

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-28T21:08:49.860  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 866390629834436992  
 2Mass ID (if available) : 07304490+2218268

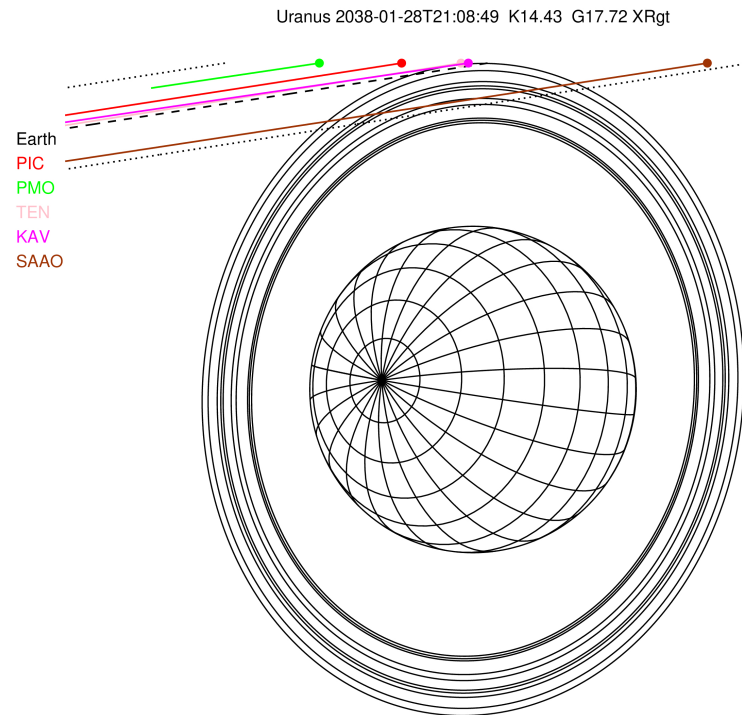
ICRS Star Coord at Epoch: 07h 30m 44.90203s +22:18:26.18026s

RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.431  
 G magnitude : 17.717  
 RP magnitude : 16.669  
 BP magnitude : 18.640  
 DUPflag : 0  
 Distance (au) : 17.760  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.91  
 Sun-Target sep (deg) : 162.38  
 Sun-Moon sep (deg) : 119.95  
 B (ring opening deg) : 55.83  
 PA of pole (deg) : 84.22

| #  | 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 |

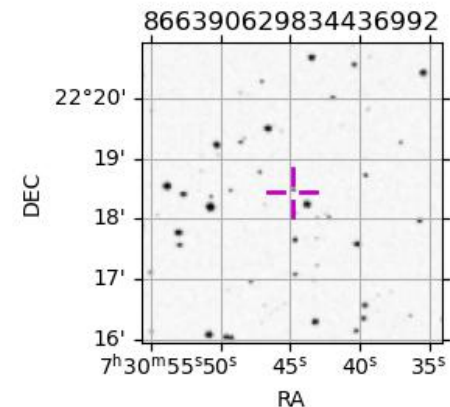


2038-01-28T21:08:49.8600 ra: 07 30 44.90203 s: +22 18 26.18026 C/A 3.902" PA 188.81 deg v\_sky -21.91 km/s D 17.76 AU  
 Credit: Styled after SORA/Lucky Star

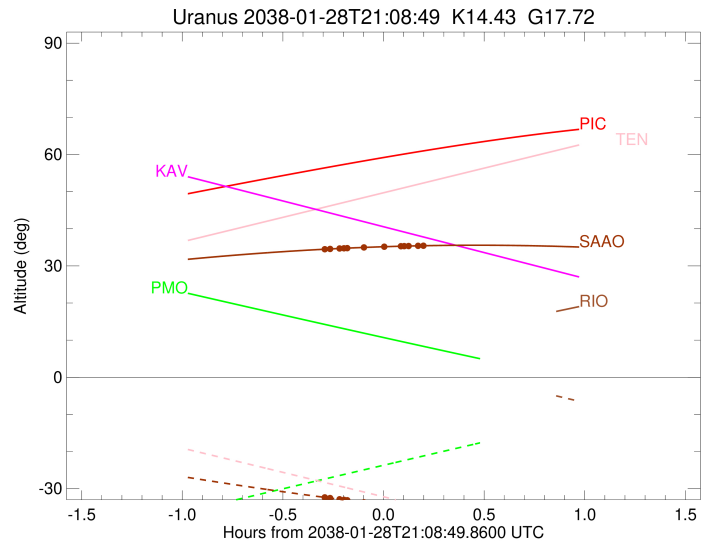
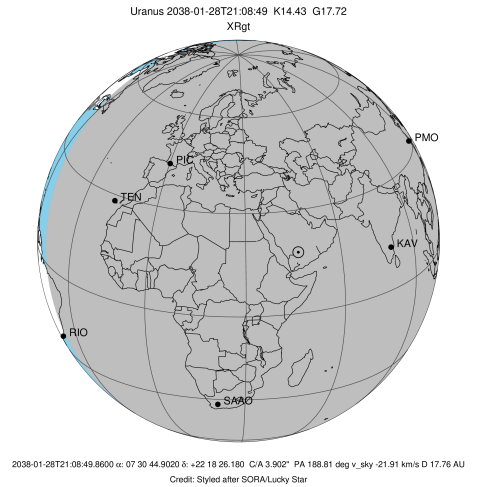


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| Obs  | Location              | lat   | Elon  | Rings I | Planet | Rings E | Observed Events Interval    | OEcode |
|------|-----------------------|-------|-------|---------|--------|---------|-----------------------------|--------|
| PIC  | Pic du Midi           | 42.9  | 0.1   |         |        |         |                             | 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 |         |        |         |                             | 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  |         |        |         |                             | PnnRnn |
| 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 28 20:51 - JAN 28 21:21 | PnnRie |
| MSO  | Mt. Stromlo Observato | -35.3 | 149.0 |         |        |         |                             | PnnRnn |



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-28T21:08:38.660  
 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 : 866390629834436992  
 2Mass ID (if available) : 07304490+2218268  
 ICRS Star Coord at Epoch: 07h 30m 44.90203s +22:18:26.18026s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.431  
 G magnitude : 17.717  
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 BP magnitude : 18.640  
 DUPflag : 0  
 Distance (au) : 17.760  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.91  
 Sun-Target sep (deg) : 162.38  
 Sun-Moon sep (deg) : 120.41  
 B (ring opening deg) : 55.83  
 PA of pole (deg) : 84.22  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.490  
 C/A sky separation (km) : 44953.0  
 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   | 2038-01-28T20:51:03.225 |    | 34.48 | -32.33  | 51359.31 | -12.62 |         |              |
| lambda  | I   | 2038-01-28T20:52:55.848 |    | 34.57 | -32.55  | 50026.71 | -11.19 |         |              |
| delta   | I   | 2038-01-28T20:55:45.877 |    | 34.69 | -32.87  | 48300.35 | -9.08  |         |              |
| gamma   | I   | 2038-01-28T20:57:04.101 |    | 34.75 | -33.02  | 47630.45 | -8.04  |         |              |
| eta     | I   | 2038-01-28T20:58:03.643 |    | 34.79 | -33.13  | 47176.12 | -7.22  |         |              |
| beta    | I   | 2038-01-28T21:03:10.159 |    | 34.98 | -33.70  | 45648.52 | -2.68  |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| beta    | E | 2038-01-28T21:08:54.221 |  | 35.16 | -34.31 | 45651.90 | 2.68  |  |  |
| eta     | E | 2038-01-28T21:13:59.635 |  | 35.30 | -34.82 | 47176.12 | 7.22  |  |  |
| gamma   | E | 2038-01-28T21:14:58.847 |  | 35.32 | -34.92 | 47627.81 | 8.04  |  |  |
| delta   | E | 2038-01-28T21:16:17.397 |  | 35.35 | -35.05 | 48300.35 | 9.08  |  |  |
| lambda  | E | 2038-01-28T21:19:07.419 |  | 35.41 | -35.32 | 50026.71 | 11.19 |  |  |
| epsilon | E | 2038-01-28T21:21:15.629 |  | 35.44 | -35.53 | 51554.92 | 12.62 |  |  |