

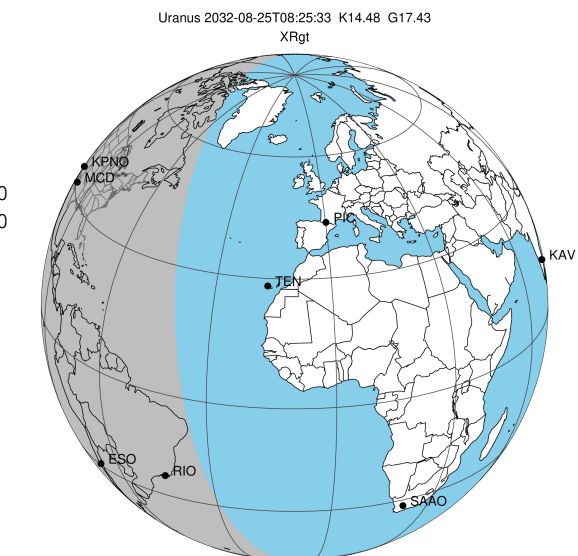
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-08-25T08:25:33.830  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3424693397257529856  
 2Mass ID (if available) : 06015583+2337055

ICRS Star Coord at Epoch: 06h 01m 55.84824s +23:37:05.52234s

RUWE (>1.4 is poor) : 2.05  
 K magnitude : 14.480  
 G magnitude : 17.432  
 RP magnitude : 16.346  
 BP magnitude : 17.975  
 DUPflag : 0  
 Distance (au) : 19.497  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.45  
 Sun-Target sep (deg) : 61.80  
 Sun-Moon sep (deg) : 58.93  
 B (ring opening deg) : 74.99  
 PA of pole (deg) : 58.14

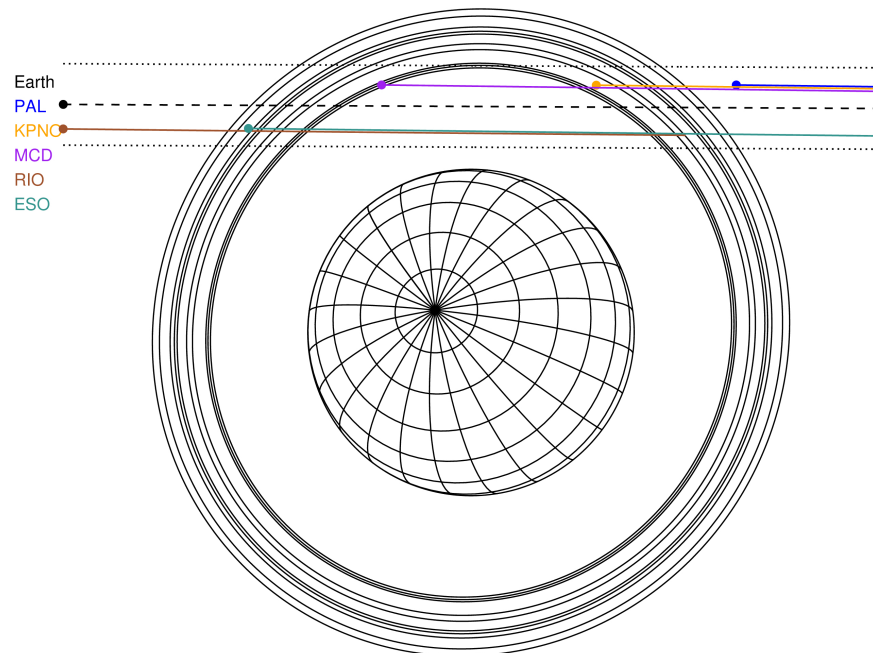
# a(km) ring

- 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



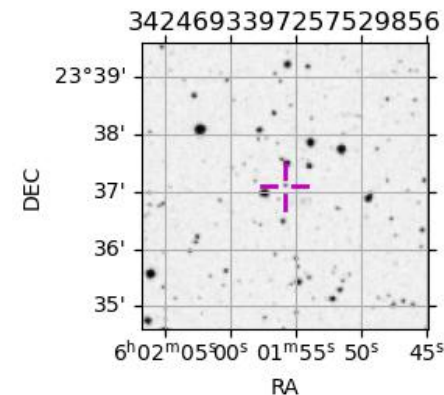
2032-08-25T08:25:33.8300 ex: 06 01 55.8482 s: +23 37 05.522 C/A 2.508° PA 179.71 deg v\_sky +20.44 km/s D 19.50 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2032-08-25T08:25:33 K14.48 G17.43 XRgt

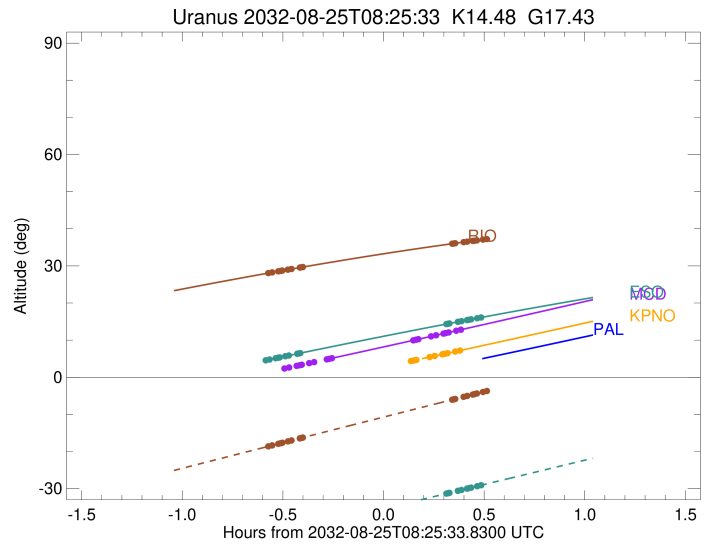
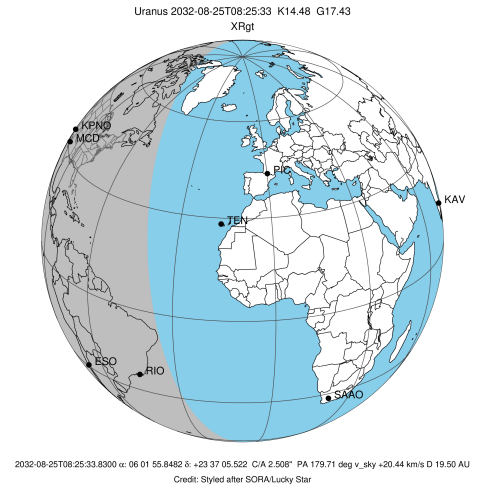


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| Obs  | Location              | lat   | Elon  | Rings I | Planet | Rings E | Observed Events Interval    | OEncode |
|------|-----------------------|-------|-------|---------|--------|---------|-----------------------------|---------|
| 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 |         |        | ++++++  | AUG 25 08:39 - AUG 25 08:48 | PnnRne  |
| MCD  | McDonald Obs. 2.7m    | 30.7  | 256.0 | +       |        | ++++++  | AUG 25 08:10 - AUG 25 08:48 | PnnRie  |
| 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 | ++++++  |        | ++++    | AUG 25 07:51 - AUG 25 08:50 | PnnRie  |
| ESO  | European Southern Obs | -29.3 | 289.3 | ++++++  |        | ++++++  | AUG 25 07:53 - AUG 25 08:54 | PnnRie  |
| 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 : 2032-08-25T08:21:30.240  
 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 : 3424693397257529856  
 2Mass ID (if available) : 06015583+2337055  
 ICRS Star Coord at Epoch: 06h 01m 55.84824s +23:37:05.52234s  
 RUWE (>1.4 is poor) : 2.05  
 K magnitude : 14.480  
 G magnitude : 17.432  
 RP magnitude : 16.346  
 BP magnitude : 17.975  
 DUPflag : 0  
 Distance (au) : 19.497  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.45  
 Sun-Target sep (deg) : 61.80  
 Sun-Moon sep (deg) : 58.55  
 B (ring opening deg) : 74.99  
 PA of pole (deg) : 58.14  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.756  
 C/A sky separation (km) : 38976.4  
 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

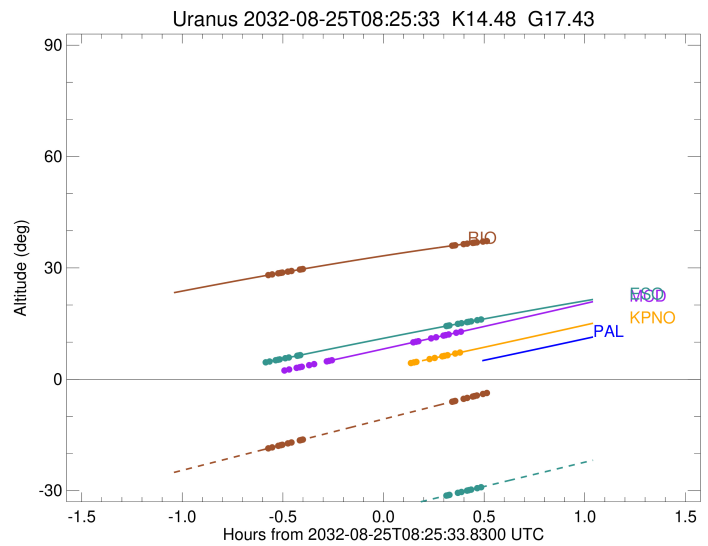
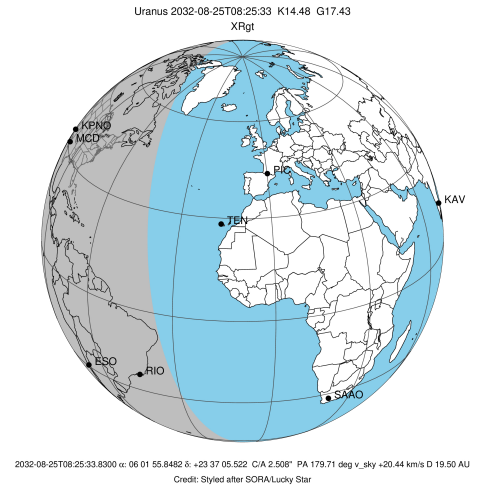


| Ring    | I/E | UTC                     | b?     | alt    | alt-sun  | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|--------|--------|----------|--------|-------|---------|--------------|
| epsilon | I   | 2032-08-25T07:57:07.996 | -2.55x | -47.14 | 50750.91 | -13.31 |       |         |              |
| lambda  | I   | 2032-08-25T07:58:02.912 | -2.38x | -47.10 | 50026.71 | -13.04 |       |         |              |
| delta   | I   | 2032-08-25T08:00:19.426 | -1.96x | -47.01 | 48300.35 | -12.24 |       |         |              |
| gamma   | I   | 2032-08-25T08:01:14.938 | -1.79x | -46.97 | 47630.42 | -11.89 |       |         |              |
| eta     | I   | 2032-08-25T08:01:53.543 | -1.67x | -46.94 | 47176.12 | -11.64 |       |         |              |
| beta    | I   | 2032-08-25T08:04:07.387 | -1.25x | -46.84 | 45679.04 | -10.71 |       |         |              |
| alpha   | I   | 2032-08-25T08:05:37.133 | -0.97x | -46.77 | 44748.82 | -10.04 |       |         |              |
| 4       | I   | 2032-08-25T08:09:37.315 | -0.22x | -46.56 | 42569.77 | -8.06  |       |         |              |
| 5       | I   | 2032-08-25T08:10:09.575 | -0.12x | -46.53 | 42315.25 | -7.76  |       |         |              |
| 6       | I   | 2032-08-25T08:11:14.114 | 0.08x  | -46.47 | 41825.31 | -7.14  |       |         |              |

No planet occultations

|         |   |                         |       |        |          |       |  |  |  |
|---------|---|-------------------------|-------|--------|----------|-------|--|--|--|
| 6       | E | 2032-08-25T08:33:37.961 | 4.34x | -44.91 | 41802.04 | 7.12  |  |  |  |
| 5       | E | 2032-08-25T08:34:44.003 | 4.56x | -44.82 | 42292.70 | 7.74  |  |  |  |
| 4       | E | 2032-08-25T08:35:23.040 | 4.68x | -44.77 | 42602.25 | 8.05  |  |  |  |
| alpha   | E | 2032-08-25T08:39:17.317 | 5.44  | -44.43 | 44722.31 | 10.01 |  |  |  |
| beta    | E | 2032-08-25T08:40:48.232 | 5.73  | -44.29 | 45661.79 | 10.68 |  |  |  |
| eta     | E | 2032-08-25T08:43:04.166 | 6.17  | -44.08 | 47176.12 | 11.60 |  |  |  |
| gamma   | E | 2032-08-25T08:43:42.440 | 6.30  | -44.02 | 47624.70 | 11.84 |  |  |  |
| delta   | E | 2032-08-25T08:44:38.663 | 6.48  | -43.93 | 48300.35 | 12.19 |  |  |  |
| lambda  | E | 2032-08-25T08:46:55.777 | 6.93  | -43.72 | 50026.71 | 12.98 |  |  |  |
| epsilon | E | 2032-08-25T08:48:09.106 | 7.16  | -43.60 | 50992.68 | 13.25 |  |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-08-25T08:21:21.380  
 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 : 3424693397257529856  
 2Mass ID (if available) : 06015583+2337055  
 ICRS Star Coord at Epoch: 06h 01m 55.84824s +23:37:05.52234s  
 RUWE (>1.4 is poor) : 2.05  
 K magnitude : 14.480  
 G magnitude : 17.432  
 RP magnitude : 16.346  
 BP magnitude : 17.975  
 DUPflag : 0  
 Distance (au) : 19.497  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.45  
 Sun-Target sep (deg) : 61.80  
 Sun-Moon sep (deg) : 58.61  
 B (ring opening deg) : 74.99  
 PA of pole (deg) : 58.14  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.729  
 C/A sky separation (km) : 38585.7  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

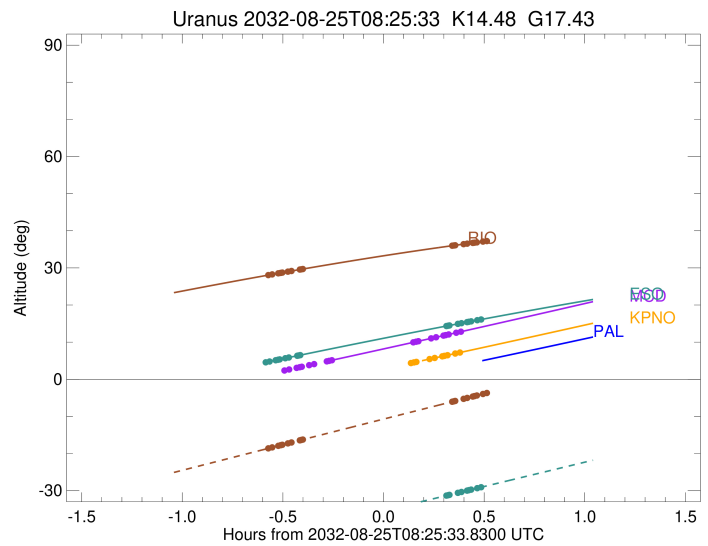
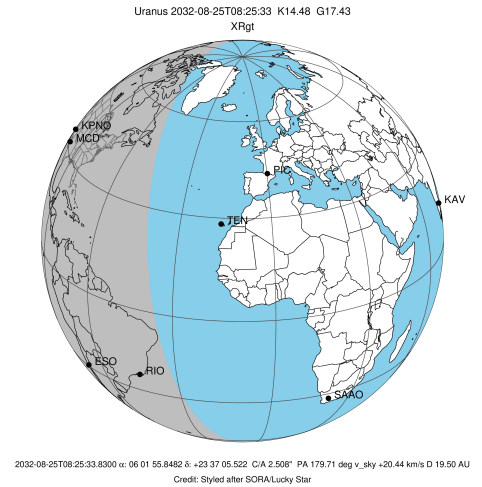


| Ring    | I/E | UTC                     | b? | alt   | alt-sun | radius   | r-dot  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I   | 2032-08-25T07:56:32.333 |    | 2.46x | -46.64  | 50751.84 | -13.48 |         |              |
| lambda  | I   | 2032-08-25T07:57:26.605 |    | 2.64x | -46.57  | 50026.71 | -13.22 |         |              |
| delta   | I   | 2032-08-25T07:59:41.050 |    | 3.07x | -46.39  | 48300.35 | -12.45 |         |              |
| gamma   | I   | 2032-08-25T08:00:35.575 |    | 3.25x | -46.32  | 47630.47 | -12.12 |         |              |
| eta     | I   | 2032-08-25T08:01:13.443 |    | 3.37x | -46.27  | 47176.12 | -11.88 |         |              |
| beta    | I   | 2032-08-25T08:03:24.276 |    | 3.80x | -46.08  | 45679.18 | -10.99 |         |              |
| alpha   | I   | 2032-08-25T08:04:51.527 |    | 4.08x | -45.96  | 44749.09 | -10.35 |         |              |
| 4       | I   | 2032-08-25T08:08:42.337 |    | 4.84x | -45.61  | 42568.72 | -8.50  |         |              |
| 5       | I   | 2032-08-25T08:09:12.774 |    | 4.93x | -45.56  | 42315.25 | -8.22  |         |              |
| 6       | I   | 2032-08-25T08:10:13.195 |    | 5.13  | -45.47  | 41826.40 | -7.65  |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2032-08-25T08:34:20.376 |  | 9.93  | -42.92 | 41801.41 | 7.63  |  |  |
| 5       | E | 2032-08-25T08:35:22.295 |  | 10.13 | -42.80 | 42291.30 | 8.20  |  |  |
| 4       | E | 2032-08-25T08:35:59.534 |  | 10.26 | -42.72 | 42603.03 | 8.48  |  |  |
| alpha   | E | 2032-08-25T08:39:44.449 |  | 11.01 | -42.27 | 44721.68 | 10.32 |  |  |
| beta    | E | 2032-08-25T08:41:12.884 |  | 11.31 | -42.09 | 45661.45 | 10.95 |  |  |
| eta     | E | 2032-08-25T08:43:25.830 |  | 11.76 | -41.81 | 47176.12 | 11.83 |  |  |
| gamma   | E | 2032-08-25T08:44:03.372 |  | 11.88 | -41.73 | 47624.63 | 12.07 |  |  |
| delta   | E | 2032-08-25T08:44:58.619 |  | 12.07 | -41.61 | 48300.35 | 12.40 |  |  |
| lambda  | E | 2032-08-25T08:47:13.688 |  | 12.53 | -41.32 | 50026.71 | 13.15 |  |  |
| epsilon | E | 2032-08-25T08:48:26.438 |  | 12.77 | -41.17 | 50997.33 | 13.41 |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-08-25T08:22:58.890  
 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 : 3424693397257529856  
 2Mass ID (if available) : 06015583+2337055  
 ICRS Star Coord at Epoch: 06h 01m 55.84824s +23:37:05.52234s  
 RUWE (>1.4 is poor) : 2.05  
 K magnitude : 14.480  
 G magnitude : 17.432  
 RP magnitude : 16.346  
 BP magnitude : 17.975  
 DUPflag : 0  
 Distance (au) : 19.497  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.45  
 Sun-Target sep (deg) : 61.80  
 Sun-Moon sep (deg) : 59.14  
 B (ring opening deg) : 74.99  
 PA of pole (deg) : 58.14  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.206  
 C/A sky separation (km) : 31200.9  
 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

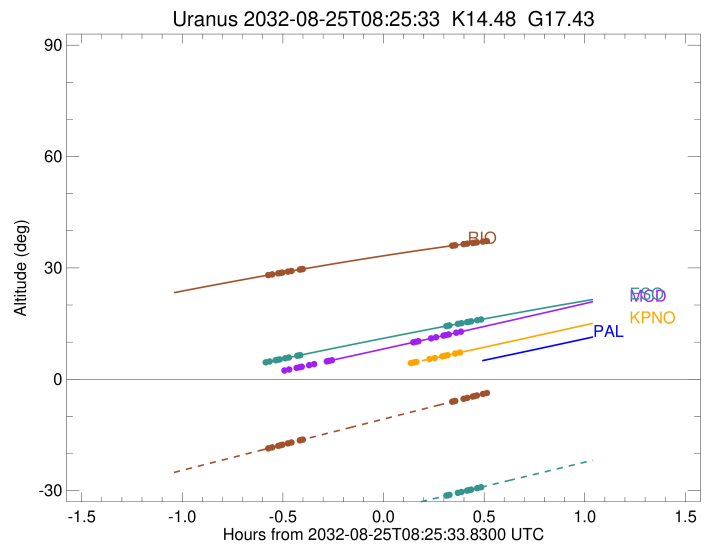
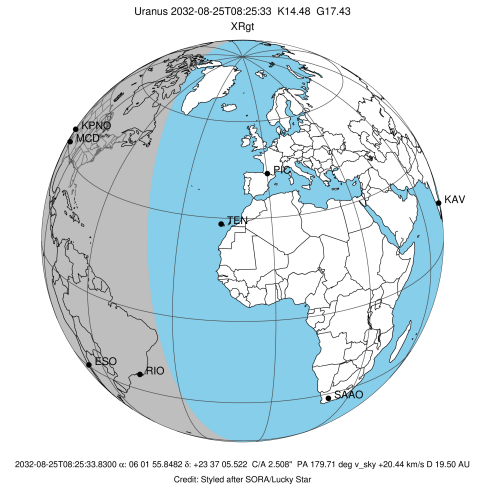


| Ring    | I/E | UTC                     | b? | alt   | alt-sun | radius   | r-dot  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I   | 2032-08-25T07:51:37.162 |    | 28.13 | -18.52  | 50777.08 | -16.17 |         |              |
| lambda  | I   | 2032-08-25T07:52:23.684 |    | 28.25 | -18.34  | 50026.71 | -16.05 |         |              |
| delta   | I   | 2032-08-25T07:54:12.541 |    | 28.54 | -17.93  | 48300.35 | -15.66 |         |              |
| gamma   | I   | 2032-08-25T07:54:55.502 |    | 28.66 | -17.76  | 47631.12 | -15.49 |         |              |
| eta     | I   | 2032-08-25T07:55:24.980 |    | 28.74 | -17.65  | 47176.12 | -15.38 |         |              |
| beta    | I   | 2032-08-25T07:57:03.580 |    | 29.00 | -17.27  | 45680.86 | -14.96 |         |              |
| alpha   | I   | 2032-08-25T07:58:06.350 |    | 29.16 | -17.03  | 44751.94 | -14.67 |         |              |
| 4       | I   | 2032-08-25T08:00:40.064 |    | 29.56 | -16.44  | 42554.40 | -13.89 |         |              |
| 5       | I   | 2032-08-25T08:00:58.124 |    | 29.61 | -16.37  | 42310.57 | -13.80 |         |              |
| 6       | I   | 2032-08-25T08:01:31.635 |    | 29.70 | -16.24  | 41841.07 | -13.57 |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2032-08-25T08:45:58.397 |  | 35.97 | -6.07  | 41795.82 | 13.53 |  |  |
| 5       | E | 2032-08-25T08:46:33.220 |  | 36.04 | -5.93  | 42269.93 | 13.75 |  |  |
| 4       | E | 2032-08-25T08:46:58.208 |  | 36.10 | -5.84  | 42611.56 | 13.85 |  |  |
| alpha   | E | 2032-08-25T08:49:25.688 |  | 36.40 | -5.28  | 44712.49 | 14.62 |  |  |
| beta    | E | 2032-08-25T08:50:29.600 |  | 36.53 | -5.04  | 45656.33 | 14.90 |  |  |
| eta     | E | 2032-08-25T08:52:10.196 |  | 36.73 | -4.66x | 47176.12 | 15.32 |  |  |
| gamma   | E | 2032-08-25T08:52:39.294 |  | 36.79 | -4.55x | 47623.51 | 15.43 |  |  |
| delta   | E | 2032-08-25T08:53:22.916 |  | 36.87 | -4.38x | 48300.35 | 15.60 |  |  |
| lambda  | E | 2032-08-25T08:55:12.219 |  | 37.09 | -3.97x | 50026.71 | 15.98 |  |  |
| epsilon | E | 2032-08-25T08:56:17.396 |  | 37.22 | -3.72x | 51075.44 | 16.10 |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-08-25T08:21:43.670  
 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 : 3424693397257529856  
 2Mass ID (if available) : 06015583+2337055  
 ICRS Star Coord at Epoch: 06h 01m 55.84824s +23:37:05.52234s  
 RUWE (>1.4 is poor) : 2.05  
 K magnitude : 14.480  
 G magnitude : 17.432  
 RP magnitude : 16.346  
 BP magnitude : 17.975  
 DUPflag : 0  
 Distance (au) : 19.497  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.45  
 Sun-Target sep (deg) : 61.80  
 Sun-Moon sep (deg) : 58.71  
 B (ring opening deg) : 74.99  
 PA of pole (deg) : 58.14  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.229  
 C/A sky separation (km) : 31524.5  
 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\_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   | 2032-08-25T07:50:50.549 |    | 4.64x | -42.87  | 50775.47 | -16.20 |         |              |
| lambda  | I   | 2032-08-25T07:51:36.879 |    | 4.79x | -42.70  | 50026.71 | -16.08 |         |              |
| delta   | I   | 2032-08-25T07:53:25.586 |    | 5.13  | -42.32  | 48300.35 | -15.67 |         |              |
| gamma   | I   | 2032-08-25T07:54:08.518 |    | 5.26  | -42.17  | 47631.09 | -15.50 |         |              |
| eta     | I   | 2032-08-25T07:54:37.983 |    | 5.35  | -42.06  | 47176.12 | -15.38 |         |              |
| beta    | I   | 2032-08-25T07:56:16.617 |    | 5.66  | -41.71  | 45680.81 | -14.94 |         |              |
| alpha   | I   | 2032-08-25T07:57:19.474 |    | 5.86  | -41.49  | 44751.87 | -14.64 |         |              |
| 4       | I   | 2032-08-25T07:59:53.591 |    | 6.34  | -40.94  | 42554.97 | -13.84 |         |              |
| 5       | I   | 2032-08-25T08:00:11.728 |    | 6.40  | -40.87  | 42310.93 | -13.73 |         |              |
| 6       | I   | 2032-08-25T08:00:45.476 |    | 6.50  | -40.75  | 41840.48 | -13.50 |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2032-08-25T08:44:14.731 |  | 14.33 | -31.36 | 41795.91 | 13.45 |  |  |
| 5       | E | 2032-08-25T08:44:49.803 |  | 14.43 | -31.23 | 42270.60 | 13.68 |  |  |
| 4       | E | 2032-08-25T08:45:14.853 |  | 14.50 | -31.14 | 42611.38 | 13.78 |  |  |
| alpha   | E | 2032-08-25T08:47:42.953 |  | 14.92 | -30.60 | 44712.75 | 14.57 |  |  |
| beta    | E | 2032-08-25T08:48:47.019 |  | 15.10 | -30.37 | 45656.48 | 14.87 |  |  |
| eta     | E | 2032-08-25T08:50:27.763 |  | 15.39 | -30.00 | 47176.12 | 15.30 |  |  |
| gamma   | E | 2032-08-25T08:50:56.890 |  | 15.47 | -29.90 | 47623.54 | 15.42 |  |  |
| delta   | E | 2032-08-25T08:51:40.537 |  | 15.60 | -29.74 | 48300.35 | 15.59 |  |  |
| lambda  | E | 2032-08-25T08:53:29.840 |  | 15.91 | -29.34 | 50026.71 | 15.99 |  |  |
| epsilon | E | 2032-08-25T08:54:34.837 |  | 16.09 | -29.10 | 51073.17 | 16.11 |  |  |