

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-01-15T18:30:54.440  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3380316970519316864  
 2Mass ID (if available) : 06522495+2317066

ICRS Star Coord at Epoch: 06h 52m 24.94859s +23:17:06.54423s

RUWE (>1.4 is poor) : 1.41  
 K magnitude : 10.986  
 G magnitude : 13.434  
 RP magnitude : 12.683  
 BP magnitude : 14.043  
 DUPflag : 0  
 Distance (au) : 17.863  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.62  
 Sun-Target sep (deg) : 167.33  
 Sun-Moon sep (deg) : 45.07  
 B (ring opening deg) : 64.38  
 PA of pole (deg) : 76.21

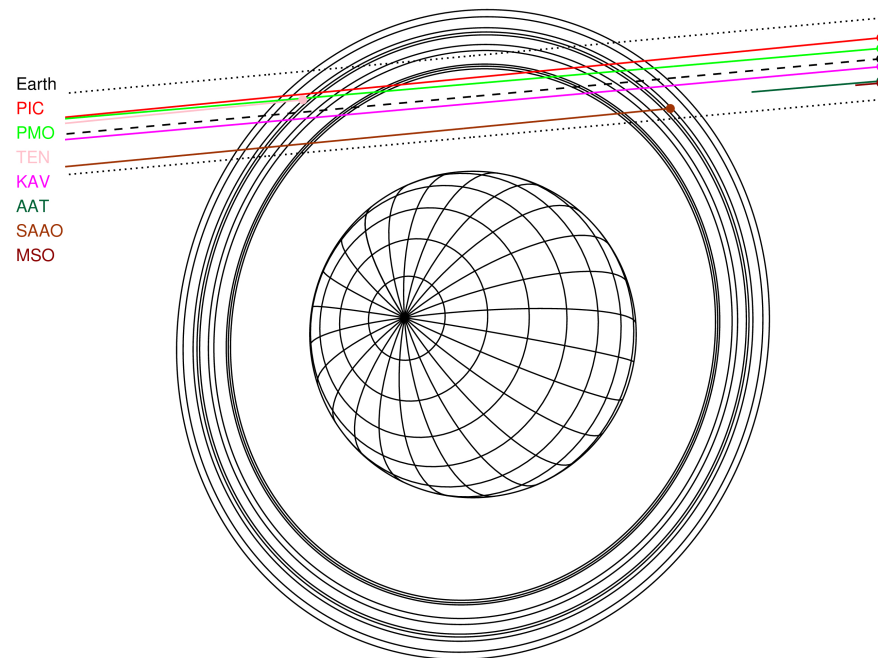
# a(km) ring

- 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



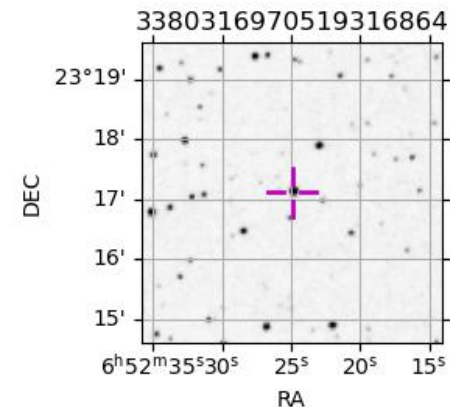
2036-01-15T18:30:54.4400 ra: 06 52 24.9486 s: +23 17 06.544 C/A 2.873° PA 185.27 deg v\_sky -22.62 km/s D 17.86 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2036-01-15T18:30:54 K10.99 G13.43 XRgt

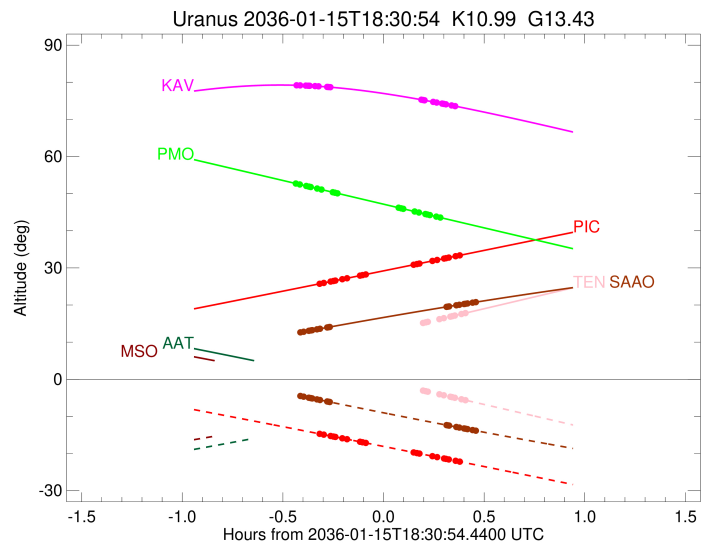
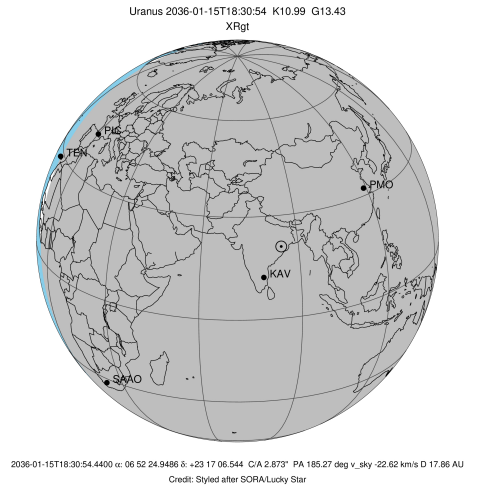


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	JAN 15 18:12 - JAN 15 18:53	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	JAN 15 18:05 - JAN 15 18:48	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			++	JAN 15 18:54 - JAN 15 18:55	PnnRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	JAN 15 18:05 - JAN 15 18:52	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	+++++		+++++	JAN 15 18:09 - JAN 15 18:58	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-01-15T18:34:31.090  
 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 : 3380316970519316864  
 2Mass ID (if available) : 06522495+2317066  
 ICRS Star Coord at Epoch: 06h 52m 24.94859s +23:17:06.54423s  
 RUWE (>1.4 is poor) : 1.41  
 K magnitude : 10.986  
 G magnitude : 13.434  
 RP magnitude : 12.683  
 BP magnitude : 14.043  
 DUPflag : 0  
 Distance (au) : 17.863  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.62  
 Sun-Target sep (deg) : 167.33  
 Sun-Moon sep (deg) : 45.94  
 B (ring opening deg) : 64.38  
 PA of pole (deg) : 76.21  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.090  
 C/A sky separation (km) : 40033.6  
 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



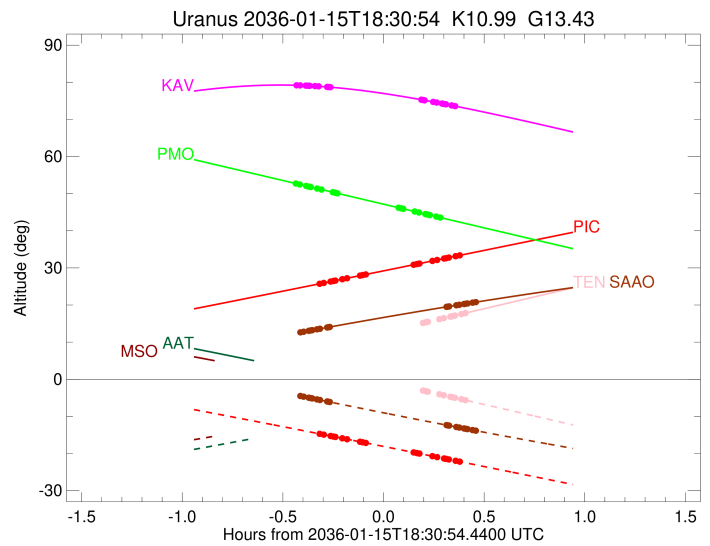
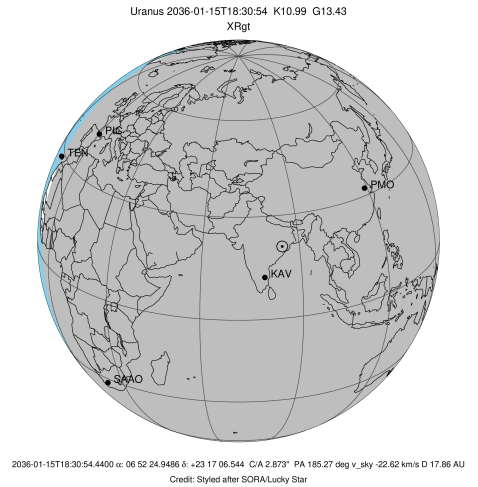
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-01-15T18:12:10.591		25.78	-14.76	50871.73	-15.22		
lambda	I	2036-01-15T18:13:07.351		25.95	-14.92	50026.71	-14.66		
delta	I	2036-01-15T18:15:09.379		26.32	-15.28	48300.35	-13.61		
gamma	I	2036-01-15T18:15:59.895		26.48	-15.43	47624.24	-13.15		
eta	I	2036-01-15T18:16:34.405		26.58	-15.53	47176.12	-12.82		
beta	I	2036-01-15T18:18:38.305		26.96	-15.90	45664.95	-11.57		
alpha	I	2036-01-15T18:20:03.934		27.22	-16.16	44715.84	-10.60		
4	I	2036-01-15T18:23:55.053		27.92	-16.84	42583.08	-7.74		
5	I	2036-01-15T18:24:44.971		28.07	-16.99	42212.31	-7.13		
6	I	2036-01-15T18:25:35.801		28.23	-17.14	41869.96	-6.37		

No planet occultations

6	E	2036-01-15T18:39:51.859		30.84	-19.70	41852.30	6.38		
5	E	2036-01-15T18:40:51.815		31.03	-19.88	42258.13	7.14		
4	E	2036-01-15T18:41:32.436		31.15	-20.00	42555.04	7.74		
alpha	E	2036-01-15T18:45:25.495		31.87	-20.70	44690.82	10.61		
beta	E	2036-01-15T18:46:54.300		32.14	-20.97	45679.51	11.59		
eta	E	2036-01-15T18:48:56.705		32.51	-21.34	47176.12	12.84		
gamma	E	2036-01-15T18:49:31.569		32.62	-21.45	47629.76	13.18		
delta	E	2036-01-15T18:50:21.566		32.77	-21.60	48300.35	13.64		
lambda	E	2036-01-15T18:52:23.334		33.15	-21.96	50026.71	14.69		
epsilon	E	2036-01-15T18:53:52.255		33.42	-22.23	51364.85	15.26		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2036-01-15T18:27:56.750
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      : 3380316970519316864
2Mass ID (if available) : 06522495+2317066
ICRS Star Coord at Epoch: 06h 52m 24.94859s +23:17:06.54423s
RUWE (>1.4 is poor) : 1.41
K magnitude          : 10.986
G magnitude          : 13.434
RP magnitude         : 12.683
BP magnitude         : 14.043
DUPflag             : 0
Distance (au)       : 17.863
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.62
Sun-Target sep (deg) : 167.33
Sun-Moon sep (deg)  : 45.17
B (ring opening deg) : 64.38
PA of pole (deg)    : 76.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.021
C/A sky separation (km) : 39132.9
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.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
    
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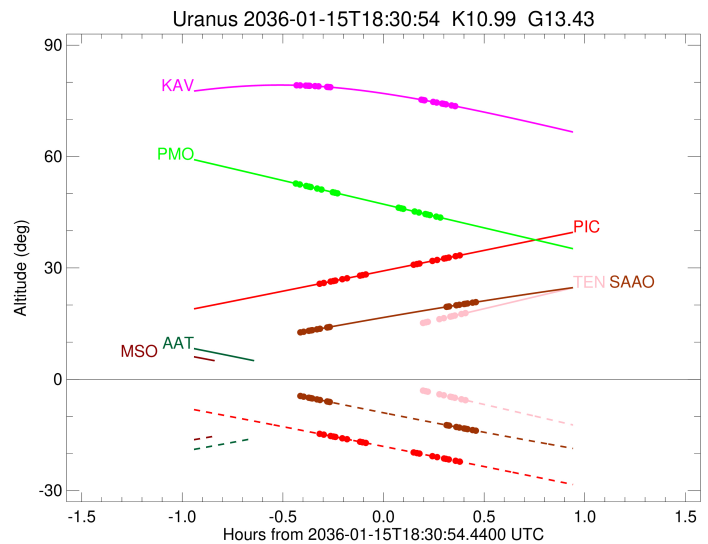
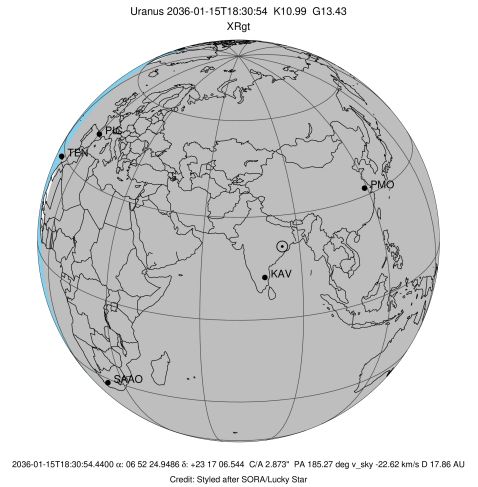


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-01-15T18:05:05.136		52.66	-63.00	50860.29	-15.94		
lambda	I	2036-01-15T18:05:58.481		52.47	-62.82	50026.71	-15.42		
delta	I	2036-01-15T18:07:53.999		52.06	-62.43	48300.35	-14.45		
gamma	I	2036-01-15T18:08:41.486		51.90	-62.27	47624.01	-14.03		
eta	I	2036-01-15T18:09:13.759		51.78	-62.16	47176.12	-13.73		
beta	I	2036-01-15T18:11:08.631		51.37	-61.77	45663.91	-12.60		
alpha	I	2036-01-15T18:12:26.394		51.10	-61.50	44717.77	-11.74		
4	I	2036-01-15T18:15:47.616		50.38	-60.81	42586.31	-9.32		
5	I	2036-01-15T18:16:29.499		50.24	-60.67	42206.28	-8.84		
6	I	2036-01-15T18:17:08.554		50.10	-60.54	41872.18	-8.26		

No planet occultations

6	E	2036-01-15T18:35:22.865		46.22	-56.75	41849.63	8.25		
5	E	2036-01-15T18:36:11.094		46.04	-56.58	42262.65	8.83		
4	E	2036-01-15T18:36:43.788		45.93	-56.47	42552.76	9.31		
alpha	E	2036-01-15T18:40:07.507		45.21	-55.76	44690.12	11.72		
beta	E	2036-01-15T18:41:28.727		44.92	-55.47	45679.77	12.58		
eta	E	2036-01-15T18:43:22.541		44.51	-55.08	47176.12	13.70		
gamma	E	2036-01-15T18:43:55.300		44.40	-54.96	47629.86	14.00		
delta	E	2036-01-15T18:44:42.475		44.23	-54.80	48300.35	14.42		
lambda	E	2036-01-15T18:46:38.266		43.82	-54.39	50026.71	15.38		
epsilon	E	2036-01-15T18:48:03.875		43.52	-54.09	51371.40	15.90		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-01-15T18:35:24.650  
 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 : 3380316970519316864  
 2Mass ID (if available) : 06522495+2317066  
 ICRS Star Coord at Epoch: 06h 52m 24.94859s +23:17:06.54423s  
 RUWE (>1.4 is poor) : 1.41  
 K magnitude : 10.986  
 G magnitude : 13.434  
 RP magnitude : 12.683  
 BP magnitude : 14.043  
 DUPflag : 0  
 Distance (au) : 17.863  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.62  
 Sun-Target sep (deg) : 167.33  
 Sun-Moon sep (deg) : 45.87  
 B (ring opening deg) : 64.38  
 PA of pole (deg) : 76.21  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.026  
 C/A sky separation (km) : 39203.3  
 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

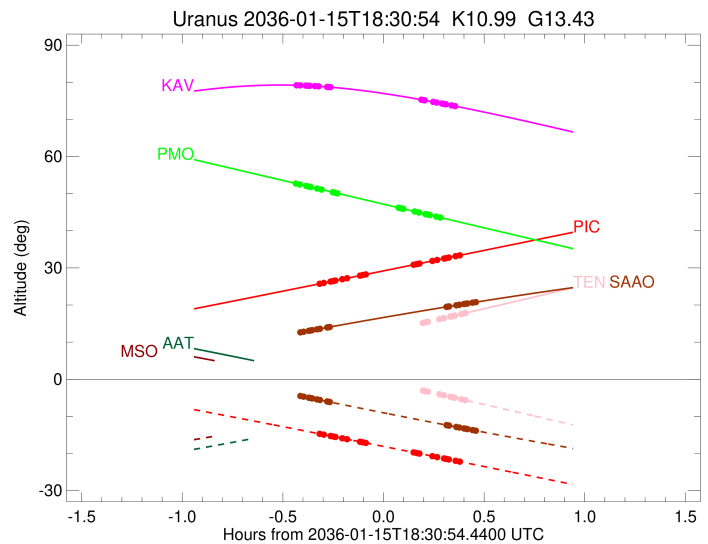
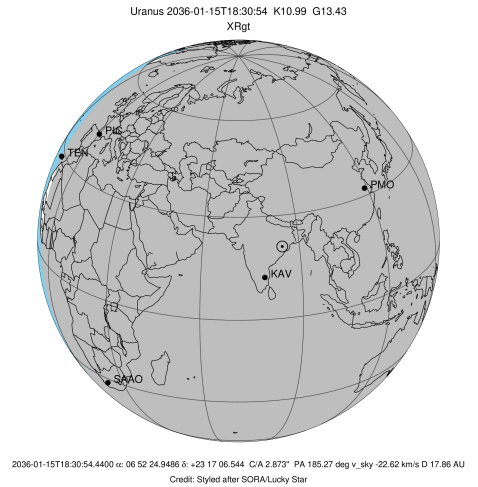


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-01-15T18:12:17.756		8.86	3.07x	50864.55	-15.67		
lambda	I	2036-01-15T18:13:12.321		9.04	2.89x	50026.71	-15.15		
delta	I	2036-01-15T18:15:09.940		9.45	2.50x	48300.35	-14.19		
gamma	I	2036-01-15T18:15:58.313		9.61	2.34x	47624.09	-13.77		
eta	I	2036-01-15T18:16:31.209		9.72	2.23x	47176.12	-13.47		
beta	I	2036-01-15T18:18:28.344		10.13	1.84x	45664.23	-12.34		
alpha	I	2036-01-15T18:19:47.840		10.40	1.57x	44717.20	-11.49		
4	I	2036-01-15T18:23:14.167		11.11	0.89x	42585.52	-9.06		
5	I	2036-01-15T18:23:57.059		11.26	0.74x	42207.68	-8.58		
6	I	2036-01-15T18:24:37.650		11.40	0.61x	41871.70	-7.99		

No planet occultations

6	E	2036-01-15T18:42:39.399		15.16	-3.04x	41849.46	8.00		
5	E	2036-01-15T18:43:29.138		15.33	-3.21x	42263.01	8.59		
4	E	2036-01-15T18:44:02.668		15.45	-3.32x	42552.54	9.07		
alpha	E	2036-01-15T18:47:30.833		16.18	-4.03x	44689.99	11.51		
beta	E	2036-01-15T18:48:53.478		16.47	-4.31x	45679.82	12.37		
eta	E	2036-01-15T18:50:49.047		16.87	-4.71x	47176.12	13.50		
gamma	E	2036-01-15T18:51:22.277		16.99	-4.82x	47629.90	13.81		
delta	E	2036-01-15T18:52:10.099		17.16	-4.98x	48300.35	14.23		
lambda	E	2036-01-15T18:54:07.374		17.57	-5.39	50026.71	15.19		
epsilon	E	2036-01-15T18:55:34.185		17.87	-5.68	51374.41	15.72		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-01-15T18:30:08.980  
 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 : 3380316970519316864  
 2Mass ID (if available) : 06522495+2317066  
 ICRS Star Coord at Epoch: 06h 52m 24.94859s +23:17:06.54423s  
 RUWE (>1.4 is poor) : 1.41  
 K magnitude : 10.986  
 G magnitude : 13.434  
 RP magnitude : 12.683  
 BP magnitude : 14.043  
 DUPflag : 0  
 Distance (au) : 17.863  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.62  
 Sun-Target sep (deg) : 167.33  
 Sun-Moon sep (deg) : 45.67  
 B (ring opening deg) : 64.38  
 PA of pole (deg) : 76.21  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.782  
 C/A sky separation (km) : 36040.5  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



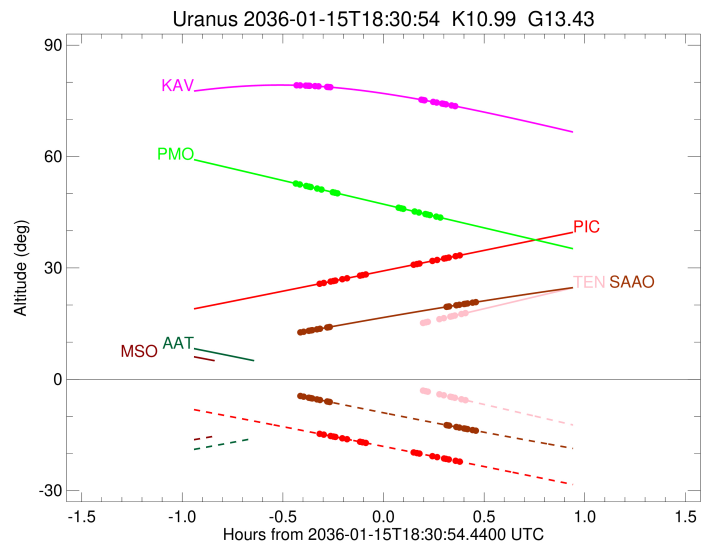
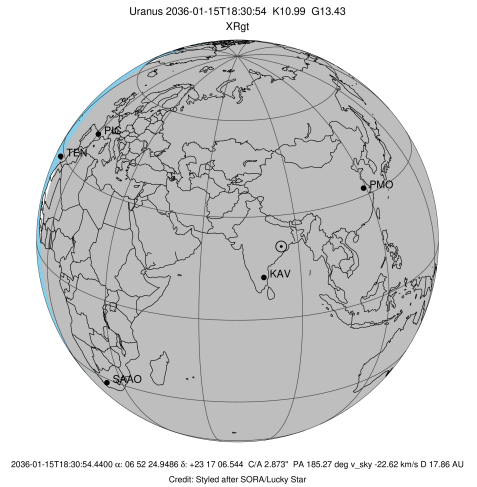
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-01-15T18:05:17.925		79.19	-75.54	50836.34	-17.77		
lambda	I	2036-01-15T18:06:04.113		79.16	-75.68	50026.71	-17.37		
delta	I	2036-01-15T18:07:45.565		79.10	-76.01	48300.35	-16.65		
gamma	I	2036-01-15T18:08:26.612		79.08	-76.13	47623.52	-16.33		
eta	I	2036-01-15T18:08:54.196		79.05	-76.22	47176.12	-16.11		
beta	I	2036-01-15T18:10:30.682		78.98	-76.52	45661.50	-15.30		
alpha	I	2036-01-15T18:11:33.384		78.92	-76.71	44722.16	-14.69		
4	I	2036-01-15T18:14:05.757		78.75	-77.17	42592.97	-13.12		
5	I	2036-01-15T18:14:36.586		78.72	-77.26	42194.13	-12.83		
6	I	2036-01-15T18:15:01.509		78.68	-77.33	41875.91	-12.49		

No planet occultations

6	E	2036-01-15T18:42:10.001		75.31	-80.95	41842.01	12.49		
5	E	2036-01-15T18:42:43.985		75.22	-80.99	42275.28	12.83		
4	E	2036-01-15T18:43:05.616		75.16	-81.02	42546.14	13.11		
alpha	E	2036-01-15T18:45:40.174		74.73	-81.18	44687.88	14.69		
beta	E	2036-01-15T18:46:46.221		74.54	-81.23	45680.57	15.29		
eta	E	2036-01-15T18:48:21.501		74.27	-81.30	47176.12	16.10		
gamma	E	2036-01-15T18:48:49.518		74.19	-81.32	47630.28	16.32		
delta	E	2036-01-15T18:49:30.180		74.07	-81.34	48300.35	16.63		
lambda	E	2036-01-15T18:51:11.707		73.77	-81.38	50026.71	17.36		
epsilon	E	2036-01-15T18:52:29.781		73.53	-81.40	51402.29	17.76		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2036-01-15T18:33:42.000
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        : 3380316970519316864
2Mass ID (if available) : 06522495+2317066
ICRS Star Coord at Epoch: 06h 52m 24.94859s +23:17:06.54423s
RUWE (>1.4 is poor)  : 1.41
K magnitude            : 10.986
G magnitude            : 13.434
RP magnitude           : 12.683
BP magnitude           : 14.043
DUPflag                : 0
Distance (au)         : 17.863
f0 (km)                : 0.000
g0 (km)                : 0.000
skyplane vel. (km/s)  : -22.62
Sun-Target sep (deg)  : 167.33
Sun-Moon sep (deg)    : 45.69
B (ring opening deg)  : 64.38
PA of pole (deg)      : 76.21
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.489
C/A sky separation (km) : 32252.5
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.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	2036-01-15T18:06:25.670		12.69	-4.56x	50813.25	-19.31		
lambda	I	2036-01-15T18:07:06.782		12.80	-4.69x	50026.71	-19.02		
delta	I	2036-01-15T18:08:38.757		13.06	-4.97x	48300.35	-18.51		
gamma	I	2036-01-15T18:09:15.574		13.16	-5.09	47623.04	-18.29		
eta	I	2036-01-15T18:09:40.119		13.23	-5.16	47176.12	-18.13		
beta	I	2036-01-15T18:11:05.148		13.46	-5.42	45659.06	-17.57		
alpha	I	2036-01-15T18:11:58.926		13.61	-5.59	44726.45	-17.16		
4	I	2036-01-15T18:14:06.149		13.95	-5.98	42598.59	-16.13		
5	I	2036-01-15T18:14:32.147		14.02	-6.06	42184.19	-15.95		
6	I	2036-01-15T18:14:51.124		14.08	-6.12	41878.18	-15.74		

No planet occultations

6	E	2036-01-15T18:49:40.145		19.50	-12.34	41834.86	15.77		
5	E	2036-01-15T18:50:08.202		19.57	-12.42	42286.07	15.98		
4	E	2036-01-15T18:50:24.807		19.61	-12.47	42540.44	16.16		
alpha	E	2036-01-15T18:52:33.801		19.93	-12.84	44686.14	17.20		
beta	E	2036-01-15T18:53:30.809		20.06	-13.01	45681.08	17.61		
eta	E	2036-01-15T18:54:54.375		20.27	-13.25	47176.12	18.17		
gamma	E	2036-01-15T18:55:19.278		20.33	-13.32	47630.67	18.33		
delta	E	2036-01-15T18:55:55.589		20.41	-13.42	48300.35	18.55		
lambda	E	2036-01-15T18:57:27.328		20.64	-13.68	50026.71	19.07		
epsilon	E	2036-01-15T18:58:40.423		20.81	-13.89	51434.93	19.36		