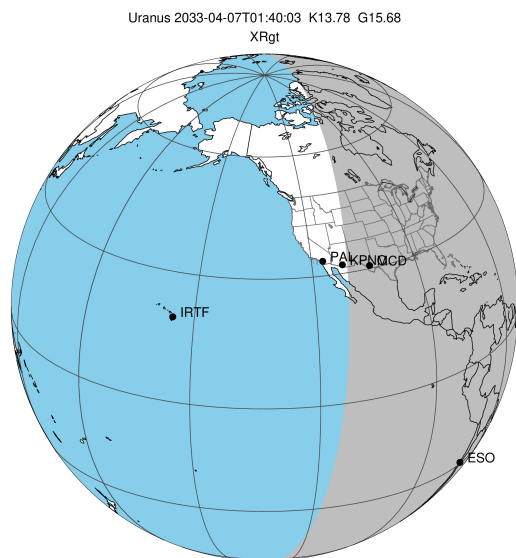


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-07T01:40:03.010  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427672493949141504  
 2Mass ID (if available) : 05492926+2337577

ICRS Star Coord at Epoch: 05h 49m 29.26379s +23:37:57.57209s

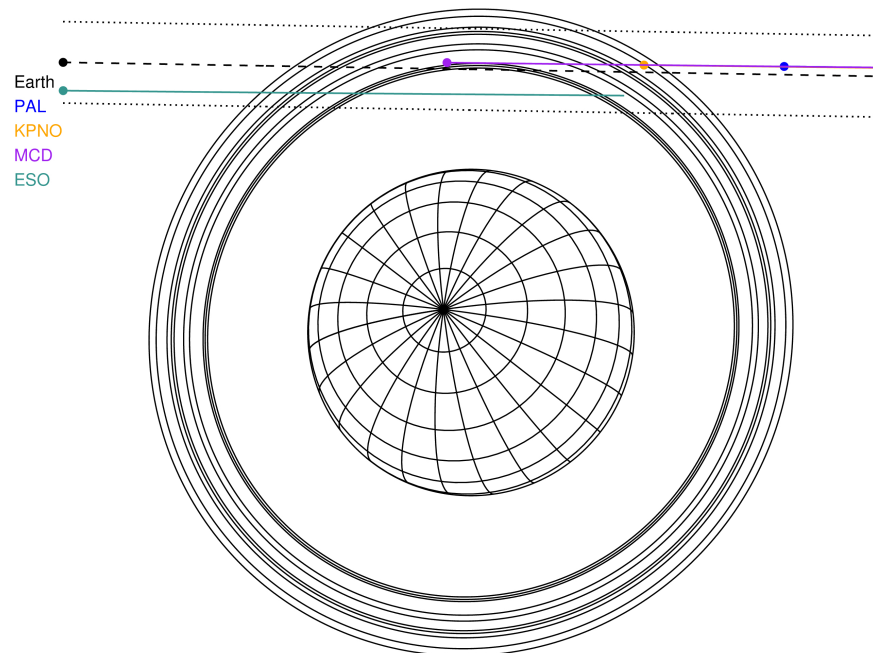
RUWE (>1.4 is poor) : 1.06  
 K magnitude : 13.779  
 G magnitude : 15.679  
 RP magnitude : 15.037  
 BP magnitude : 16.155  
 DUPflag : 0  
 Distance (au) : 19.311  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 16.31  
 Sun-Target sep (deg) : 70.49  
 Sun-Moon sep (deg) : 25.13  
 B (ring opening deg) : 77.30  
 PA of pole (deg) : 50.07

#	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



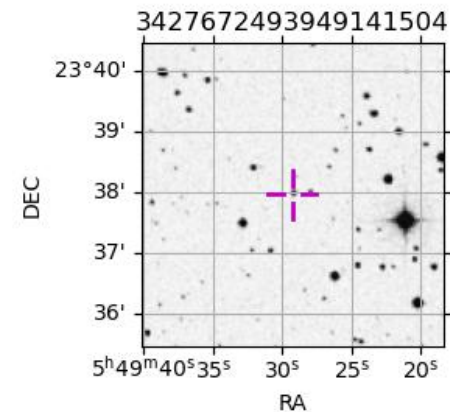
2033-04-07T01:40:03.0100 ex: 05 49 29.2638 s: +23 37 57.572 C/A 2.948° PA 179.02 deg v\_sky +16.31 km/s D 19.31 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2033-04-07T01:40:03 K13.78 G15.68 XRgt



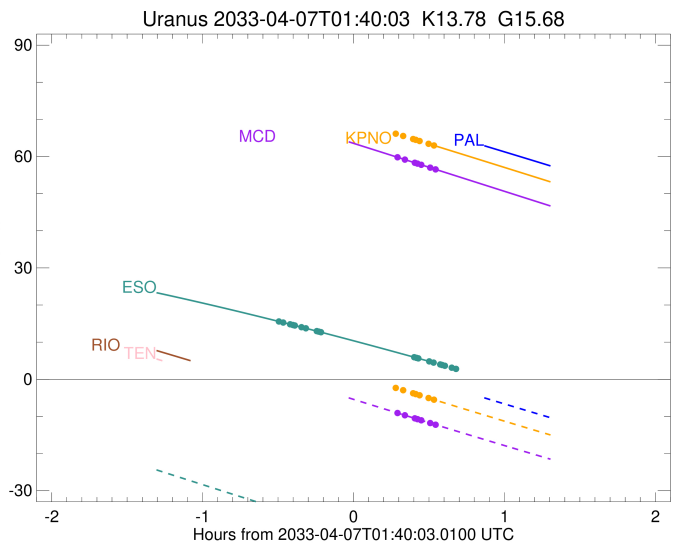
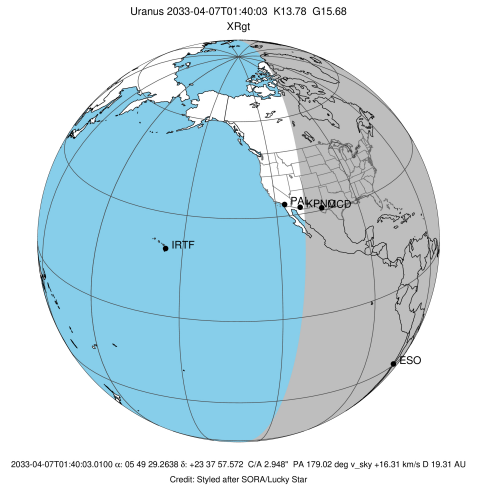
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
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			++	APR 07 02:09 - APR 07 02:11	PnnRne
MCD	McDonald Obs. 2.7m	30.7	256.0			++++++	APR 07 01:57 - APR 07 02:11	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					PnnRnn
ESO	European Southern Obs	-29.3	289.3	+++++++		+++	APR 07 01:10 - APR 07 02:05	PnnRie
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            : 2033-04-07T01:41:57.830
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      : 3427672493949141504
2Mass ID (if available) : 05492926+2337577
ICRS Star Coord at Epoch: 05h 49m 29.26379s +23:37:57.57209s
RUWE (>1.4 is poor) : 1.06
K magnitude         : 13.779
G magnitude         : 15.679
RP magnitude        : 15.037
BP magnitude        : 16.155
DUPflag            : 0
Distance (au)       : 19.311
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 16.31
Sun-Target sep (deg) : 70.49
Sun-Moon sep (deg)  : 25.28
B (ring opening deg) : 77.30
PA of pole (deg)    : 50.07
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.016
C/A sky separation (km) : 42237.6
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.bsp
ural161.bsp
vgr2.ural161.bsp
peph.ural160.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

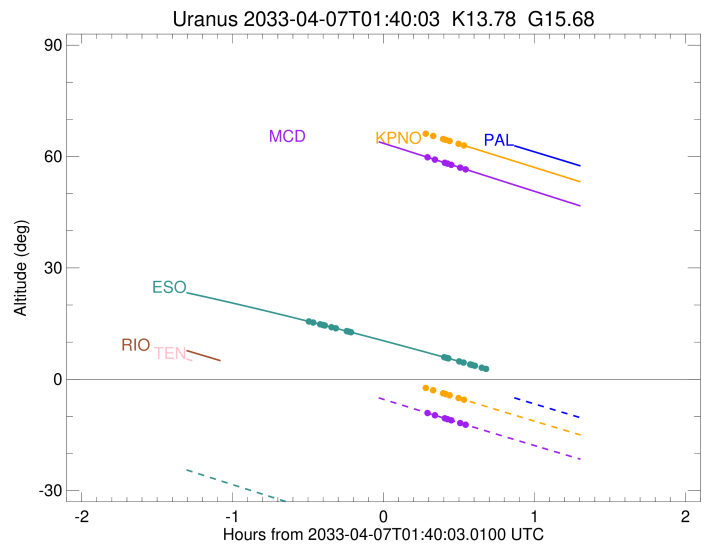
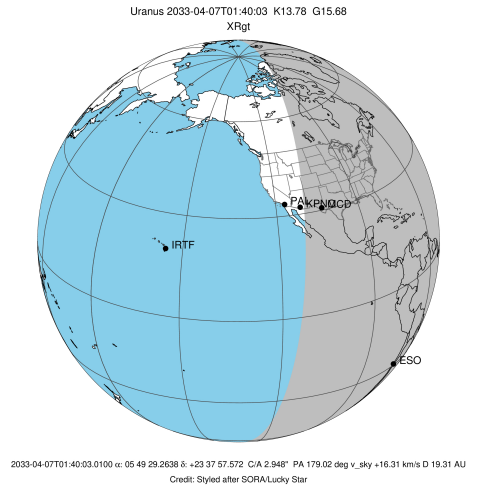


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-04-07T01:14:22.794		74.62	6.62x	50942.30	-8.75		
lambda	I	2033-04-07T01:16:08.706		74.29	6.25x	50026.71	-8.45		
delta	I	2033-04-07T01:19:43.878		73.61	5.49x	48300.35	-7.58		
gamma	I	2033-04-07T01:21:14.970		73.32	5.17x	47627.29	-7.19		
eta	I	2033-04-07T01:22:18.982		73.11	4.94x	47176.12	-6.90		
beta	I	2033-04-07T01:26:20.259		72.33	4.09x	45647.70	-5.75		
alpha	I	2033-04-07T01:29:21.709		71.73	3.45x	44685.38	-4.81		

No planet occultations

alpha	E	2033-04-07T01:56:41.067		66.18	-2.30x	44687.16	4.82		
beta	E	2033-04-07T01:59:41.098		65.56	-2.92x	45641.18	5.76		
eta	E	2033-04-07T02:03:42.878		64.72	-3.77x	47176.12	6.92		
gamma	E	2033-04-07T02:04:46.097		64.50	-3.99x	47622.74	7.21		
delta	E	2033-04-07T02:06:17.577		64.18	-4.30x	48300.35	7.61		
lambda	E	2033-04-07T02:09:52.109		63.44	-5.05	50026.71	8.47		
epsilon	E	2033-04-07T02:11:15.419		63.15	-5.34	50745.84	8.78		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-07T01:42:37.190  
 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 : 3427672493949141504  
 2Mass ID (if available) : 05492926+2337577  
 ICRS Star Coord at Epoch: 05h 49m 29.26379s +23:37:57.57209s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 13.779  
 G magnitude : 15.679  
 RP magnitude : 15.037  
 BP magnitude : 16.155  
 DUPflag : 0  
 Distance (au) : 19.311  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 16.31  
 Sun-Target sep (deg) : 70.49  
 Sun-Moon sep (deg) : 25.17  
 B (ring opening deg) : 77.30  
 PA of pole (deg) : 50.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.014  
 C/A sky separation (km) : 42216.7  
 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

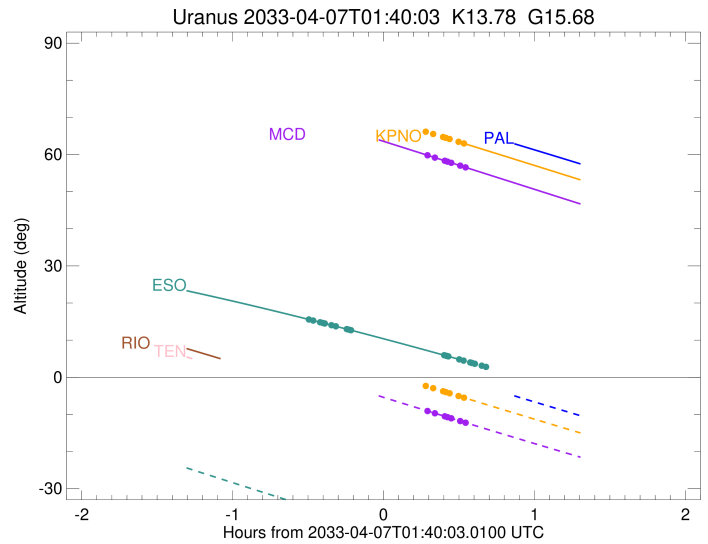
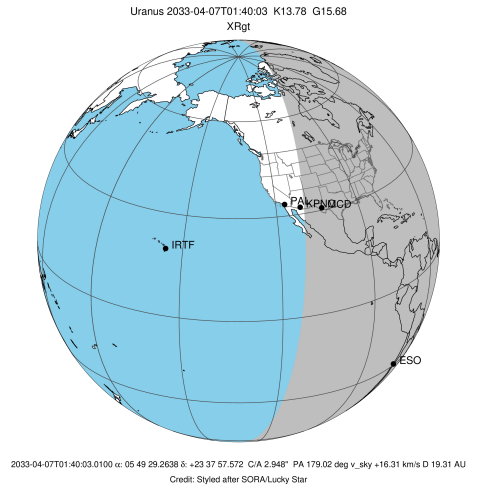


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-04-07T01:15:01.672		68.87	-0.10x	50943.00	-8.76		
lambda	I	2033-04-07T01:16:47.467		68.50	-0.47x	50026.71	-8.46		
delta	I	2033-04-07T01:20:22.175		67.74	-1.24x	48300.35	-7.60		
gamma	I	2033-04-07T01:21:53.035		67.42	-1.56x	47627.30	-7.21		
eta	I	2033-04-07T01:22:56.872		67.20	-1.79x	47176.12	-6.92		
beta	I	2033-04-07T01:26:57.323		66.35	-2.64x	45647.74	-5.77		
alpha	I	2033-04-07T01:29:57.911		65.71	-3.28x	44685.40	-4.84		

No planet occultations

alpha	E	2033-04-07T01:57:23.304		59.84	-9.05	44687.17	4.85		
beta	E	2033-04-07T02:00:22.402		59.20	-9.68	45641.18	5.79		
eta	E	2033-04-07T02:04:23.237		58.33	-10.52	47176.12	6.95		
gamma	E	2033-04-07T02:05:26.245		58.10	-10.73	47622.74	7.23		
delta	E	2033-04-07T02:06:57.438		57.78	-11.05	48300.35	7.63		
lambda	E	2033-04-07T02:10:31.362		57.01	-11.79	50026.71	8.50		
epsilon	E	2033-04-07T02:11:54.452		56.71	-12.08	50745.82	8.80		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-07T01:44:44.420  
 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 : 3427672493949141504  
 2Mass ID (if available) : 05492926+2337577  
 ICRS Star Coord at Epoch: 05h 49m 29.26379s +23:37:57.57209s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 13.779  
 G magnitude : 15.679  
 RP magnitude : 15.037  
 BP magnitude : 16.155  
 DUPflag : 0  
 Distance (au) : 19.311  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 16.31  
 Sun-Target sep (deg) : 70.49  
 Sun-Moon sep (deg) : 24.46  
 B (ring opening deg) : 77.30  
 PA of pole (deg) : 50.07  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.663  
 C/A sky separation (km) : 37295.4  
 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	2033-04-07T01:10:38.185		15.53	-34.96	51003.08	-10.91		
lambda	I	2033-04-07T01:12:08.047		15.27	-35.28	50026.71	-10.73		
delta	I	2033-04-07T01:14:52.829		14.80	-35.86	48300.35	-10.21		
gamma	I	2033-04-07T01:15:59.379		14.61	-36.10	47628.32	-9.98		
eta	I	2033-04-07T01:16:45.040		14.48	-36.26	47176.12	-9.82		
beta	I	2033-04-07T01:19:25.167		14.02	-36.82	45651.67	-9.21		
alpha	I	2033-04-07T01:21:11.786		13.71	-37.20	44688.52	-8.78		
4	I	2033-04-07T01:25:33.923		12.95	-38.12	42544.99	-7.57		
5	I	2033-04-07T01:26:20.207		12.81	-38.29	42188.41	-7.37		
6	I	2033-04-07T01:27:03.187		12.69	-38.44	41879.74	-7.13		

No planet occultations

6	E	2033-04-07T02:04:12.047		5.94	-46.12	41863.85	7.16		
5	E	2033-04-07T02:05:06.567		5.76	-46.31	42260.05	7.41		
4	E	2033-04-07T02:05:41.873		5.65	-46.42	42525.93	7.61		
alpha	E	2033-04-07T02:10:04.809	4.83x	-47.31	44691.55	8.83			
beta	E	2033-04-07T02:11:49.684	4.50x	-47.66	45641.20	9.27			
eta	E	2033-04-07T02:14:29.834	3.99x	-48.19	47176.12	9.89			
gamma	E	2033-04-07T02:15:14.560	3.85x	-48.34	47622.04	10.05			
delta	E	2033-04-07T02:16:21.267	3.64x	-48.56	48300.35	10.28			
lambda	E	2033-04-07T02:19:04.821	3.12x	-49.10	50026.71	10.82			
epsilon	E	2033-04-07T02:20:11.746	2.91x	-49.32	50757.47	10.99			