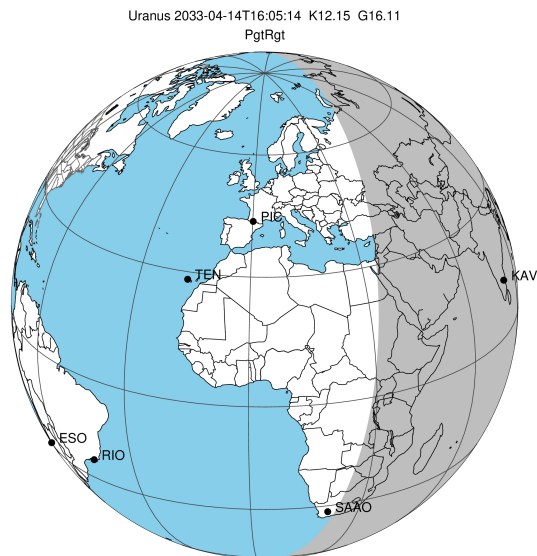


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-04-14T16:05:14.510
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427508116959954176
 2Mass ID (if available) : 05503065+2338103

ICRS Star Coord at Epoch: 05h 50m 30.65631s +23:38:10.19326s

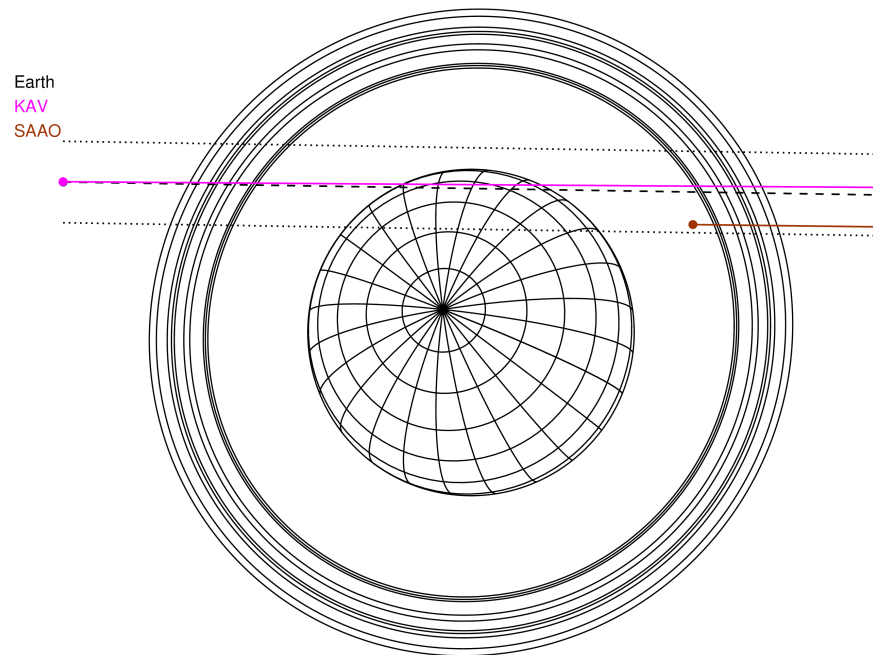
RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.146
 G magnitude : 16.108
 RP magnitude : 15.027
 BP magnitude : 17.340
 DUPflag : 0
 Distance (au) : 19.429
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.75
 Sun-Target sep (deg) : 63.26
 Sun-Moon sep (deg) : 115.26
 B (ring opening deg) : 77.12
 PA of pole (deg) : 50.82

| # | 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 |



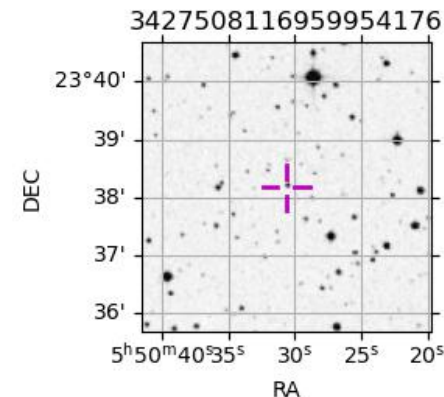
2033-04-14T16:05:14.5100 ex: 05 50 30.6563 8: +23 38 10.193 C/A 1.607" PA 179.09 deg v_sky +19.75 km/s D 19.43 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-04-14T16:05:14 K12.15 G16.11 PgtRgt

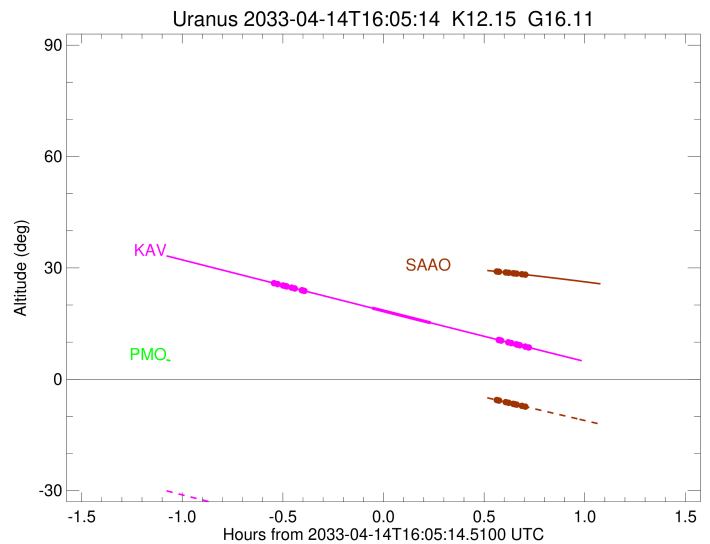
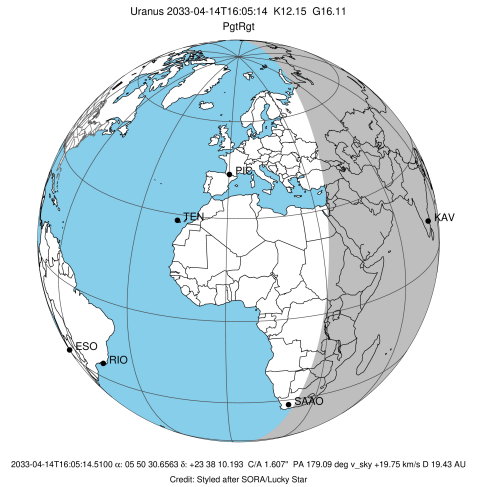


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| 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 | +++++ | + + | +++++ | APR 14 15:32 - APR 14 16:48 | PieRie |
| 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 | | | +++++ | APR 14 16:38 - APR 14 16:47 | PnnRne |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |

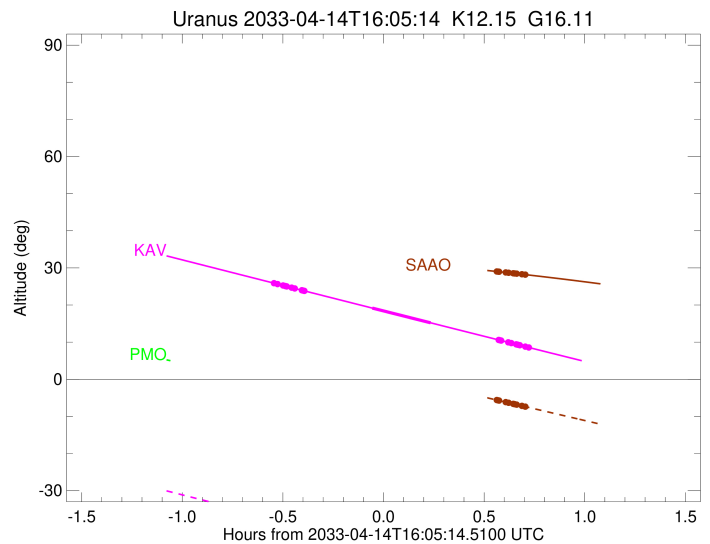
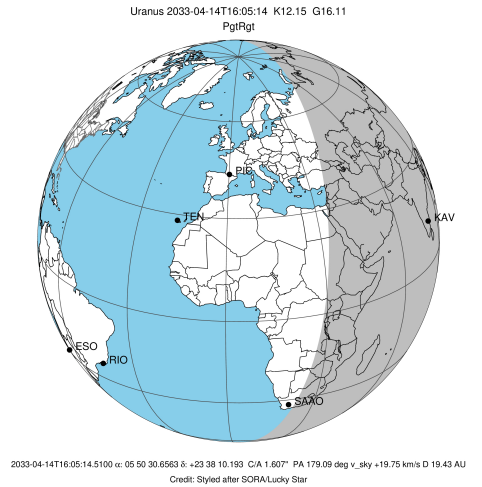


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-04-14T16:10:10.820
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3427508116959954176
 2Mass ID (if available) : 05503065+2338103
 ICRS Star Coord at Epoch: 05h 50m 30.65631s +23:38:10.19326s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.146
 G magnitude : 16.108
 RP magnitude : 15.027
 BP magnitude : 17.340
 DUPflag : 0
 Distance (au) : 19.429
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.75
 Sun-Target sep (deg) : 63.26
 Sun-Moon sep (deg) : 115.89
 B (ring opening deg) : 77.12
 PA of pole (deg) : 50.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.643
 C/A sky separation (km) : 23154.5
 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 | 2033-04-14T15:32:41.128 | | 25.86 | -37.39 | 51070.79 | -17.59 | | |
| lambda | I | 2033-04-14T15:33:40.405 | | 25.64 | -37.61 | 50026.71 | -17.56 | | |
| delta | I | 2033-04-14T15:35:19.183 | | 25.26 | -37.98 | 48300.35 | -17.39 | | |
| gamma | I | 2033-04-14T15:35:57.871 | | 25.11 | -38.12 | 47629.11 | -17.31 | | |
| eta | I | 2033-04-14T15:36:24.077 | | 25.01 | -38.22 | 47176.12 | -17.26 | | |
| beta | I | 2033-04-14T15:37:52.729 | | 24.67 | -38.55 | 45654.68 | -17.07 | | |
| alpha | I | 2033-04-14T15:38:49.231 | | 24.46 | -38.76 | 44691.46 | -16.93 | | |
| 4 | I | 2033-04-14T15:40:57.229 | | 23.97 | -39.24 | 42551.25 | -16.60 | | |
| 5 | I | 2033-04-14T15:41:18.940 | | 23.89 | -39.32 | 42178.52 | -16.56 | | |
| 6 | I | 2033-04-14T15:41:36.900 | | 23.82 | -39.39 | 41879.13 | -16.49 | | |
| Uranus | I | 2033-04-14T16:01:54.151 | | 19.17 | -43.86 | 25124.98 | | 11.31 | 11.84 |
| Uranus | E | 2033-04-14T16:19:17.407 | | 15.21 | -47.59 | 25525.90 | | 3.07 | 3.21 |
| 6 | E | 2033-04-14T16:39:33.858 | | 10.60 | -51.79 | 41828.08 | 16.60 | | |
| 5 | E | 2033-04-14T16:40:02.675 | | 10.49 | -51.89 | 42309.46 | 16.67 | | |
| 4 | E | 2033-04-14T16:40:16.579 | | 10.44 | -51.94 | 42541.79 | 16.71 | | |
| alpha | E | 2033-04-14T16:42:25.091 | | 9.95 | -52.37 | 44712.55 | 17.06 | | |
| beta | E | 2033-04-14T16:43:19.696 | | 9.75 | -52.55 | 45647.48 | 17.19 | | |
| eta | E | 2033-04-14T16:44:48.063 | | 9.41 | -52.84 | 47176.12 | 17.39 | | |
| gamma | E | 2033-04-14T16:45:13.599 | | 9.32 | -52.93 | 47620.96 | 17.45 | | |
| delta | E | 2033-04-14T16:45:52.450 | | 9.17 | -53.06 | 48300.35 | 17.53 | | |
| lambda | E | 2033-04-14T16:47:30.426 | | 8.80 | -53.38 | 50026.71 | 17.71 | | |
| epsilon | E | 2033-04-14T16:48:17.729 | | 8.62 | -53.53 | 50866.48 | 17.74 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-04-14T16:06:31.240
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3427508116959954176
 2Mass ID (if available) : 05503065+2338103
 ICRS Star Coord at Epoch: 05h 50m 30.65631s +23:38:10.19326s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 12.146
 G magnitude : 16.108
 RP magnitude : 15.027
 BP magnitude : 17.340
 DUPflag : 0
 Distance (au) : 19.429
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.75
 Sun-Target sep (deg) : 63.26
 Sun-Moon sep (deg) : 115.78
 B (ring opening deg) : 77.12
 PA of pole (deg) : 50.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.232
 C/A sky separation (km) : 17357.2
 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_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 | 2033-04-14T15:26:13.639 | | 33.71 | 9.42x | 51118.42 | -18.41 | | |
| lambda | I | 2033-04-14T15:27:12.846 | | 33.68 | 9.22x | 50026.71 | -18.41 | | |
| delta | I | 2033-04-14T15:28:46.849 | | 33.63 | 8.90x | 48300.35 | -18.32 | | |
| gamma | I | 2033-04-14T15:29:23.503 | | 33.61 | 8.78x | 47629.66 | -18.28 | | |
| eta | I | 2033-04-14T15:29:48.335 | | 33.60 | 8.69x | 47176.12 | -18.25 | | |
| beta | I | 2033-04-14T15:31:11.793 | | 33.55 | 8.41x | 45657.33 | -18.15 | | |
| alpha | I | 2033-04-14T15:32:04.825 | | 33.52 | 8.23x | 44694.60 | -18.08 | | |
| 4 | I | 2033-04-14T15:34:03.929 | | 33.45 | 7.83x | 42557.58 | -17.91 | | |
| 5 | I | 2033-04-14T15:34:24.904 | | 33.43 | 7.76x | 42170.55 | -17.89 | | |
| 6 | I | 2033-04-14T15:34:41.110 | | 33.42 | 7.71x | 41877.53 | -17.85 | | |
| Uranus | I | 2033-04-14T15:51:02.078 | | 32.67 | 4.37x | 25007.54 | | 12.82 | 13.41 |
| Uranus | E | 2033-04-14T16:22:37.968 | | 30.50 | -2.17x | 25545.60 | | -1.95 | -2.04 |
| 6 | E | 2033-04-14T16:38:59.483 | | 29.03 | -5.59 | 41821.31 | 17.90 | | |
| 5 | E | 2033-04-14T16:39:26.780 | | 28.99 | -5.68 | 42313.37 | 17.94 | | |
| 4 | E | 2033-04-14T16:39:39.768 | | 28.97 | -5.73 | 42547.80 | 17.96 | | |
| alpha | E | 2033-04-14T16:41:40.052 | | 28.78 | -6.15 | 44717.73 | 18.13 | | |
| beta | E | 2033-04-14T16:42:31.369 | | 28.69 | -6.33 | 45649.84 | 18.20 | | |
| eta | E | 2033-04-14T16:43:54.959 | | 28.55 | -6.62 | 47176.12 | 18.31 | | |
| gamma | E | 2033-04-14T16:44:19.241 | | 28.51 | -6.71 | 47621.00 | 18.33 | | |
| delta | E | 2033-04-14T16:44:56.252 | | 28.45 | -6.84 | 48300.35 | 18.38 | | |
| lambda | E | 2033-04-14T16:46:29.950 | | 28.29 | -7.16 | 50026.71 | 18.47 | | |
| epsilon | E | 2033-04-14T16:47:17.555 | | 28.21 | -7.33 | 50907.15 | 18.47 | | |