

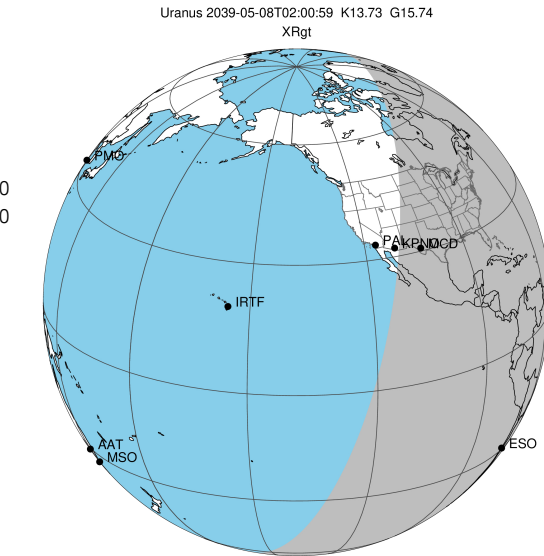
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-05-08T02:00:59.530  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 674534238859691904  
 2Mass ID (if available) : 07465594+2141532

ICRS Star Coord at Epoch: 07h 46m 55.93973s +21:41:53.45353s

RUWE (>1.4 is poor) : 0.91  
 K magnitude : 13.728  
 G magnitude : 15.743  
 RP magnitude : 15.090  
 BP magnitude : 16.229  
 DUPflag : 0  
 Distance (au) : 18.984  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.72  
 Sun-Target sep (deg) : 67.88  
 Sun-Moon sep (deg) : 106.54  
 B (ring opening deg) : 52.14  
 PA of pole (deg) : 86.97

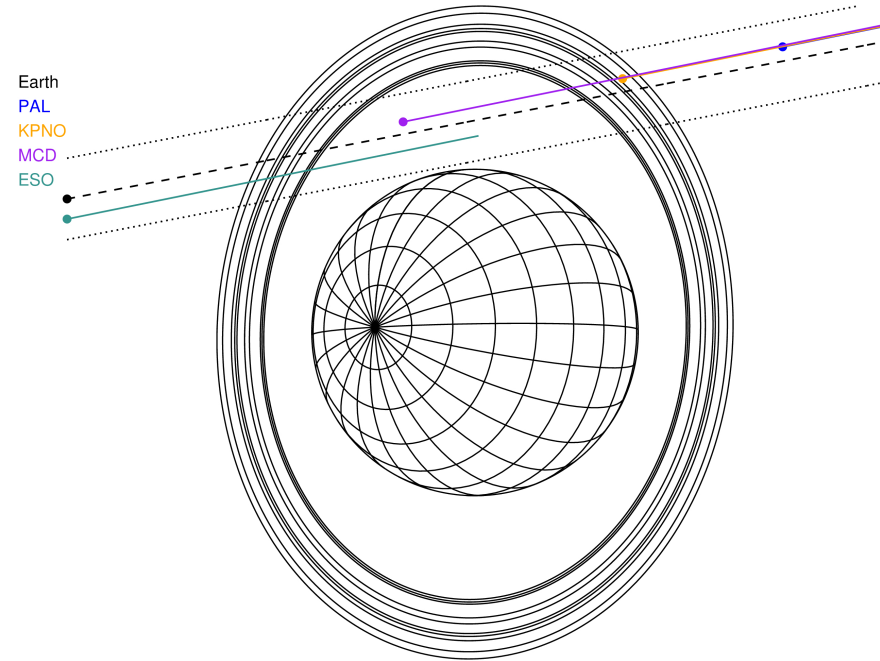
# a(km) ring

- 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



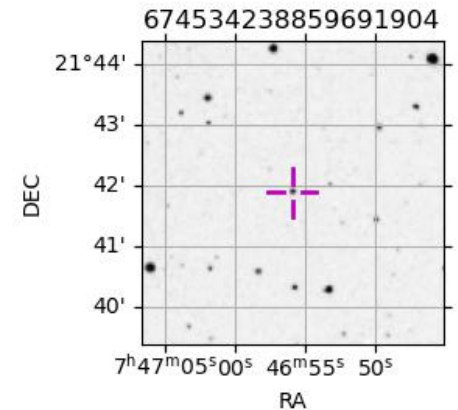
2039-05-08T02:00:59.5300 ex: 07 46 55.93973 s +21 41 53.454 C/A 2.379" PA 190.89 deg v\_sky +17.72 km/s D 18.98 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2039-05-08T02:00:59 K13.73 G15.74 XRgt



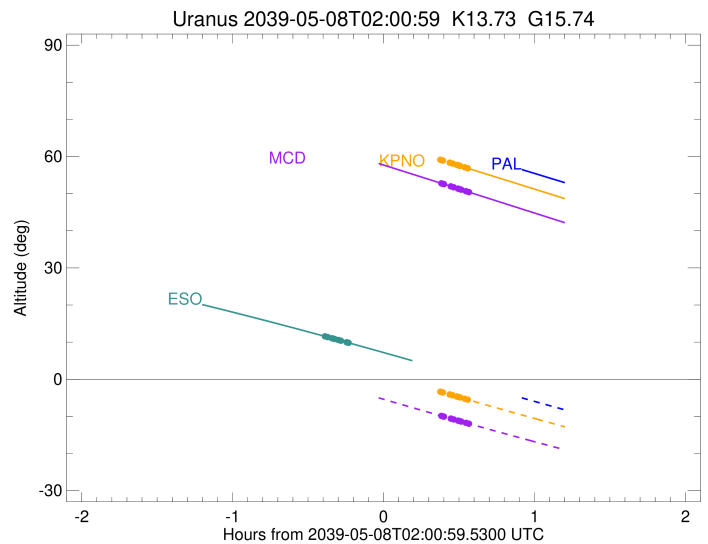
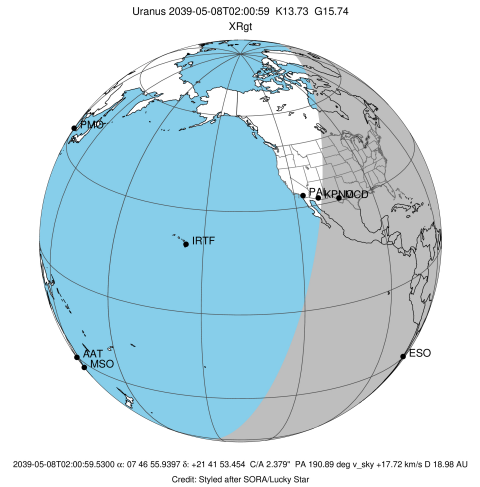
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	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			++	MAY 08 02:33 - MAY 08 02:34	PnnRne
MCD	McDonald Obs. 2.7m	30.7	256.0			+++++	MAY 08 02:24 - MAY 08 02:35	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	+++++			MAY 08 01:37 - MAY 08 01:47	PnnRin
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            : 2039-05-08T02:02:48.810
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      : 674534238859691904
2Mass ID (if available) : 07465594+2141532
ICRS Star Coord at Epoch: 07h 46m 55.93973s +21:41:53.45353s
RUWE (>1.4 is poor) : 0.91
K magnitude          : 13.728
G magnitude          : 15.743
RP magnitude         : 15.090
BP magnitude         : 16.229
DUPflag             : 0
Distance (au)       : 18.984
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 17.72
Sun-Target sep (deg) : 67.88
Sun-Moon sep (deg)  : 107.52
B (ring opening deg) : 52.14
PA of pole (deg)    : 86.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.500
C/A sky separation (km) : 34426.3
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

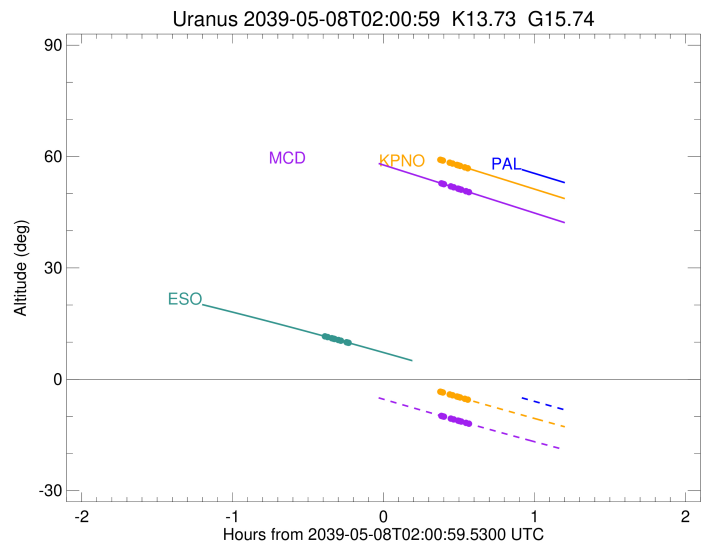
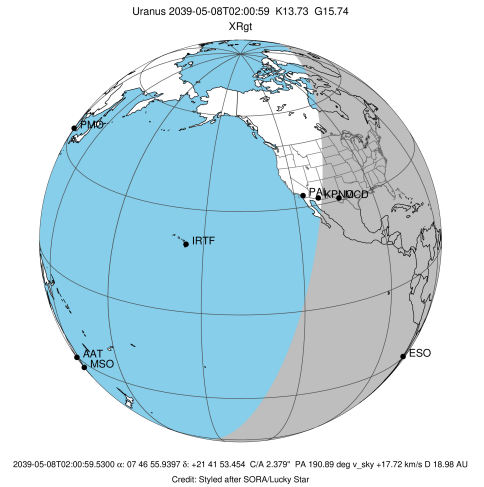


Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-05-08T01:37:18.541	68.56	5.91x	51046.20	-16.00		
lambda	I	2039-05-08T01:38:23.303	68.35	5.69x	50026.71	-15.60		
delta	I	2039-05-08T01:40:15.915	67.98	5.31x	48300.35	-15.05		
gamma	I	2039-05-08T01:41:00.685	67.83	5.16x	47631.54	-14.82		
eta	I	2039-05-08T01:41:31.584	67.73	5.05x	47176.12	-14.66		
beta	I	2039-05-08T01:43:16.140	67.38	4.70x	45672.57	-14.06		
alpha	I	2039-05-08T01:44:23.781	67.16	4.47x	44745.11	-13.65		
4	I	2039-05-08T01:47:12.567	66.60	3.90x	42541.46	-12.46		
5	I	2039-05-08T01:47:33.567	66.53	3.83x	42293.53	-12.31		
6	I	2039-05-08T01:48:04.252	66.42	3.73x	41879.24	-12.05		

No planet occultations

6	E	2039-05-08T02:23:35.142	59.13	-3.36x	41847.35	12.08		
5	E	2039-05-08T02:24:04.156	59.03	-3.45x	42204.86	12.34		
4	E	2039-05-08T02:24:30.031	58.94	-3.54x	42528.96	12.50		
alpha	E	2039-05-08T02:27:19.415	58.34	-4.09x	44744.71	13.69		
beta	E	2039-05-08T02:28:26.565	58.11	-4.31x	45679.31	14.11		
eta	E	2039-05-08T02:30:10.520	57.75	-4.65x	47176.12	14.71		
gamma	E	2039-05-08T02:30:41.025	57.64	-4.75x	47627.23	14.87		
delta	E	2039-05-08T02:31:25.928	57.48	-4.89x	48300.35	15.11		
lambda	E	2039-05-08T02:33:18.126	57.09	-5.26	50026.71	15.66		
epsilon	E	2039-05-08T02:34:54.048	56.75	-5.57	51549.23	16.06		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-05-08T02:03:24.140  
 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 : 674534238859691904  
 2Mass ID (if available) : 07465594+2141532  
 ICRS Star Coord at Epoch: 07h 46m 55.93973s +21:41:53.45353s  
 RUWE (>1.4 is poor) : 0.91  
 K magnitude : 13.728  
 G magnitude : 15.743  
 RP magnitude : 15.090  
 BP magnitude : 16.229  
 DUPflag : 0  
 Distance (au) : 18.984  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.72  
 Sun-Target sep (deg) : 67.88  
 Sun-Moon sep (deg) : 107.50  
 B (ring opening deg) : 52.14  
 PA of pole (deg) : 86.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.510  
 C/A sky separation (km) : 34558.7  
 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

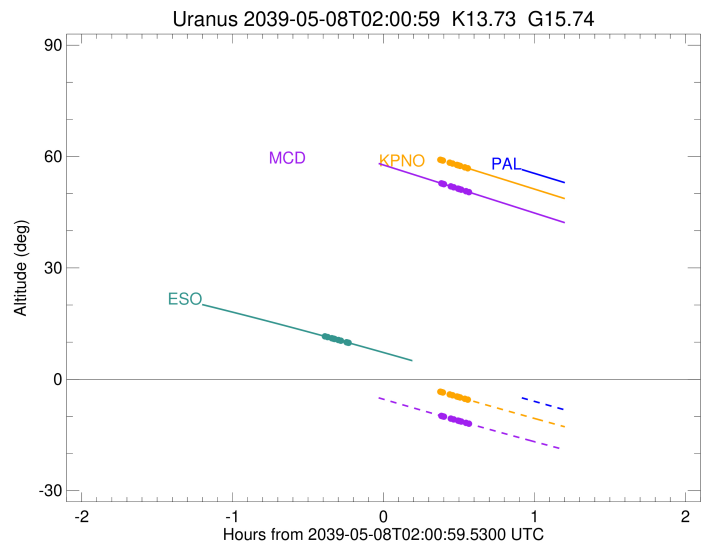
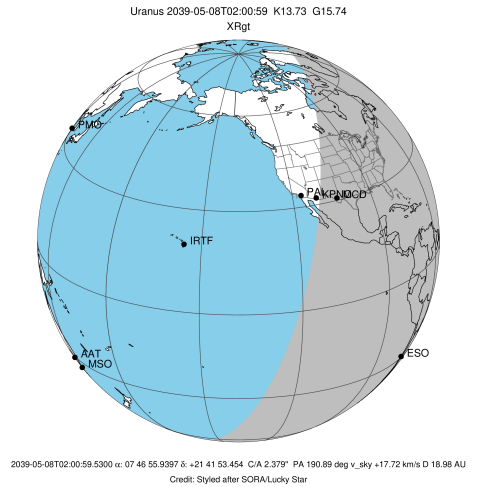


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-05-08T01:38:02.820		62.60	-0.80x	51047.38	-15.96		
lambda	I	2039-05-08T01:39:07.815		62.37	-1.02x	50026.71	-15.56		
delta	I	2039-05-08T01:41:00.747		61.97	-1.40x	48300.35	-15.01		
gamma	I	2039-05-08T01:41:45.662		61.82	-1.55x	47631.54	-14.77		
eta	I	2039-05-08T01:42:16.669		61.71	-1.65x	47176.12	-14.60		
beta	I	2039-05-08T01:44:01.631		61.34	-2.00x	45672.64	-14.00		
alpha	I	2039-05-08T01:45:09.578		61.10	-2.23x	44745.20	-13.58		
4	I	2039-05-08T01:47:59.357		60.49	-2.80x	42541.29	-12.38		
5	I	2039-05-08T01:48:20.509		60.42	-2.87x	42293.24	-12.22		
6	I	2039-05-08T01:48:51.429		60.31	-2.97x	41879.20	-11.96		

No planet occultations

6	E	2039-05-08T02:24:00.358		52.77	-9.87	41847.61	11.99		
5	E	2039-05-08T02:24:29.611		52.67	-9.97	42205.32	12.25		
4	E	2039-05-08T02:24:55.613		52.58	-10.05	42528.86	12.42		
alpha	E	2039-05-08T02:27:45.915		51.96	-10.60	44744.83	13.63		
beta	E	2039-05-08T02:28:53.335		51.72	-10.81	45679.35	14.05		
eta	E	2039-05-08T02:30:37.639		51.35	-11.14	47176.12	14.66		
gamma	E	2039-05-08T02:31:08.234		51.24	-11.24	47627.26	14.83		
delta	E	2039-05-08T02:31:53.257		51.07	-11.38	48300.35	15.07		
lambda	E	2039-05-08T02:33:45.707		50.67	-11.74	50026.71	15.63		
epsilon	E	2039-05-08T02:35:21.779		50.33	-12.04	51548.94	16.04		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-05-08T02:06:11.400  
 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 : 674534238859691904  
 2Mass ID (if available) : 07465594+2141532  
 ICRS Star Coord at Epoch: 07h 46m 55.93973s +21:41:53.45353s  
 RUWE (>1.4 is poor) : 0.91  
 K magnitude : 13.728  
 G magnitude : 15.743  
 RP magnitude : 15.090  
 BP magnitude : 16.229  
 DUPflag : 0  
 Distance (au) : 18.984  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.72  
 Sun-Target sep (deg) : 67.88  
 Sun-Moon sep (deg) : 106.92  
 B (ring opening deg) : 52.14  
 PA of pole (deg) : 86.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.185  
 C/A sky separation (km) : 30077.7  
 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	2039-05-08T01:37:52.253		11.53	-46.81	51002.62	-17.72		
lambda	I	2039-05-08T01:38:47.941		11.36	-47.01	50026.71	-17.43		
delta	I	2039-05-08T01:40:28.055		11.05	-47.38	48300.35	-17.05		
gamma	I	2039-05-08T01:41:07.463		10.93	-47.52	47631.42	-16.89		
eta	I	2039-05-08T01:41:34.502		10.85	-47.62	47176.12	-16.78		
beta	I	2039-05-08T01:43:05.194		10.57	-47.94	45670.16	-16.38		
alpha	I	2039-05-08T01:44:02.979		10.39	-48.15	44741.77	-16.11		
4	I	2039-05-08T01:46:22.711		9.96	-48.66	42547.42	-15.34		
5	I	2039-05-08T01:46:39.659		9.90	-48.72	42301.82	-15.25		
6	I	2039-05-08T01:47:04.164		9.83	-48.81	41879.74	-15.08		

No planet occultations

6	E	2039-05-08T02:30:30.630	1.48x	-58.12	41840.30	15.16		
5	E	2039-05-08T02:30:53.078	1.41x	-58.20	42193.12	15.33		
4	E	2039-05-08T02:31:14.953	1.34x	-58.28	42532.12	15.42		
alpha	E	2039-05-08T02:33:34.977	0.88x	-58.77	44741.37	16.20		
beta	E	2039-05-08T02:34:32.244	0.69x	-58.97	45677.96	16.48		
eta	E	2039-05-08T02:36:02.099	0.39x	-59.28	47176.12	16.89		
gamma	E	2039-05-08T02:36:28.683	0.30x	-59.38	47626.57	17.00		
delta	E	2039-05-08T02:37:08.124	0.17x	-59.51	48300.35	17.16		
lambda	E	2039-05-08T02:38:47.571	-0.16x	-59.86	50026.71	17.55		
epsilon	E	2039-05-08T02:40:13.881	-0.44x	-60.16	51554.50	17.84		