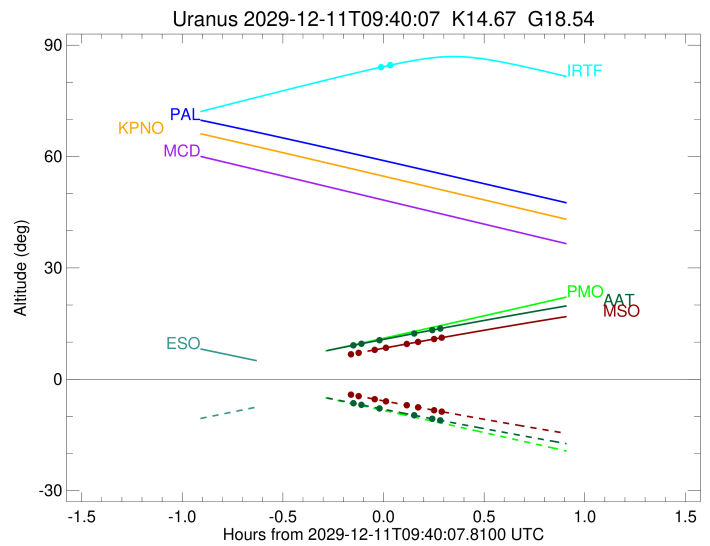
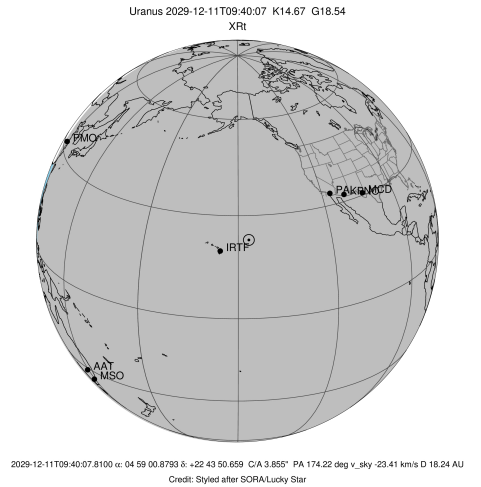
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+		+	DEC 11 09:37 - DEC 11 09:43	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 11 09:30 - DEC 11 09:57	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	++		++++	DEC 11 09:37 - DEC 11 09:57	PnnRie



3412521837895996928

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-12-11T09:40:37.250  
 Event type : XRt  
 : No Uranus occs  
 : Ring occs: topocentric, not geocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 3412521837895996928  
 2Mass ID (if available) : 04590082+2243503  
 ICRS Star Coord at Epoch: 04h 59m 00.87931s +22:43:50.65910s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.666  
 G magnitude : 18.538  
 RP magnitude : 17.369  
 BP magnitude : 19.877  
 DUPflag : 0  
 Distance (au) : 18.241  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 176.75  
 Sun-Moon sep (deg) : 103.03  
 B (ring opening deg) : 82.07  
 PA of pole (deg) : -18.18  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.828  
 C/A sky separation (km) : 50645.6  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

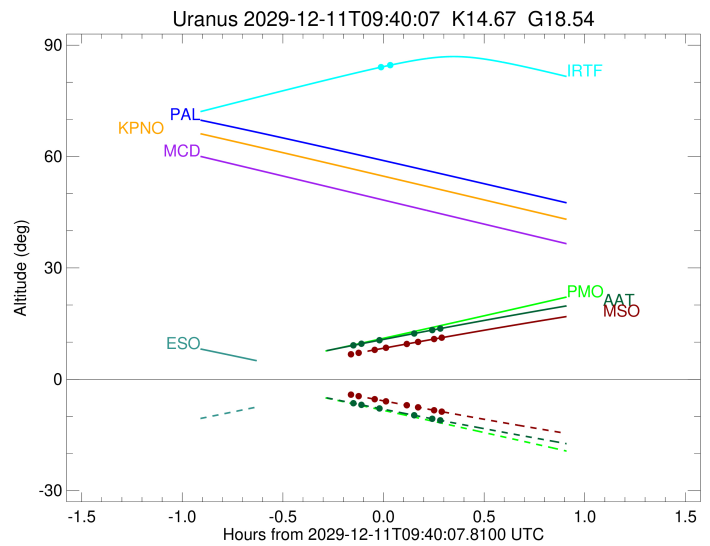
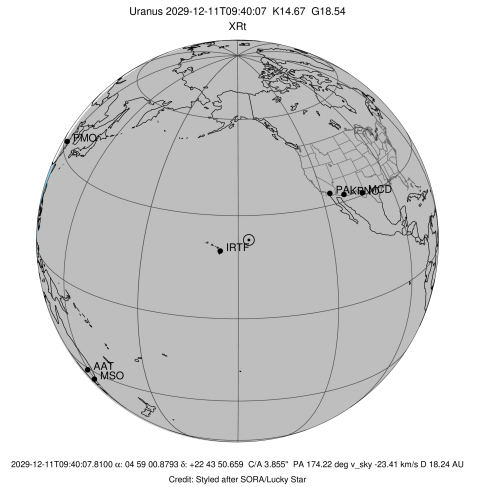


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-11T09:37:09.010		83.62	-80.54	51448.30	-2.52		

No planet occultations

epsilon	E	2029-12-11T09:43:52.008		84.94	-81.98	51330.11	2.30		
---------	---	-------------------------	--	-------	--------	----------	------	--	--

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-12-11T09:43:58.300  
 Event type : XRt  
 : No Uranus occs  
 : Ring occs: topocentric, not geocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3412521837895996928  
 2Mass ID (if available) : 04590082+2243503  
 ICRS Star Coord at Epoch: 04h 59m 00.87931s +22:43:50.65910s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.666  
 G magnitude : 18.538  
 RP magnitude : 17.369  
 BP magnitude : 19.877  
 DUPflag : 0  
 Distance (au) : 18.241  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 176.75  
 Sun-Moon sep (deg) : 102.42  
 B (ring opening deg) : 82.07  
 PA of pole (deg) : -18.18  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.576  
 C/A sky separation (km) : 47304.6  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLv1.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

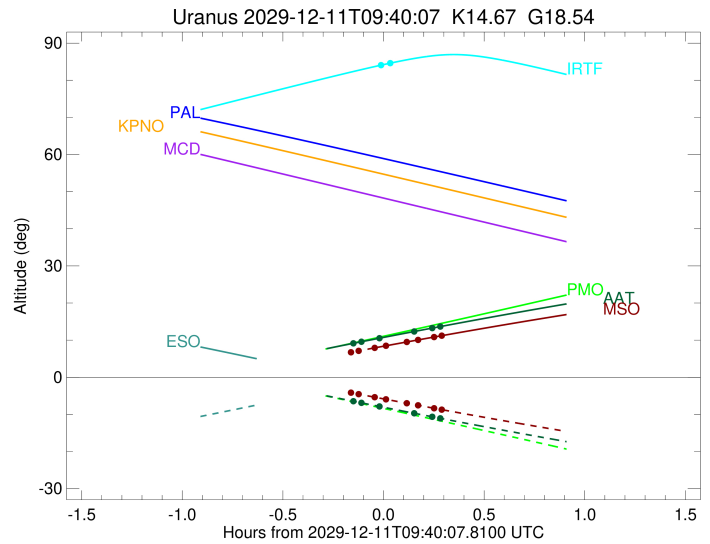
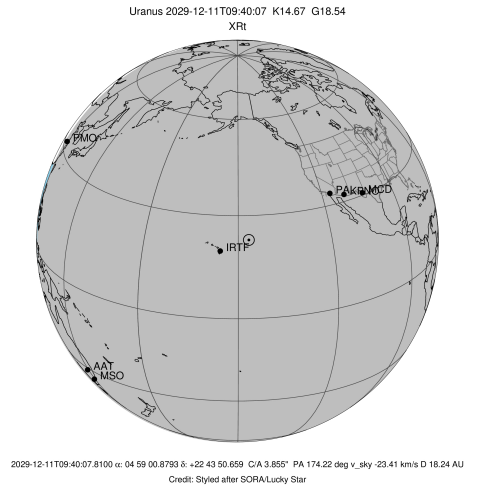


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-11T09:30:33.629		9.04	-6.35	51465.99	-8.69		
lambda	I	2029-12-11T09:33:35.184		9.58	-6.90	50026.71	-7.03		
delta	I	2029-12-11T09:38:59.851		10.53	-7.87	48300.35	-3.54		

No planet occultations

delta	E	2029-12-11T09:49:13.414		12.32	-9.69	48300.35	3.54		
lambda	E	2029-12-11T09:54:37.751		13.24	-10.64	50026.71	7.04		
epsilon	E	2029-12-11T09:57:09.076		13.67	-11.08	51206.30	8.70		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-12-11T09:43:50.000  
 Event type : XRt  
 : No Uranus occs  
 : Ring occs: topocentric, not geocentric  
 Observer code : MSO  
 Location : Mt. Stromlo Observatory  
 Latitude (deg) : -35.32000  
 E. Longitude (deg) : 149.00833  
 Altitude (km) : 0.770  
 Gaia source ID : 3412521837895996928  
 2Mass ID (if available) : 04590082+2243503  
 ICRS Star Coord at Epoch: 04h 59m 00.87931s +22:43:50.65910s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.666  
 G magnitude : 18.538  
 RP magnitude : 17.369  
 BP magnitude : 19.877  
 DUPflag : 0  
 Distance (au) : 18.241  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 176.75  
 Sun-Moon sep (deg) : 102.38  
 B (ring opening deg) : 82.07  
 PA of pole (deg) : -18.18  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.552  
 C/A sky separation (km) : 46991.0  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-11T09:29:51.899		6.63	-4.05x	51470.20	-9.04		
lambda	I	2029-12-11T09:32:45.135		7.12	-4.55x	50026.71	-7.49		
delta	I	2029-12-11T09:37:33.252		7.93	-5.38	48300.35	-4.44		
gamma	I	2029-12-11T09:41:01.056		8.51	-5.97	47621.86	-2.07		

No planet occultations

gamma	E	2029-12-11T09:46:55.832		9.49	-6.97	47622.45	2.08		
delta	E	2029-12-11T09:50:23.232		10.05	-7.55	48300.35	4.44		
lambda	E	2029-12-11T09:55:11.032		10.83	-8.34	50026.71	7.50		
epsilon	E	2029-12-11T09:57:34.045		11.21	-8.74	51199.79	9.06		