

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-10T17:40:59.680
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 57051047025880960
 2Mass ID (if available) : 03442283+1934484

ICRS Star Coord at Epoch: 03h 44m 22.83091s +19:34:48.22807s

RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.657
 G magnitude : 18.495
 RP magnitude : 17.355
 BP magnitude : 19.775
 DUPflag : 0
 Distance (au) : 18.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.60
 Sun-Target sep (deg) : 159.73
 Sun-Moon sep (deg) : 96.98
 B (ring opening deg) : 69.30
 PA of pole (deg) : -81.07

a(km) ring

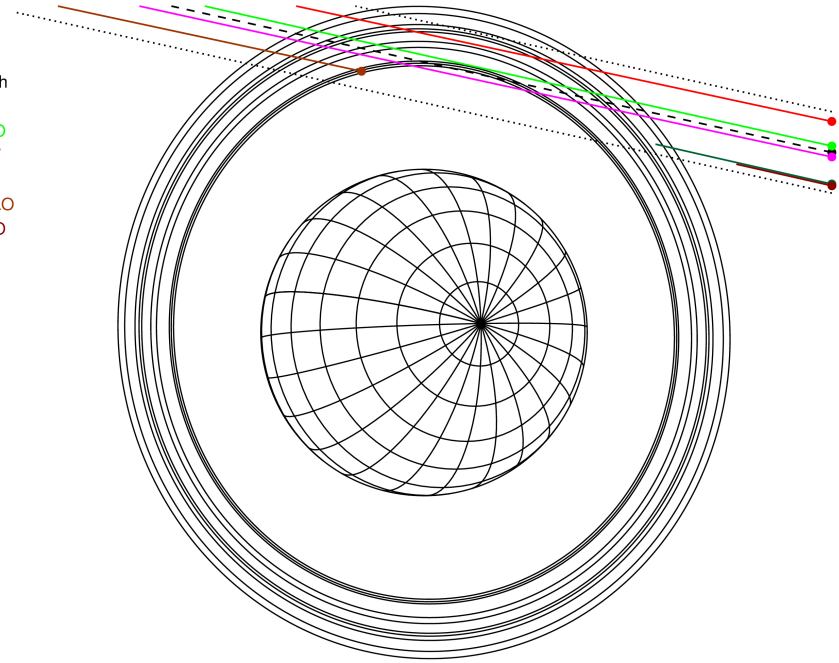
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2025-12-10T17:40:59.6800 ra: 03 44 22.8309 s: +19 34 48.228 C/A 3.074" PA 167.51 deg v_sky -21.60 km/s D 18.57 AU
 Credit: Styled after SORA/Lucky Star

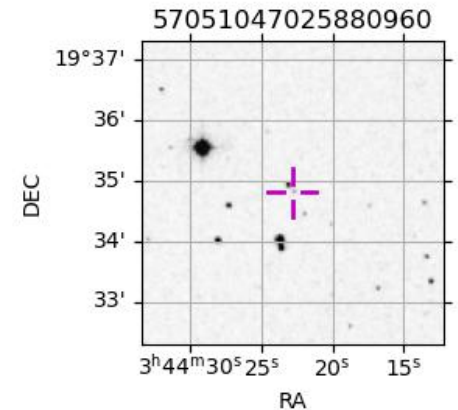
Uranus 2025-12-10T17:40:59 K14.66 G18.50 XRgt

Earth
 PIC
 PMO
 KAV
 AAT
 SAAO
 MSO



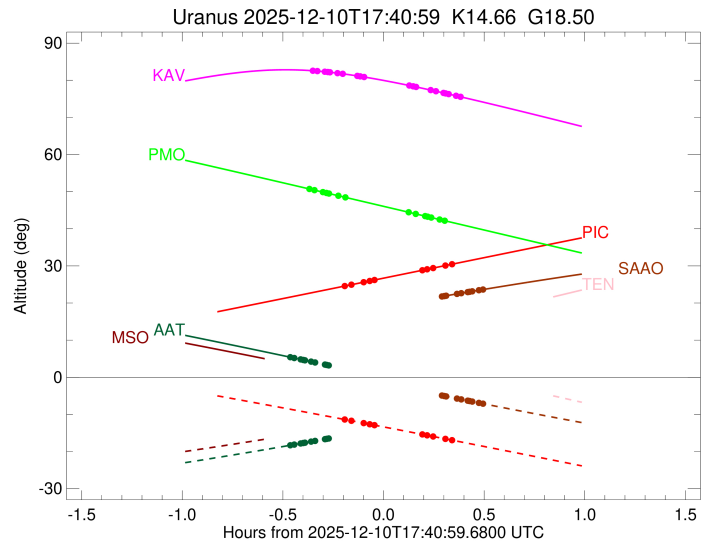
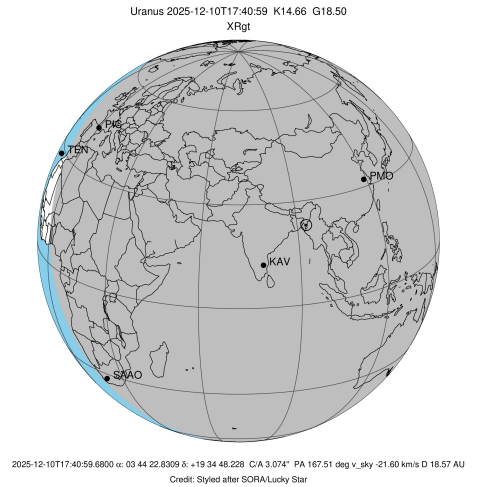
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 10 17:29 - DEC 10 18:01	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++++		+++++++	DEC 10 17:19 - DEC 10 17:59	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					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++++		+++++++	DEC 10 17:20 - DEC 10 18:04	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	++			DEC 10 17:13 - DEC 10 17:14	PnnRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8			+++++++	DEC 10 17:59 - DEC 10 18:10	PnnRne
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2025-12-10T17:43:56.790
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      : 57051047025880960
2Mass ID (if available) : 03442283+1934484
ICRS Star Coord at Epoch: 03h 44m 22.83091s +19:34:48.22807s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 14.657
G magnitude         : 18.495
RP magnitude        : 17.355
BP magnitude        : 19.775
DUPflag            : 0
Distance (au)       : 18.567
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -21.60
Sun-Target sep (deg) : 159.73
Sun-Moon sep (deg)  : 97.33
B (ring opening deg) : 69.30
PA of pole (deg)    : -81.07
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.398
C/A sky separation (km) : 45763.9
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

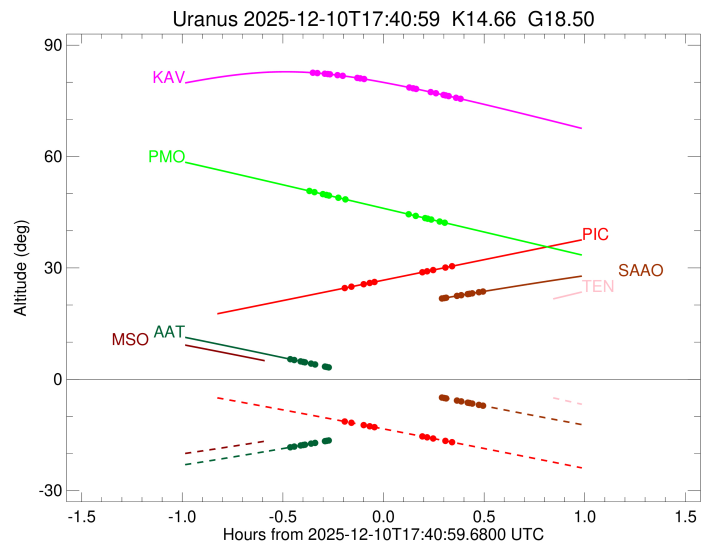
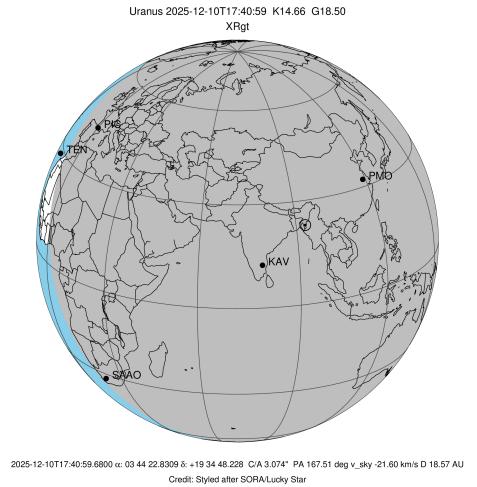


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-12-10T17:29:55.523		24.66	-11.46	50877.69	-9.79		
lambda	I	2025-12-10T17:31:27.319		24.94	-11.72	50026.71	-8.86		
delta	I	2025-12-10T17:35:07.551		25.62	-12.36	48300.35	-6.78		
gamma	I	2025-12-10T17:36:56.198		25.95	-12.67	47623.99	-5.67		
eta	I	2025-12-10T17:38:22.072		26.21	-12.92	47176.12	-4.76		

No planet occultations

eta	E	2025-12-10T17:52:31.352		28.82	-15.38	47176.12	4.76		
gamma	E	2025-12-10T17:53:57.595		29.08	-15.63	47626.56	5.68		
delta	E	2025-12-10T17:55:45.663		29.41	-15.95	48300.35	6.78		
lambda	E	2025-12-10T17:59:25.565		30.09	-16.59	50026.71	8.88		
epsilon	E	2025-12-10T18:01:30.873		30.47	-16.96	51208.77	9.81		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-10T17:37:40.100
 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 : 57051047025880960
 2Mass ID (if available) : 03442283+1934484
 ICRS Star Coord at Epoch: 03h 44m 22.83091s +19:34:48.22807s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.657
 G magnitude : 18.495
 RP magnitude : 17.355
 BP magnitude : 19.775
 DUPflag : 0
 Distance (au) : 18.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.60
 Sun-Target sep (deg) : 159.73
 Sun-Moon sep (deg) : 97.74
 B (ring opening deg) : 69.30
 PA of pole (deg) : -81.07
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.147
 C/A sky separation (km) : 42382.4
 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



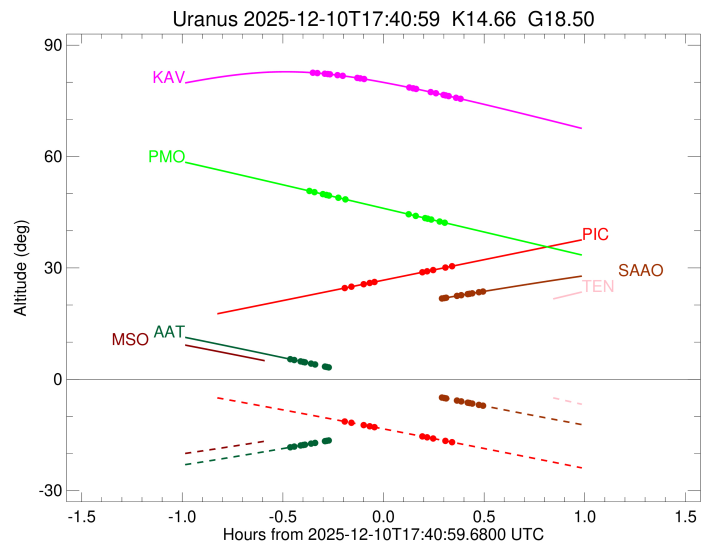
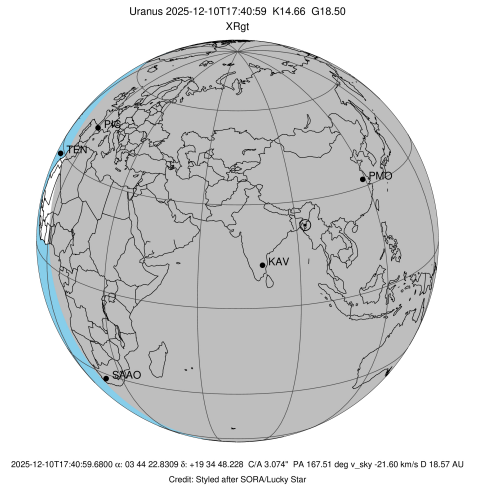
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-12-10T17:19:20.181		50.63	-69.86	50837.45	-12.67		
lambda	I	2025-12-10T17:20:26.009		50.40	-69.64	50026.71	-12.06		
delta	I	2025-12-10T17:22:56.876		49.87	-69.14	48300.35	-10.80		
gamma	I	2025-12-10T17:24:01.278		49.65	-68.93	47623.02	-10.23		
eta	I	2025-12-10T17:24:45.875		49.49	-68.78	47176.12	-9.81		
beta	I	2025-12-10T17:27:36.351		48.89	-68.21	45645.25	-8.13		
alpha	I	2025-12-10T17:29:42.918		48.44	-67.79	44702.65	-6.79		

No planet occultations

alpha	E	2025-12-10T17:48:28.623		44.46	-63.95	44722.08	6.78		
beta	E	2025-12-10T17:50:33.799		44.02	-63.52	45657.18	8.12		
eta	E	2025-12-10T17:53:22.991		43.42	-62.93	47176.12	9.80		
gamma	E	2025-12-10T17:54:08.113		43.26	-62.78	47627.60	10.21		
delta	E	2025-12-10T17:55:12.184		43.03	-62.56	48300.35	10.78		
lambda	E	2025-12-10T17:57:43.358		42.49	-62.03	50026.71	12.03		
epsilon	E	2025-12-10T17:59:22.691		42.14	-61.69	51259.83	12.64		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-10T17:40:38.580
 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 : 57051047025880960
 2Mass ID (if available) : 03442283+1934484
 ICRS Star Coord at Epoch: 03h 44m 22.83091s +19:34:48.22807s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.657
 G magnitude : 18.495
 RP magnitude : 17.355
 BP magnitude : 19.775
 DUPflag : 0
 Distance (au) : 18.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.60
 Sun-Target sep (deg) : 159.73
 Sun-Moon sep (deg) : 97.91
 B (ring opening deg) : 69.30
 PA of pole (deg) : -81.07
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.002
 C/A sky separation (km) : 40421.4
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

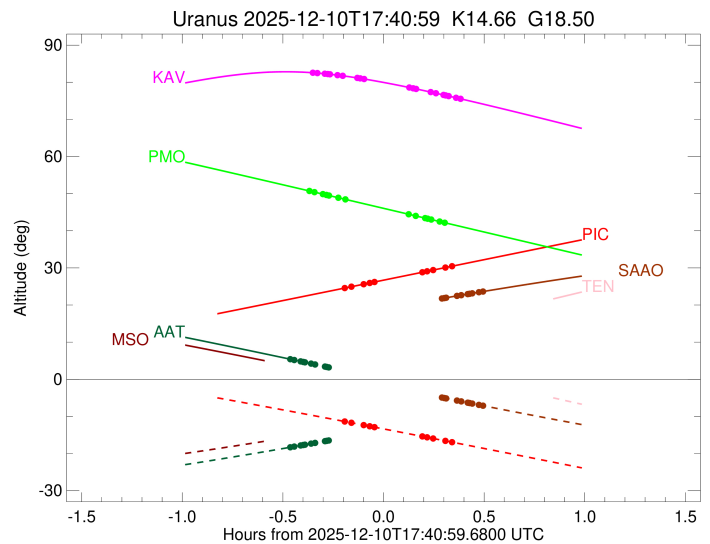
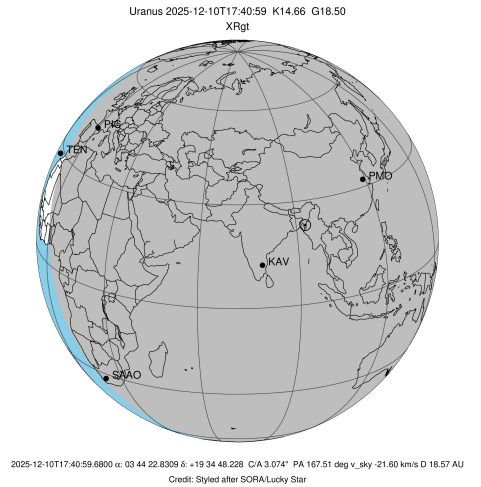


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-12-10T17:20:20.072		82.55	-68.85	50821.74	-14.05		
lambda	I	2025-12-10T17:21:17.860		82.48	-69.05	50026.71	-13.55		
delta	I	2025-12-10T17:23:30.116		82.30	-69.50	48300.35	-12.54		
gamma	I	2025-12-10T17:24:25.155		82.22	-69.68	47622.69	-12.08		
eta	I	2025-12-10T17:25:02.605		82.16	-69.81	47176.12	-11.76		
beta	I	2025-12-10T17:27:20.085		81.92	-70.27	45644.06	-10.52		
alpha	I	2025-12-10T17:28:54.243		81.74	-70.59	44699.14	-9.60		
4	I	2025-12-10T17:33:09.977		81.18	-71.43	42592.64	-6.79		
5	I	2025-12-10T17:33:53.449		81.08	-71.57	42305.96	-6.22		
6	I	2025-12-10T17:35:23.659		80.86	-71.87	41801.06	-5.13		

No planet occultations

6	E	2025-12-10T17:48:29.526		78.63	-74.30	41795.00	5.13		
5	E	2025-12-10T17:49:54.992		78.36	-74.55	42276.72	6.22		
4	E	2025-12-10T17:50:46.485		78.20	-74.70	42611.21	6.79		
alpha	E	2025-12-10T17:55:03.277		77.37	-75.42	44726.46	9.60		
beta	E	2025-12-10T17:56:35.942		77.06	-75.67	45659.44	10.51		
eta	E	2025-12-10T17:58:51.937		76.60	-76.04	47176.12	11.76		
gamma	E	2025-12-10T17:59:29.845		76.47	-76.13	47628.07	12.08		
delta	E	2025-12-10T18:00:24.461		76.28	-76.28	48300.35	12.53		
lambda	E	2025-12-10T18:02:36.772		75.83	-76.61	50026.71	13.55		
epsilon	E	2025-12-10T18:04:07.720		75.51	-76.83	51287.88	14.04		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-12-10T17:37:26.090
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 57051047025880960
 2Mass ID (if available) : 03442283+1934484
 ICRS Star Coord at Epoch: 03h 44m 22.83091s +19:34:48.22807s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.657
 G magnitude : 18.495
 RP magnitude : 17.355
 BP magnitude : 19.775
 DUPflag : 0
 Distance (au) : 18.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.60
 Sun-Target sep (deg) : 159.73
 Sun-Moon sep (deg) : 97.06
 B (ring opening deg) : 69.30
 PA of pole (deg) : -81.07
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.731
 C/A sky separation (km) : 36770.7
 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



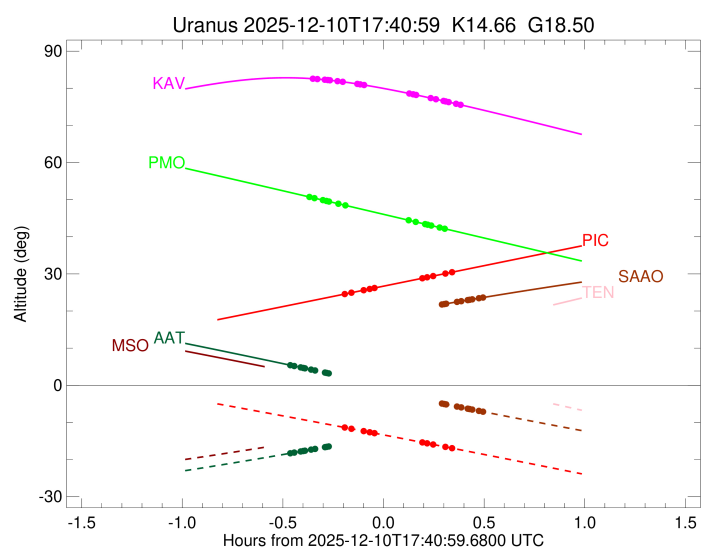
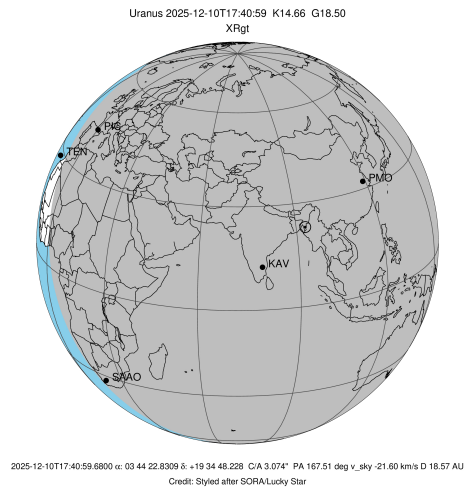
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-12-10T17:13:35.224		5.33	-18.26	50795.57	-15.82		
lambda	I	2025-12-10T17:14:24.463		5.18	-18.13	50026.71	-15.47		
delta	I	2025-12-10T17:16:18.605		4.81x	-17.83	48300.35	-14.76		
gamma	I	2025-12-10T17:17:05.018		4.66x	-17.71	47622.17	-14.46		
eta	I	2025-12-10T17:17:36.103		4.56x	-17.63	47176.12	-14.24		
beta	I	2025-12-10T17:19:26.933		4.21x	-17.33	45642.57	-13.43		
alpha	I	2025-12-10T17:20:39.254		3.97x	-17.14	44694.54	-12.86		
4	I	2025-12-10T17:23:33.028		3.41x	-16.67	42583.09	-11.33		
5	I	2025-12-10T17:23:56.648		3.34x	-16.61	42312.82	-11.07		
6	I	2025-12-10T17:24:44.038		3.18x	-16.48	41808.13	-10.60		

No planet occultations

6	E	2025-12-10T17:52:35.802		-2.30x	-11.82	41795.16	10.57		
5	E	2025-12-10T17:53:18.664		-2.44x	-11.69	42260.50	11.04		
4	E	2025-12-10T17:53:50.425		-2.55x	-11.60	42614.81	11.30		
alpha	E	2025-12-10T17:56:45.577		-3.13x	-11.10	44731.64	12.83		
beta	E	2025-12-10T17:57:56.574		-3.37x	-10.89	45662.39	13.39		
eta	E	2025-12-10T17:59:46.226		-3.74x	-10.57	47176.12	14.19		
gamma	E	2025-12-10T18:00:17.871		-3.84x	-10.48	47628.68	14.41		
delta	E	2025-12-10T18:01:03.998		-4.00x	-10.34	48300.35	14.71		
lambda	E	2025-12-10T18:02:58.573		-4.38x	-10.01	50026.71	15.41		
epsilon	E	2025-12-10T18:04:21.650		-4.66x	-9.77	51326.48	15.76		


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2025-12-10T17:45:01.320
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      : 57051047025880960
2Mass ID (if available) : 03442283+1934484
ICRS Star Coord at Epoch: 03h 44m 22.83091s +19:34:48.22807s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 14.657
G magnitude         : 18.495
RP magnitude        : 17.355
BP magnitude        : 19.775
DUPflag            : 0
Distance (au)       : 18.567
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -21.60
Sun-Target sep (deg) : 159.73
Sun-Moon sep (deg)  : 97.19
B (ring opening deg) : 69.30
PA of pole (deg)    : -81.07
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.819
C/A sky separation (km) : 37960.4
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_itrfr93_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	2025-12-10T17:22:11.909		15.84	1.79x	50804.91	-15.27		
lambda	I	2025-12-10T17:23:03.657		15.98	1.63x	50026.71	-14.88		
delta	I	2025-12-10T17:25:02.766		16.32	1.25x	48300.35	-14.09		
gamma	I	2025-12-10T17:25:51.461		16.46	1.10x	47622.35	-13.75		
eta	I	2025-12-10T17:26:24.200		16.55	1.00x	47176.12	-13.51		
beta	I	2025-12-10T17:28:21.657		16.88	0.63x	45643.03	-12.59		
alpha	I	2025-12-10T17:29:39.051		17.10	0.39x	44696.03	-11.94		
4	I	2025-12-10T17:32:49.176		17.63	-0.21x	42586.15	-10.15		
5	I	2025-12-10T17:33:16.174		17.71	-0.29x	42311.19	-9.84		
6	I	2025-12-10T17:34:09.993		17.86	-0.46x	41805.85	-9.27		

No planet occultations

6	E	2025-12-10T17:58:18.968		21.75	-4.91x	41794.90	9.28		
5	E	2025-12-10T17:59:07.945		21.87	-5.05	42264.30	9.85		
4	E	2025-12-10T17:59:42.961		21.97	-5.16	42614.15	10.17		
alpha	E	2025-12-10T18:02:53.716		22.46	-5.73	44730.45	11.97		
beta	E	2025-12-10T18:04:09.431		22.65	-5.96	45661.70	12.62		
eta	E	2025-12-10T18:06:05.086		22.94	-6.30	47176.12	13.54		
gamma	E	2025-12-10T18:06:38.198		23.03	-6.40	47628.54	13.78		
delta	E	2025-12-10T18:07:26.326		23.15	-6.55	48300.35	14.13		
lambda	E	2025-12-10T18:09:25.127		23.45	-6.90	50026.71	14.92		
epsilon	E	2025-12-10T18:10:50.197		23.66	-7.15	51318.16	15.31		