

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-09T00:17:50.230
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377546682254680960
 2Mass ID (if available) : 06184157+2338245

ICRS Star Coord at Epoch: 06h 18m 41.58086s +23:38:24.29754s

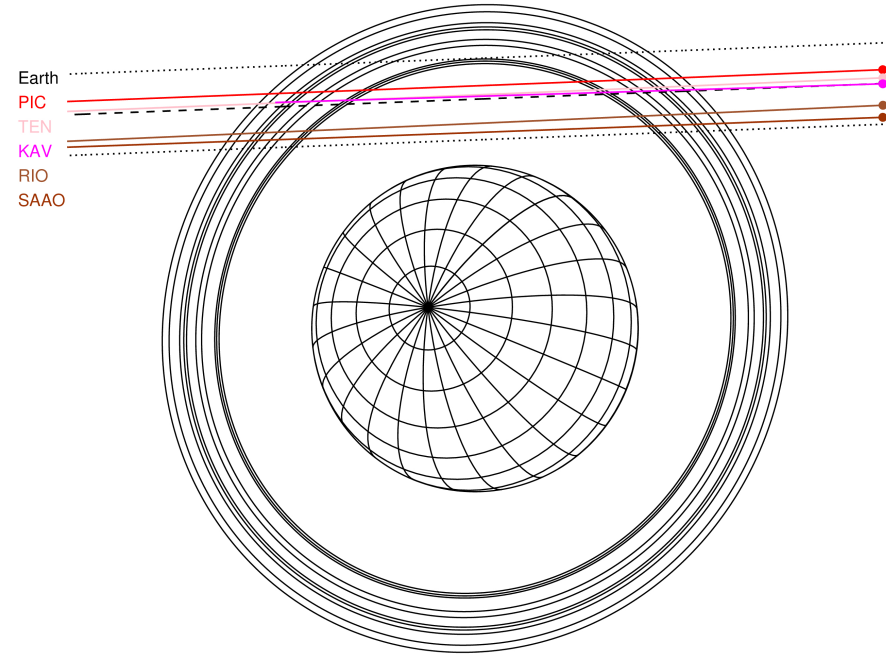
RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.032
 G magnitude : 16.450
 RP magnitude : 15.658
 BP magnitude : 17.127
 DUPflag : 0
 Distance (au) : 18.015
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.00
 Sun-Target sep (deg) : 162.47
 Sun-Moon sep (deg) : 18.91
 B (ring opening deg) : 71.59
 PA of pole (deg) : 65.78

#	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



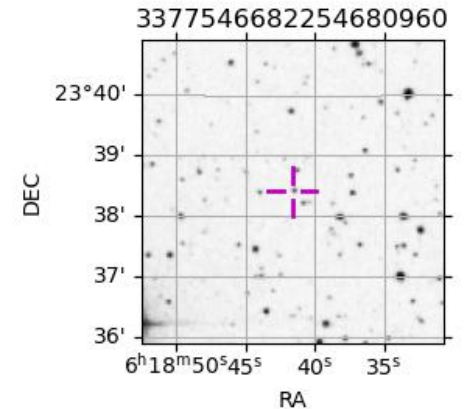
2033-12-09T00:17:50.2300 ra: 06 18 41.5809 s: +23 38 24.298 C/A 2.754 PA 182.19 deg v_sky -22.00 km/s D 18.01 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-12-09T00:17:50 K14.03 G16.45 XRgt



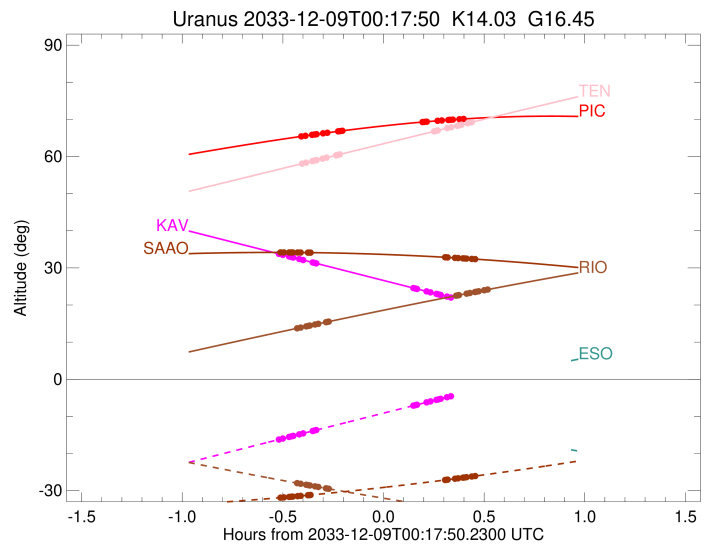
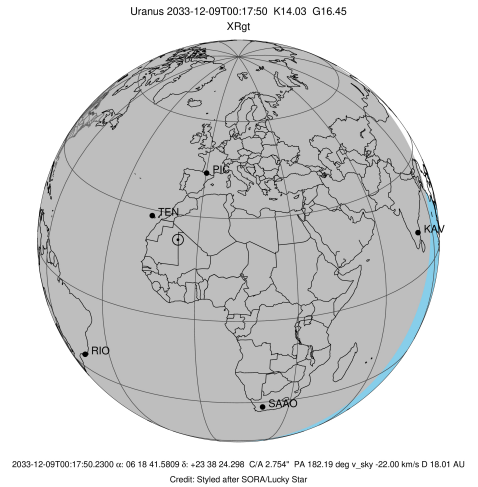
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 08 23:53 - DEC 09 00:41	PnnRie
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					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 08 23:54 - DEC 09 00:44	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	DEC 08 23:47 - DEC 09 00:34	PnnRie
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	DEC 08 23:52 - DEC 09 00:48	PnnRie
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	+++++		+++++	DEC 08 23:47 - DEC 09 00:45	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



3377546682254680960

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-09T00:18:40.740
 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 : 3377546682254680960
 2Mass ID (if available) : 06184157+2338245
 ICRS Star Coord at Epoch: 06h 18m 41.58086s +23:38:24.29754s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.032
 G magnitude : 16.450
 RP magnitude : 15.658
 BP magnitude : 17.127
 DUPflag : 0
 Distance (au) : 18.015
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.00
 Sun-Target sep (deg) : 162.47
 Sun-Moon sep (deg) : 19.44
 B (ring opening deg) : 71.59
 PA of pole (deg) : 65.78
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.906
 C/A sky separation (km) : 37969.2
 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

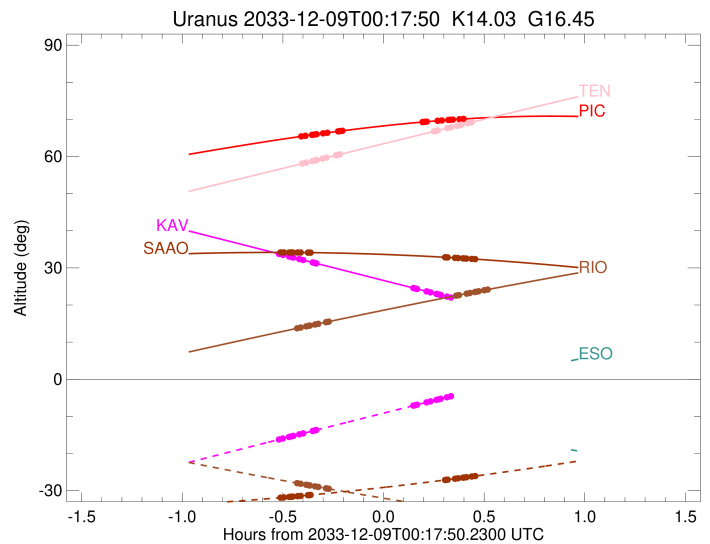
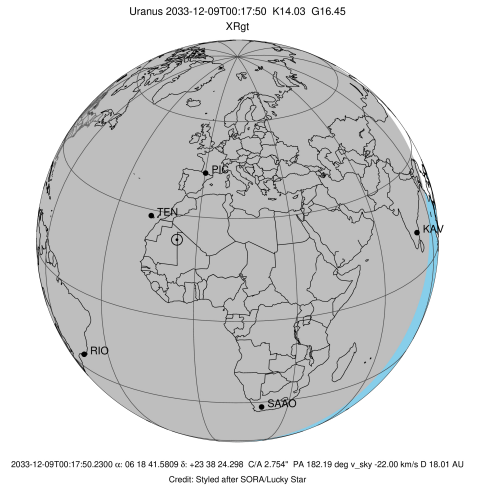


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-08T23:53:46.782		65.49	-70.07	50750.17	-15.28		
lambda	I	2033-12-08T23:54:34.678		65.59	-70.06	50026.71	-14.95		
delta	I	2033-12-08T23:56:33.229		65.84	-70.05	48300.35	-14.16		
gamma	I	2033-12-08T23:57:21.761		65.94	-70.04	47621.77	-13.80		
eta	I	2033-12-08T23:57:54.331		66.01	-70.03	47176.12	-13.56		
beta	I	2033-12-08T23:59:48.627		66.25	-70.00	45677.61	-12.64		
alpha	I	2033-12-09T00:01:04.143		66.40	-69.98	44746.82	-12.00		
4	I	2033-12-09T00:04:21.325		66.79	-69.90	42564.96	-10.12		
5	I	2033-12-09T00:05:00.632		66.87	-69.88	42176.42	-9.65		
6	I	2033-12-09T00:05:31.901		66.93	-69.87	41879.28	-9.34		

No planet occultations

6	E	2033-12-09T00:29:30.350		69.29	-68.58	41870.40	9.34		
5	E	2033-12-09T00:30:00.686		69.33	-68.54	42155.24	9.65		
4	E	2033-12-09T00:30:46.133		69.39	-68.48	42602.40	10.12		
alpha	E	2033-12-09T00:33:58.877		69.63	-68.22	44748.32	12.01		
beta	E	2033-12-09T00:35:13.004		69.72	-68.12	45657.45	12.65		
eta	E	2033-12-09T00:37:08.731		69.85	-67.95	47176.12	13.57		
gamma	E	2033-12-09T00:37:41.309		69.88	-67.90	47622.22	13.81		
delta	E	2033-12-09T00:38:29.772		69.93	-67.83	48300.35	14.17		
lambda	E	2033-12-09T00:40:28.226		70.05	-67.64	50026.71	14.97		
epsilon	E	2033-12-09T00:41:43.136		70.13	-67.53	51165.44	15.29		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-09T00:19:58.720
 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 : 3377546682254680960
 2Mass ID (if available) : 06184157+2338245
 ICRS Star Coord at Epoch: 06h 18m 41.58086s +23:38:24.29754s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.032
 G magnitude : 16.450
 RP magnitude : 15.658
 BP magnitude : 17.127
 DUPflag : 0
 Distance (au) : 18.015
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.00
 Sun-Target sep (deg) : 162.47
 Sun-Moon sep (deg) : 19.60
 B (ring opening deg) : 71.59
 PA of pole (deg) : 65.78
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.797
 C/A sky separation (km) : 36545.8
 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

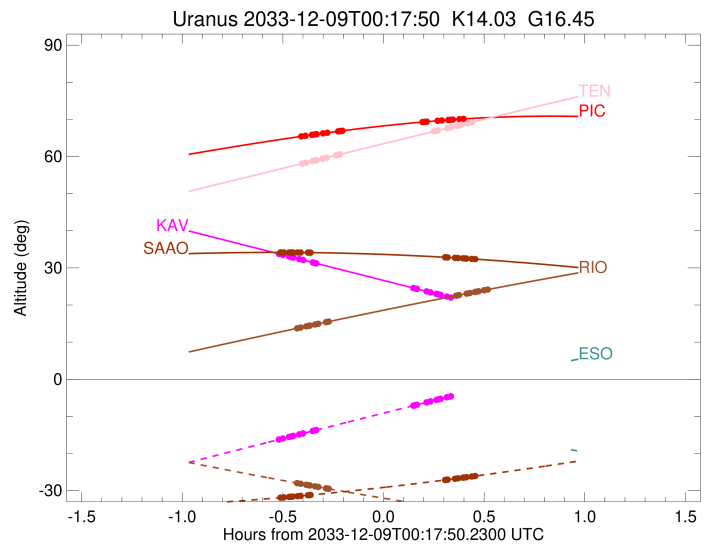
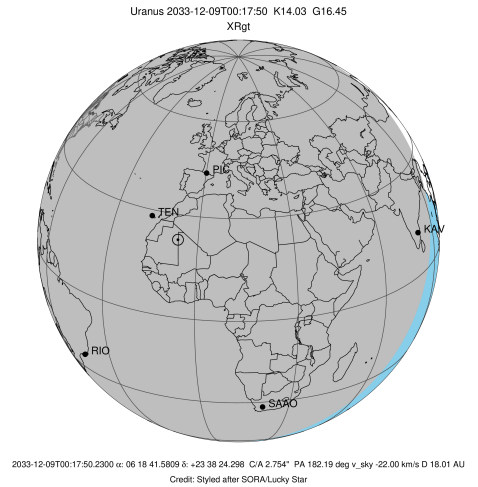


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-08T23:54:00.692		58.18	-74.59	50747.58	-16.01		
lambda	I	2033-12-08T23:54:46.147		58.35	-74.75	50026.71	-15.73		
delta	I	2033-12-08T23:56:38.375		58.77	-75.15	48300.35	-15.03		
gamma	I	2033-12-08T23:57:23.986		58.93	-75.31	47621.91	-14.72		
eta	I	2033-12-08T23:57:54.489		59.05	-75.41	47176.12	-14.51		
beta	I	2033-12-08T23:59:40.563		59.44	-75.78	45678.20	-13.72		
alpha	I	2033-12-09T00:00:49.892		59.69	-76.02	44745.71	-13.17		
4	I	2033-12-09T00:03:46.106		60.34	-76.63	42561.83	-11.61		
5	I	2033-12-09T00:04:19.362		60.46	-76.75	42180.61	-11.23		
6	I	2033-12-09T00:04:46.483		60.56	-76.84	41878.68	-10.99		

No planet occultations

6	E	2033-12-09T00:32:56.360		66.78	-82.21	41868.16	11.01		
5	E	2033-12-09T00:33:22.538		66.88	-82.29	42156.11	11.25		
4	E	2033-12-09T00:34:01.869		67.02	-82.39	42604.75	11.63		
alpha	E	2033-12-09T00:36:53.535		67.65	-82.84	44747.27	13.19		
beta	E	2033-12-09T00:38:01.405		67.90	-83.01	45656.32	13.74		
eta	E	2033-12-09T00:39:48.809		68.29	-83.26	47176.12	14.53		
gamma	E	2033-12-09T00:40:19.290		68.40	-83.33	47622.40	14.75		
delta	E	2033-12-09T00:41:04.781		68.57	-83.44	48300.35	15.06		
lambda	E	2033-12-09T00:42:56.786		68.98	-83.67	50026.71	15.76		
epsilon	E	2033-12-09T00:44:09.200		69.24	-83.82	51183.17	16.04		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-09T00:13:21.420
 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 : 3377546682254680960
 2Mass ID (if available) : 06184157+2338245
 ICRS Star Coord at Epoch: 06h 18m 41.58086s +23:38:24.29754s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.032
 G magnitude : 16.450
 RP magnitude : 15.658
 BP magnitude : 17.127
 DUPflag : 0
 Distance (au) : 18.015
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.00
 Sun-Target sep (deg) : 162.47
 Sun-Moon sep (deg) : 18.28
 B (ring opening deg) : 71.59
 PA of pole (deg) : 65.78
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.781
 C/A sky separation (km) : 36331.6
 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

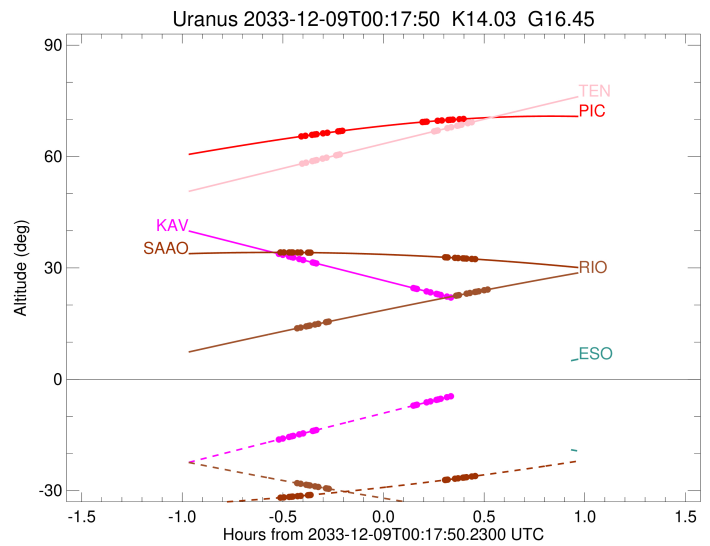
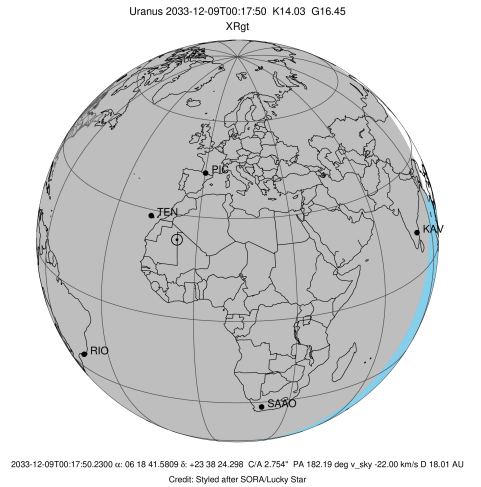


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-08T23:47:04.572		33.68	-16.13	50746.67	-16.04		
lambda	I	2033-12-08T23:47:49.851		33.51	-15.96	50026.71	-15.77		
delta	I	2033-12-08T23:49:41.709		33.08	-15.54	48300.35	-15.08		
gamma	I	2033-12-08T23:50:27.129		32.91	-15.36	47621.97	-14.78		
eta	I	2033-12-08T23:50:57.496		32.79	-15.25	47176.12	-14.58		
beta	I	2033-12-08T23:52:42.965		32.39	-14.85	45678.39	-13.81		
alpha	I	2033-12-08T23:53:51.846		32.12	-14.58	44745.31	-13.28		
4	I	2033-12-08T23:56:46.334		31.45	-13.92	42560.90	-11.77		
5	I	2033-12-08T23:57:18.913		31.33	-13.80	42181.89	-11.40		
6	I	2033-12-08T23:57:45.754		31.23	-13.69	41878.46	-11.17		

No planet occultations

6	E	2033-12-09T00:26:45.823		24.57	-7.10	41868.11	11.14		
5	E	2033-12-09T00:27:11.706		24.47	-7.00	42156.13	11.37		
4	E	2033-12-09T00:27:50.645		24.32	-6.86	42604.78	11.74		
alpha	E	2033-12-09T00:30:41.273		23.67	-6.21	44747.29	13.24		
beta	E	2033-12-09T00:31:48.969		23.41	-5.96	45656.34	13.76		
eta	E	2033-12-09T00:33:36.298		23.00	-5.55	47176.12	14.53		
gamma	E	2033-12-09T00:34:06.797		22.88	-5.44	47622.40	14.73		
delta	E	2033-12-09T00:34:52.345		22.71	-5.27	48300.35	15.03		
lambda	E	2033-12-09T00:36:44.614		22.28	-4.85x	50026.71	15.71		
epsilon	E	2033-12-09T00:37:57.197		22.01	-4.57x	51181.78	15.98		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-09T00:21:30.440
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 3377546682254680960
 2Mass ID (if available) : 06184157+2338245
 ICRS Star Coord at Epoch: 06h 18m 41.58086s +23:38:24.29754s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.032
 G magnitude : 16.450
 RP magnitude : 15.658
 BP magnitude : 17.127
 DUPflag : 0
 Distance (au) : 18.015
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.00
 Sun-Target sep (deg) : 162.47
 Sun-Moon sep (deg) : 19.52
 B (ring opening deg) : 71.59
 PA of pole (deg) : 65.78
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.455
 C/A sky separation (km) : 32072.8
 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



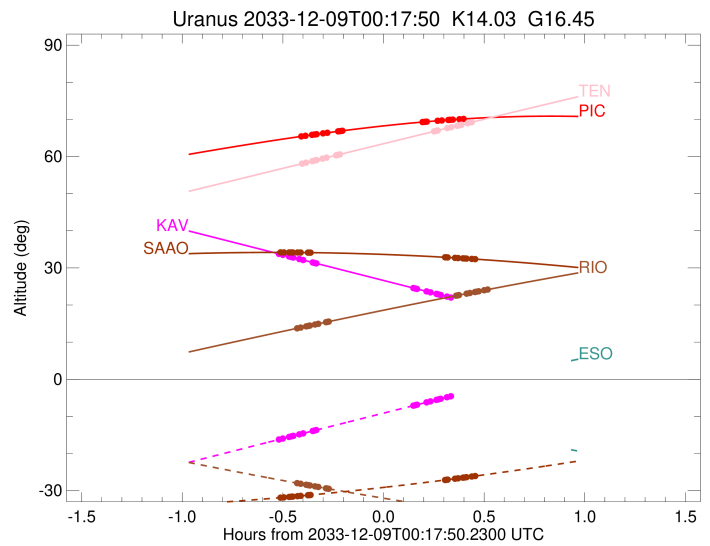
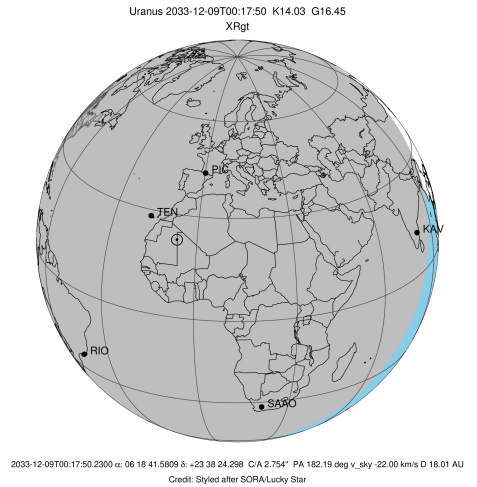
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-08T23:52:28.845		13.80	-28.04	50743.63	-17.83		
lambda	I	2033-12-08T23:53:09.264		13.93	-28.15	50026.71	-17.65		
delta	I	2033-12-08T23:54:48.383		14.25	-28.43	48300.35	-17.18		
gamma	I	2033-12-08T23:55:28.083		14.38	-28.53	47622.37	-16.97		
eta	I	2033-12-08T23:55:54.477		14.46	-28.60	47176.12	-16.84		
beta	I	2033-12-08T23:57:24.697		14.75	-28.85	45679.59	-16.33		
alpha	I	2033-12-08T23:58:22.712		14.93	-29.01	44742.19	-15.98		
4	I	2033-12-09T00:00:43.946		15.38	-29.38	42553.98	-15.04		
5	I	2033-12-09T00:01:07.857		15.46	-29.45	42192.53	-14.80		
6	I	2033-12-09T00:01:29.255		15.53	-29.50	41876.12	-14.68		

No planet occultations

6	E	2033-12-09T00:39:30.969		22.52	-35.14	41861.84	14.72		
5	E	2033-12-09T00:39:51.382		22.58	-35.18	42160.31	14.85		
4	E	2033-12-09T00:40:21.311		22.67	-35.25	42609.85	15.08		
alpha	E	2033-12-09T00:42:37.877		23.07	-35.55	44743.97	16.04		
beta	E	2033-12-09T00:43:34.307		23.24	-35.68	45653.36	16.38		
eta	E	2033-12-09T00:45:05.740		23.50	-35.88	47176.12	16.90		
gamma	E	2033-12-09T00:45:32.073		23.58	-35.94	47622.96	17.04		
delta	E	2033-12-09T00:46:11.589		23.69	-36.02	48300.35	17.24		
lambda	E	2033-12-09T00:47:50.320		23.98	-36.24	50026.71	17.72		
epsilon	E	2033-12-09T00:48:57.823		24.17	-36.38	51232.95	17.90		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-12-09T00:17:03.960
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      : 3377546682254680960
2Mass ID (if available) : 06184157+2338245
ICRS Star Coord at Epoch: 06h 18m 41.58086s +23:38:24.29754s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 14.032
G magnitude          : 16.450
RP magnitude         : 15.658
BP magnitude         : 17.127
DUPflag             : 0
Distance (au)       : 18.015
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -22.00
Sun-Target sep (deg) : 162.47
Sun-Moon sep (deg)  : 18.75
B (ring opening deg) : 71.59
PA of pole (deg)    : 65.78
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.347
C/A sky separation (km) : 30665.9
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_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	2033-12-08T23:47:29.795		34.17	-31.86	50743.59	-18.51		
lambda	I	2033-12-08T23:48:08.694		34.17	-31.81	50026.71	-18.35		
delta	I	2033-12-08T23:49:43.850		34.16	-31.69	48300.35	-17.93		
gamma	I	2033-12-08T23:50:21.847		34.16	-31.64	47622.54	-17.75		
eta	I	2033-12-08T23:50:47.089		34.16	-31.61	47176.12	-17.62		
beta	I	2033-12-08T23:52:13.063		34.15	-31.49	45679.97	-17.17		
alpha	I	2033-12-08T23:53:08.240		34.14	-31.42	44740.88	-16.87		
4	I	2033-12-08T23:55:21.488		34.12	-31.23	42551.61	-16.03		
5	I	2033-12-08T23:55:43.409		34.12	-31.20	42196.58	-15.83		
6	I	2033-12-08T23:56:03.723		34.11	-31.17	41875.03	-15.72		

No planet occultations

6	E	2033-12-09T00:36:12.519		32.86	-27.13	41860.25	15.72		
5	E	2033-12-09T00:36:31.837		32.84	-27.10	42161.67	15.83		
4	E	2033-12-09T00:36:59.883		32.82	-27.04	42610.83	16.03		
alpha	E	2033-12-09T00:39:08.996		32.70	-26.79	44743.10	16.86		
beta	E	2033-12-09T00:40:02.773		32.66	-26.69	45652.69	17.16		
eta	E	2033-12-09T00:41:30.296		32.57	-26.51	47176.12	17.62		
gamma	E	2033-12-09T00:41:55.578		32.55	-26.46	47623.09	17.74		
delta	E	2033-12-09T00:42:33.556		32.51	-26.39	48300.35	17.92		
lambda	E	2033-12-09T00:44:08.746		32.42	-26.20	50026.71	18.34		
epsilon	E	2033-12-09T00:45:14.639		32.36	-26.06	51244.21	18.50		