

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-18T14:29:23.440  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415590368690214400  
 2Mass ID (if available) : 05171231+2309574

ICRS Star Coord at Epoch: 05h 17m 12.33093s +23:09:57.46755s

RUWE (>1.4 is poor) : 1.04  
 K magnitude : 14.989  
 G magnitude : 17.867  
 RP magnitude : 17.003  
 BP magnitude : 18.649  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 173.90  
 Sun-Moon sep (deg) : 103.41  
 B (ring opening deg) : 81.79  
 PA of pole (deg) : 13.58

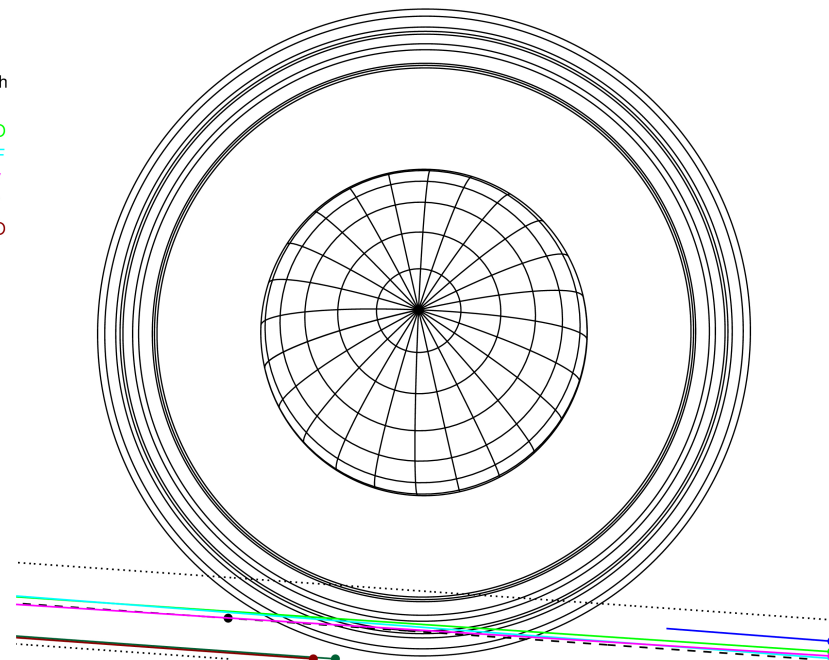
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2030-12-18T14:29:23.4400 ra: 05 17 12.33093 s: +23 09 57.468 C/A 3.543° PA 355.98 deg v\_sky -23.29 km/s D 18.18 AU  
 Credit: Styled after SORA/Lucky Star

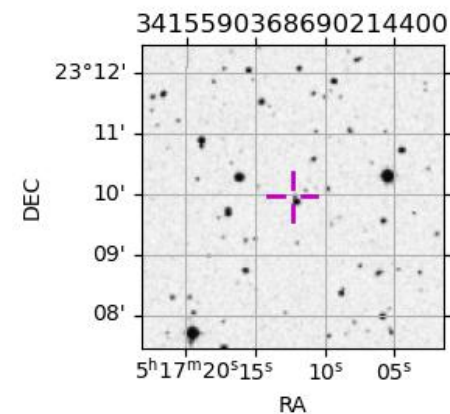
Uranus 2030-12-18T14:29:23 K14.99 G17.87 XRgt

Earth  
 PAL  
 PMO  
 IRTF  
 KAV  
 AAT  
 MSO



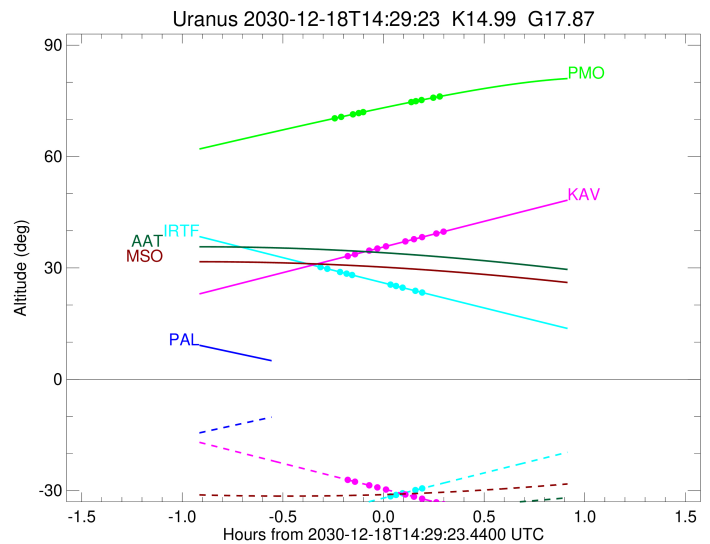
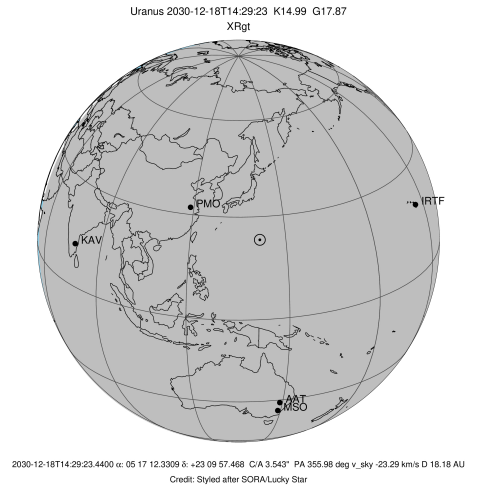
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	DEC 18 14:15 - DEC 18 14:46	PnnRie
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 18 14:10 - DEC 18 14:41	PnnRie
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	DEC 18 14:19 - DEC 18 14:47	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					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



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target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-18T14:30:19.120
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      : 3415590368690214400
2Mass ID (if available) : 05171231+2309574
ICRS Star Coord at Epoch: 05h 17m 12.33093s +23:09:57.46755s
RUWE (>1.4 is poor) : 1.04
K magnitude         : 14.989
G magnitude         : 17.867
RP magnitude        : 17.003
BP magnitude        : 18.649
DUPflag            : 0
Distance (au)       : 18.175
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -23.29
Sun-Target sep (deg) : 173.90
Sun-Moon sep (deg)  : 104.24
B (ring opening deg) : 81.79
PA of pole (deg)    : 13.58
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.462
C/A sky separation (km) : 45634.6
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.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
  
```

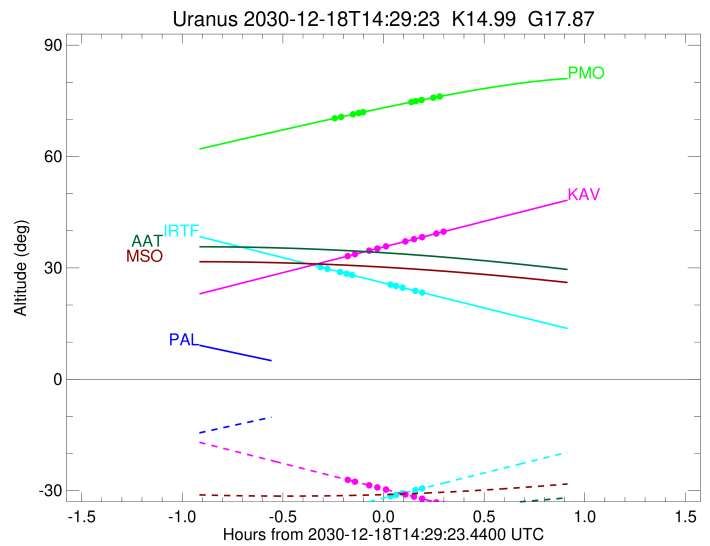
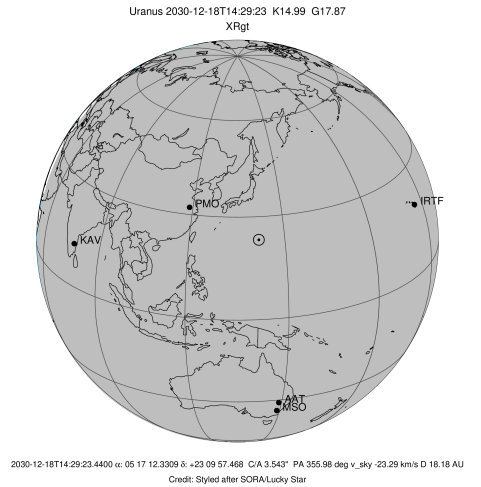


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-18T14:15:11.530		70.37	-65.08	50956.58	-10.25		
lambda	I	2030-12-18T14:16:47.759		70.68	-65.41	50026.71	-9.21		
delta	I	2030-12-18T14:20:18.982		71.38	-66.14	48300.35	-7.09		
gamma	I	2030-12-18T14:22:02.469		71.71	-66.49	47623.49	-5.98		
eta	I	2030-12-18T14:23:23.391		71.98	-66.77	47176.12	-5.07		

No planet occultations

eta	E	2030-12-18T14:37:37.742		74.66	-69.65	47176.12	5.08		
gamma	E	2030-12-18T14:38:59.069		74.91	-69.92	47626.06	5.98		
delta	E	2030-12-18T14:40:42.088		75.22	-70.27	48300.35	7.10		
lambda	E	2030-12-18T14:44:13.208		75.84	-70.96	50026.71	9.22		
epsilon	E	2030-12-18T14:46:23.656		76.22	-71.39	51308.35	10.26		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-18T14:25:33.570  
 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 : 3415590368690214400  
 2Mass ID (if available) : 05171231+2309574  
 ICRS Star Coord at Epoch: 05h 17m 12.33093s +23:09:57.46755s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 14.989  
 G magnitude : 17.867  
 RP magnitude : 17.003  
 BP magnitude : 18.649  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 173.90  
 Sun-Moon sep (deg) : 104.02  
 B (ring opening deg) : 81.79  
 PA of pole (deg) : 13.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.493  
 C/A sky separation (km) : 46050.8  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

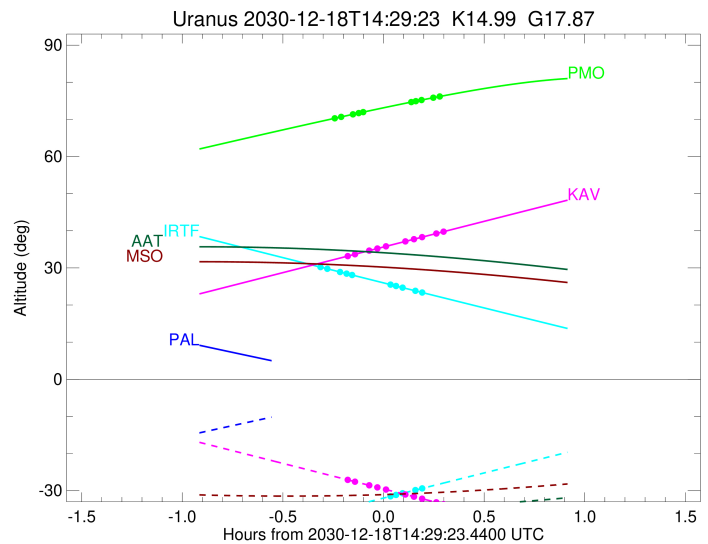
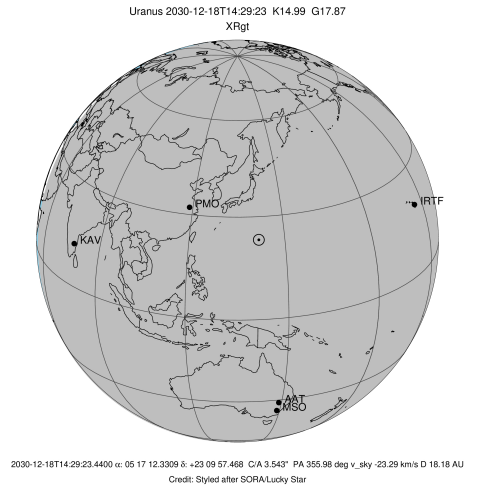


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-18T14:10:56.910		30.14	-36.18	50966.80	-9.78		
lambda	I	2030-12-18T14:12:39.633		29.75	-35.79	50026.71	-8.67		
delta	I	2030-12-18T14:16:28.749		28.89	-34.93	48300.35	-6.36		
gamma	I	2030-12-18T14:18:26.964		28.44	-34.48	47623.70	-5.08		
eta	I	2030-12-18T14:20:05.816		28.07	-34.11	47176.12	-3.97		

No planet occultations

eta	E	2030-12-18T14:31:25.442		25.51	-31.54	47176.12	3.97		
gamma	E	2030-12-18T14:33:04.826		25.13	-31.17	47625.91	5.08		
delta	E	2030-12-18T14:35:02.752		24.69	-30.72	48300.35	6.35		
lambda	E	2030-12-18T14:38:52.253		23.83	-29.86	50026.71	8.65		
epsilon	E	2030-12-18T14:41:09.816		23.31	-29.34	51304.64	9.75		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-18T14:32:49.660  
 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 : 3415590368690214400  
 2Mass ID (if available) : 05171231+2309574  
 ICRS Star Coord at Epoch: 05h 17m 12.33093s +23:09:57.46755s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 14.989  
 G magnitude : 17.867  
 RP magnitude : 17.003  
 BP magnitude : 18.649  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.29  
 Sun-Target sep (deg) : 173.90  
 Sun-Moon sep (deg) : 103.77  
 B (ring opening deg) : 81.79  
 PA of pole (deg) : 13.58  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.532  
 C/A sky separation (km) : 46559.3  
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-18T14:19:04.710		33.26	-27.18	50971.15	-9.24		
lambda	I	2030-12-18T14:20:54.899		33.68	-27.60	50026.71	-8.04		
delta	I	2030-12-18T14:25:10.918		34.67	-28.58	48300.35	-5.40		
gamma	I	2030-12-18T14:27:38.534		35.23	-29.14	47623.91	-3.76		
eta	I	2030-12-18T14:30:15.179		35.83	-29.74	47176.12	-1.95		

No planet occultations

eta	E	2030-12-18T14:35:47.355		37.11	-31.01	47176.12	1.95		
gamma	E	2030-12-18T14:38:24.345		37.71	-31.61	47625.54	3.76		
delta	E	2030-12-18T14:40:51.397		38.28	-32.17	48300.35	5.40		
lambda	E	2030-12-18T14:45:07.071		39.26	-33.15	50026.71	8.06		
epsilon	E	2030-12-18T14:47:31.484		39.81	-33.70	51290.05	9.26		