

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-10-26T21:57:53.580  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3418380555542204160  
 2Mass ID (if available) : 05062287+2253257

ICRS Star Coord at Epoch: 05h 06m 22.88194s +22:53:25.49092s

RUWE (>1.4 is poor) : 0.96  
 K magnitude : 10.965  
 G magnitude : 12.860  
 RP magnitude : 12.218  
 BP magnitude : 13.333  
 DUPflag : 0  
 Distance (au) : 18.509  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.97  
 Sun-Target sep (deg) : 135.69  
 Sun-Moon sep (deg) : 4.87  
 B (ring opening deg) : 82.26  
 PA of pole (deg) : -5.13

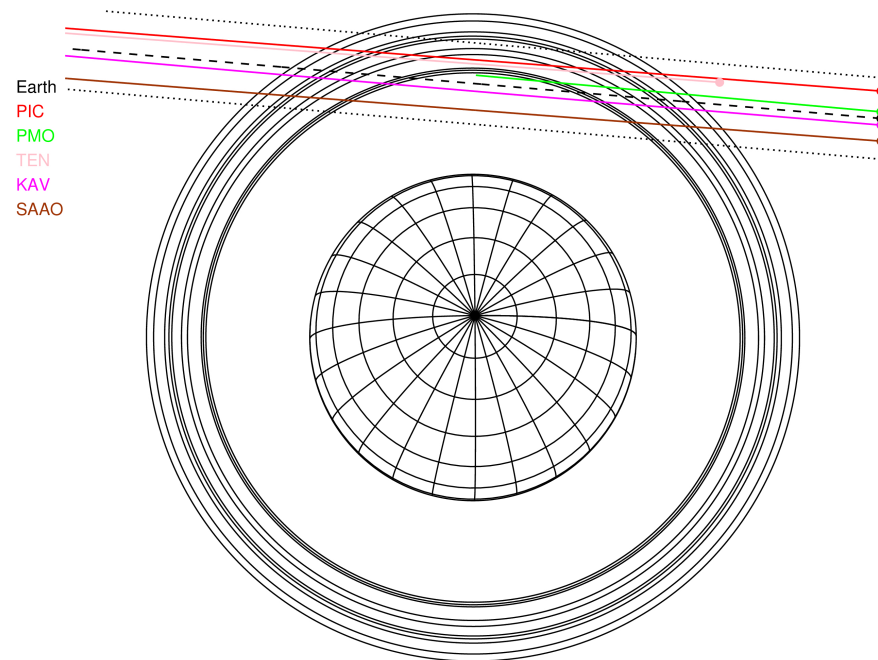
# a(km) ring

- 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



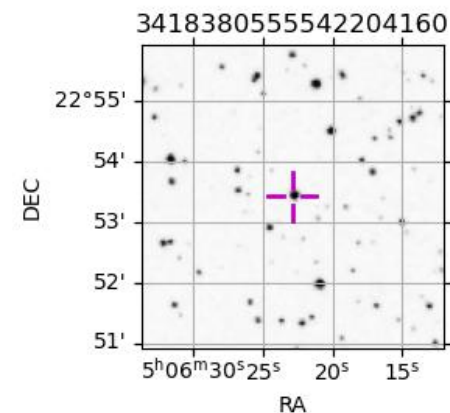
Uranus 2029-10-26T21:57:53 K10.96 G12.86 XRgt  
 2029-10-26T21:57:53.5800 cc: 05 06 22.8819 s: +22 53 25.491 C/A 2.959° PA 175.09 deg v\_sky -14.97 km/s D 18.51 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2029-10-26T21:57:53 K10.96 G12.86 XRgt

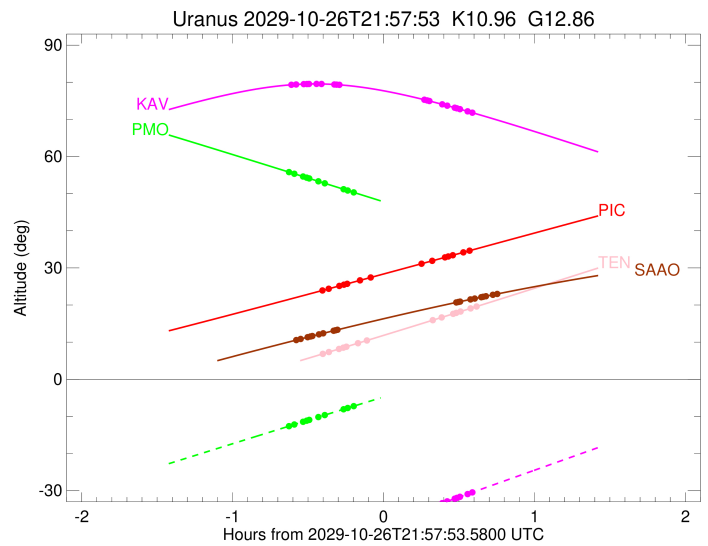
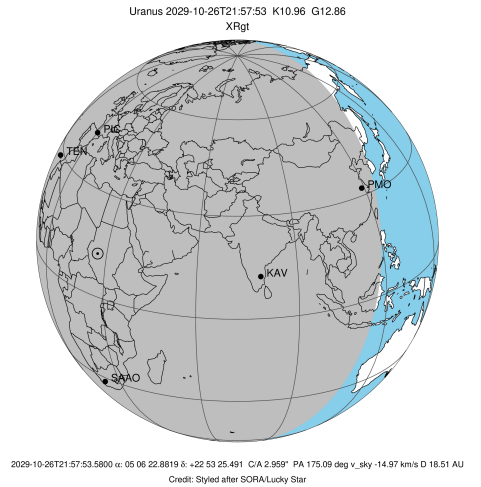


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+++++++		+++++++	OCT 26 21:33 - OCT 26 22:31	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++++			OCT 26 21:20 - OCT 26 21:46	PnnRin
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	+++++++		+++++++	OCT 26 21:33 - OCT 26 22:34	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++++		+++++++	OCT 26 21:21 - OCT 26 22:32	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	+++++++		+++++++	OCT 26 21:23 - OCT 26 22:42	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-10-26T22:02:54.530  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3418380555542204160  
 2Mass ID (if available) : 05062287+2253257  
 ICRS Star Coord at Epoch: 05h 06m 22.88194s +22:53:25.49092s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 10.965  
 G magnitude : 12.860  
 RP magnitude : 12.218  
 BP magnitude : 13.333  
 DUPflag : 0  
 Distance (au) : 18.509  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.97  
 Sun-Target sep (deg) : 135.69  
 Sun-Moon sep (deg) : 5.50  
 B (ring opening deg) : 82.26  
 PA of pole (deg) : -5.13  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.231  
 C/A sky separation (km) : 43374.4  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



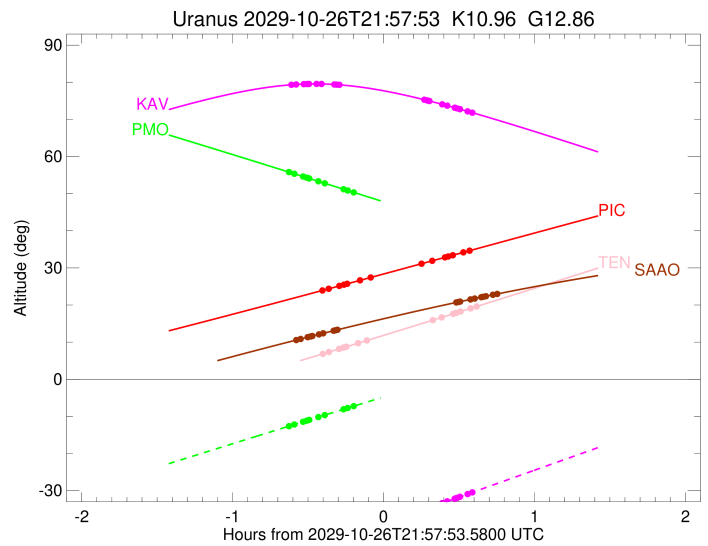
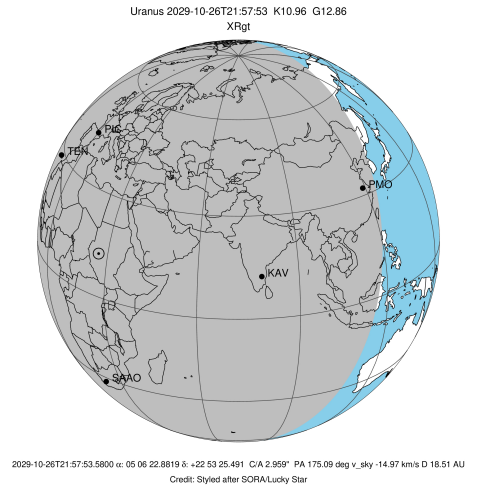
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-26T21:33:42.115		23.94	-49.00	51134.80	-7.66		
lambda	I	2029-10-26T21:36:09.553		24.39	-49.36	50026.71	-7.27		
delta	I	2029-10-26T21:40:22.922		25.15	-49.97	48300.35	-6.34		
gamma	I	2029-10-26T21:42:12.800		25.49	-50.23	47626.80	-5.91		
eta	I	2029-10-26T21:43:31.120		25.72	-50.41	47176.12	-5.59		
beta	I	2029-10-26T21:48:41.173		26.67	-51.13	45647.32	-4.25		
alpha	I	2029-10-26T21:52:46.155		27.41	-51.68	44746.89	-3.08		

No planet occultations

alpha	E	2029-10-26T22:13:00.896		31.12	-54.24	44737.07	3.09		
beta	E	2029-10-26T22:17:10.902		31.89	-54.72	45657.41	4.26		
eta	E	2029-10-26T22:22:17.457		32.83	-55.29	47176.12	5.62		
gamma	E	2029-10-26T22:23:36.036		33.07	-55.43	47630.45	5.94		
delta	E	2029-10-26T22:25:24.763		33.41	-55.63	48300.35	6.38		
lambda	E	2029-10-26T22:29:36.721		34.18	-56.06	50026.71	7.31		
epsilon	E	2029-10-26T22:31:18.253		34.49	-56.23	50786.89	7.71		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-10-26T21:53:11.660  
 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 : 3418380555542204160  
 2Mass ID (if available) : 05062287+2253257  
 ICRS Star Coord at Epoch: 05h 06m 22.88194s +22:53:25.49092s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 10.965  
 G magnitude : 12.860  
 RP magnitude : 12.218  
 BP magnitude : 13.333  
 DUPflag : 0  
 Distance (au) : 18.509  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.97  
 Sun-Target sep (deg) : 135.69  
 Sun-Moon sep (deg) : 4.34  
 B (ring opening deg) : 82.26  
 PA of pole (deg) : -5.13  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.050  
 C/A sky separation (km) : 40945.4  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

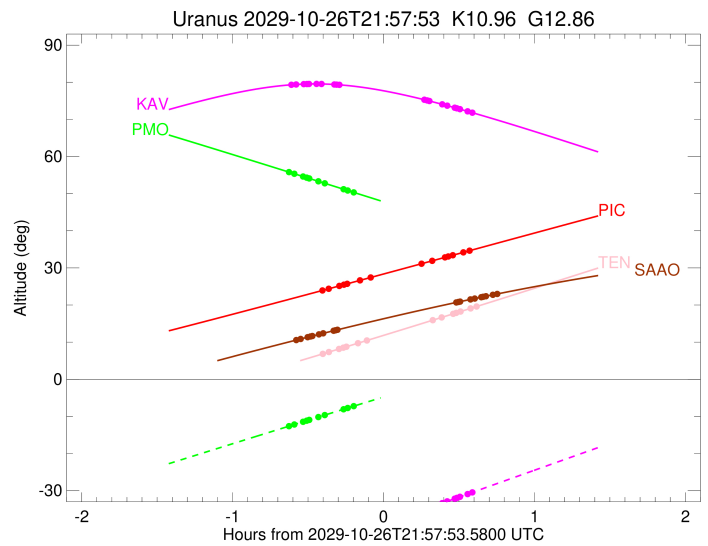
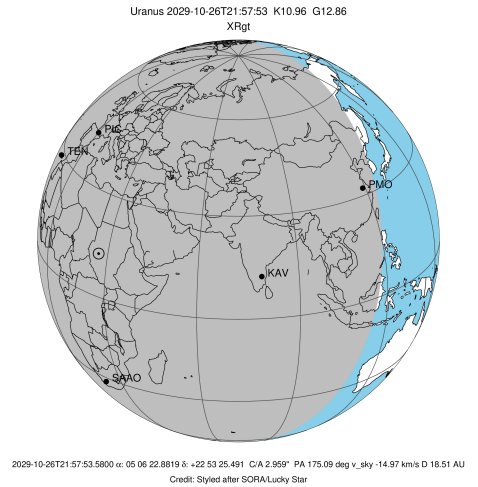


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-26T21:20:18.610		55.81	-12.64	51176.09	-8.92		
lambda	I	2029-10-26T21:22:28.977		55.35	-12.18	50026.71	-8.61		
delta	I	2029-10-26T21:25:57.830		54.61	-11.45	48300.35	-7.91		
gamma	I	2029-10-26T21:27:24.824		54.30	-11.14	47626.12	-7.59		
eta	I	2029-10-26T21:28:24.995		54.09	-10.93	47176.12	-7.36		
beta	I	2029-10-26T21:32:05.972		53.31	-10.16	45645.11	-6.48		
alpha	I	2029-10-26T21:34:31.039		52.79	-9.65	44750.01	-5.85		
4	I	2029-10-26T21:42:16.434		51.14	-8.03	42537.39	-3.61		
5	I	2029-10-26T21:44:11.758		50.74	-7.63	42164.32	-3.00		
6	I	2029-10-26T21:46:27.875		50.25	-7.16	41797.50	-2.26		

No planet occultations

6	E	2029-10-26T21:59:58.235		47.38	-4.35x	41803.62	2.26		
5	E	2029-10-26T22:02:19.356		46.88	-3.86x	42184.33	3.00		
4	E	2029-10-26T22:04:12.345		46.48	-3.47x	42554.94	3.60		
alpha	E	2029-10-26T22:11:50.836		44.85	-1.90x	44731.97	5.83		
beta	E	2029-10-26T22:14:21.836		44.31	-1.38x	45660.14	6.47		
eta	E	2029-10-26T22:18:01.171		43.54	-0.63x	47176.12	7.34		
gamma	E	2029-10-26T22:19:02.147		43.32	-0.42x	47630.76	7.57		
delta	E	2029-10-26T22:20:28.817		43.01	-0.12x	48300.35	7.88		
lambda	E	2029-10-26T22:23:58.431		42.27	0.59x	50026.71	8.58		
epsilon	E	2029-10-26T22:25:24.265		41.97	0.89x	50774.57	8.88		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-10-26T22:04:23.260  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 3418380555542204160  
 2Mass ID (if available) : 05062287+2253257  
 ICRS Star Coord at Epoch: 05h 06m 22.88194s +22:53:25.49092s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 10.965  
 G magnitude : 12.860  
 RP magnitude : 12.218  
 BP magnitude : 13.333  
 DUPflag : 0  
 Distance (au) : 18.509  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.97  
 Sun-Target sep (deg) : 135.69  
 Sun-Moon sep (deg) : 5.65  
 B (ring opening deg) : 82.26  
 PA of pole (deg) : -5.13  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.185  
 C/A sky separation (km) : 42748.5  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

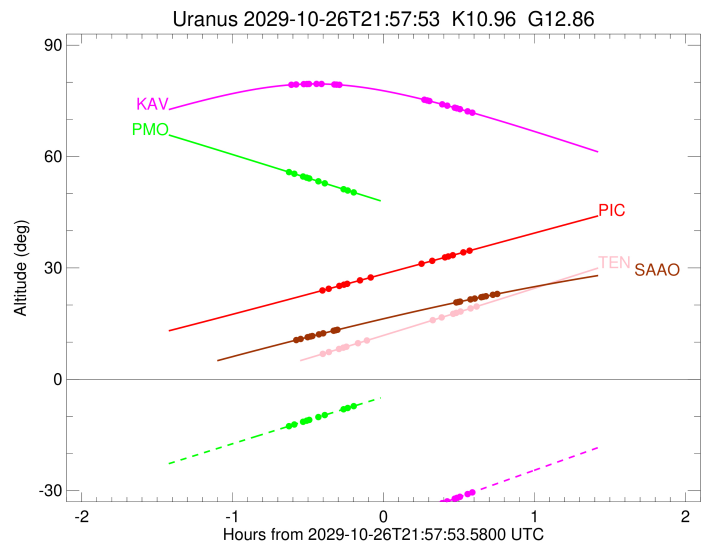
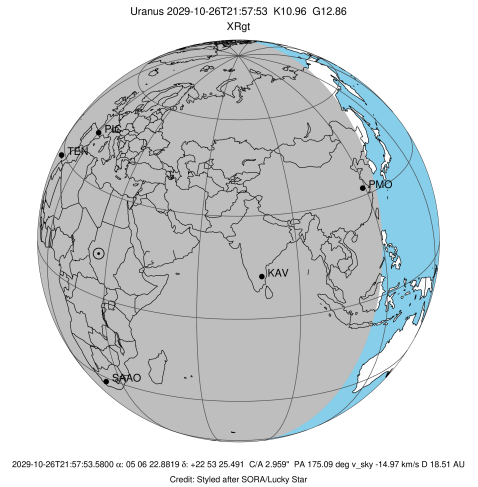


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-26T21:33:49.512		6.85	-41.94	51143.75	-7.90		
lambda	I	2029-10-26T21:36:13.166		7.34	-42.46	50026.71	-7.54		
delta	I	2029-10-26T21:40:15.288		8.17	-43.34	48300.35	-6.70		
gamma	I	2029-10-26T21:41:58.806		8.53	-43.72	47626.64	-6.31		
eta	I	2029-10-26T21:43:11.810		8.78	-43.98	47176.12	-6.03		
beta	I	2029-10-26T21:47:52.207		9.74	-45.00	45646.70	-4.87		
alpha	I	2029-10-26T21:51:16.056		10.44	-45.73	44747.92	-3.94		

No planet occultations

alpha	E	2029-10-26T22:17:27.836		15.91	-51.36	44735.28	3.95		
beta	E	2029-10-26T22:20:56.586		16.64	-52.10	45658.35	4.89		
eta	E	2029-10-26T22:25:33.177		17.62	-53.07	47176.12	6.06		
gamma	E	2029-10-26T22:26:46.356		17.88	-53.33	47630.56	6.35		
delta	E	2029-10-26T22:28:28.589		18.24	-53.69	48300.35	6.75		
lambda	E	2029-10-26T22:32:28.955		19.08	-54.53	50026.71	7.60		
epsilon	E	2029-10-26T22:34:06.254		19.43	-54.86	50782.32	7.97		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2029-10-26T21:57:14.630  
 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 : 3418380555542204160  
 2Mass ID (if available) : 05062287+2253257  
 ICRS Star Coord at Epoch: 05h 06m 22.88194s +22:53:25.49092s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 10.965  
 G magnitude : 12.860  
 RP magnitude : 12.218  
 BP magnitude : 13.333  
 DUPflag : 0  
 Distance (au) : 18.509  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.97  
 Sun-Target sep (deg) : 135.69  
 Sun-Moon sep (deg) : 4.87  
 B (ring opening deg) : 82.26  
 PA of pole (deg) : -5.13  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.864  
 C/A sky separation (km) : 38448.1  
 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



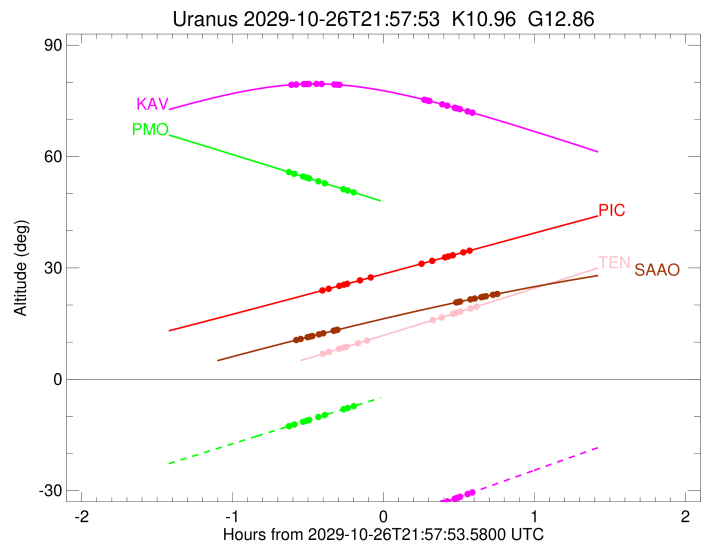
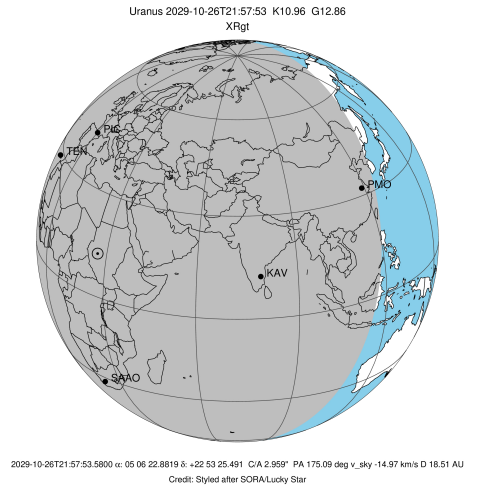
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-10-26T21:21:12.528		79.32	-47.93	51205.55	-9.97		
lambda	I	2029-10-26T21:23:11.612		79.41	-47.45	50026.71	-9.73		
delta	I	2029-10-26T21:26:14.067		79.51	-46.71	48300.35	-9.18		
gamma	I	2029-10-26T21:27:28.528		79.54	-46.41	47625.63	-8.94		
eta	I	2029-10-26T21:28:19.297		79.55	-46.21	47176.12	-8.77		
beta	I	2029-10-26T21:31:20.689		79.56	-45.47	45643.89	-8.12		
alpha	I	2029-10-26T21:33:13.628		79.55	-45.01	44751.30	-7.67		
4	I	2029-10-26T21:38:29.964		79.40	-43.73	42532.64	-6.31		
5	I	2029-10-26T21:39:31.873		79.36	-43.48	42158.31	-6.02		
6	I	2029-10-26T21:40:32.068		79.31	-43.24	41795.15	-5.72		

No planet occultations

6	E	2029-10-26T22:14:00.386		75.32	-35.12	41810.67	5.72		
5	E	2029-10-26T22:15:05.361		75.14	-34.86	42198.33	6.02		
4	E	2029-10-26T22:16:04.806		74.97	-34.62	42563.19	6.31		
alpha	E	2029-10-26T22:21:13.335		74.07	-33.37	44727.68	7.68		
beta	E	2029-10-26T22:23:11.761		73.71	-32.90	45662.60	8.12		
eta	E	2029-10-26T22:26:10.834		73.16	-32.17	47176.12	8.77		
gamma	E	2029-10-26T22:27:02.189		73.00	-31.97	47631.03	8.94		
delta	E	2029-10-26T22:28:16.021		72.76	-31.67	48300.35	9.18		
lambda	E	2029-10-26T22:31:18.406		72.18	-30.93	50026.71	9.74		
epsilon	E	2029-10-26T22:32:33.168		71.94	-30.63	50762.53	9.97		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2029-10-26T22:03:14.140
Event type            : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code         : SAAO
Location              : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)        : -32.37953
E. Longitude (deg)    : 20.81070
Altitude (km)         : 1.768
Gaia source ID        : 3418380555542204160
2Mass ID (if available) : 05062287+2253257
ICRS Star Coord at Epoch: 05h 06m 22.88194s +22:53:25.49092s
RUWE (>1.4 is poor)  : 0.96
K magnitude           : 10.965
G magnitude           : 12.860
RP magnitude          : 12.218
BP magnitude          : 13.333
DUPflag              : 0
Distance (au)         : 18.509
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -14.97
Sun-Target sep (deg)  : 135.69
Sun-Moon sep (deg)    : 5.61
B (ring opening deg)  : 82.26
PA of pole (deg)      : -5.13
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.646
C/A sky separation (km) : 35516.4
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.bsp
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	2029-10-26T21:23:06.527		10.54	-42.97	51236.62	-10.74		
lambda	I	2029-10-26T21:24:59.632		10.86	-43.10	50026.71	-10.57		
delta	I	2029-10-26T21:27:46.175		11.34	-43.28	48300.35	-10.16		
gamma	I	2029-10-26T21:28:53.241		11.53	-43.35	47625.15	-9.98		
eta	I	2029-10-26T21:29:38.526		11.66	-43.40	47176.12	-9.85		
beta	I	2029-10-26T21:32:17.876		12.11	-43.56	45642.90	-9.39		
alpha	I	2029-10-26T21:33:54.319		12.38	-43.66	44752.07	-9.07		
4	I	2029-10-26T21:38:11.671		13.09	-43.89	42529.73	-8.16		
5	I	2029-10-26T21:38:58.863		13.22	-43.93	42155.74	-7.98		
6	I	2029-10-26T21:39:43.412		13.35	-43.97	41794.75	-7.80		

No planet occultations

6	E	2029-10-26T22:26:45.407		20.69	-44.99	41816.57	7.84		
5	E	2029-10-26T22:27:34.556		20.81	-44.98	42210.21	8.02		
4	E	2029-10-26T22:28:19.022		20.91	-44.98	42570.14	8.21		
alpha	E	2029-10-26T22:32:26.998		21.50	-44.93	44723.41	9.13		
beta	E	2029-10-26T22:34:08.432		21.74	-44.90	45665.01	9.45		
eta	E	2029-10-26T22:36:44.388		22.11	-44.85	47176.12	9.92		
gamma	E	2029-10-26T22:37:29.954		22.21	-44.83	47631.26	10.05		
delta	E	2029-10-26T22:38:35.915		22.37	-44.81	48300.35	10.23		
lambda	E	2029-10-26T22:41:21.157		22.75	-44.74	50026.71	10.65		
epsilon	E	2029-10-26T22:42:28.790		22.90	-44.71	50752.75	10.83		