

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-28T19:11:31.290
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415769829603416576
 2Mass ID (if available) : 05105634+2303259

Uranus 2031-01-28T19:11:31 K14.81 G17.54 PgtRgt

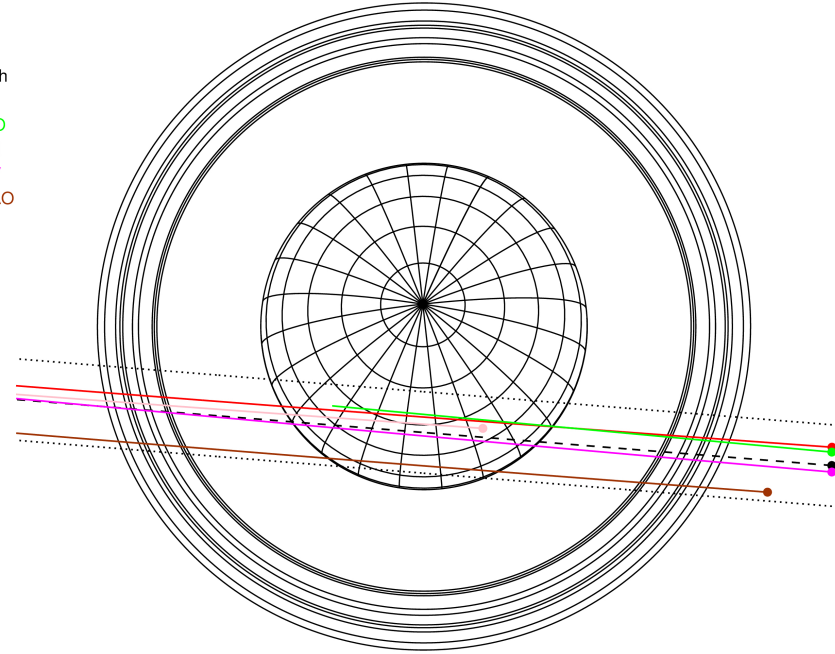
ICRS Star Coord at Epoch: 05h 10m 56.35353s +23:03:26.01776s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.806
 G magnitude : 17.538
 RP magnitude : 16.733
 BP magnitude : 18.237
 DUPflag : 0
 Distance (au) : 18.492
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.01
 Sun-Target sep (deg) : 130.50
 Sun-Moon sep (deg) : 57.94
 B (ring opening deg) : 82.11
 PA of pole (deg) : 2.98
 # a(km) ring



2031-01-28T19:11:31.2900 α: 05 10 56.3535 s: +23 03 26.018 C/A 1.228° PA 355.38 deg v_sky -13.01 km/s D 18.49 AU
 Credit: Styled after SORA/Lucky Star

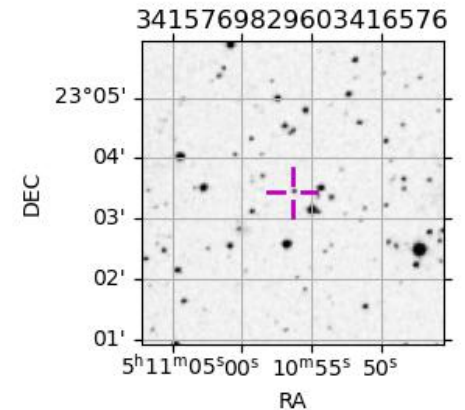
Earth
 PIC
 PMO
 TEN
 KAV
 SAAO



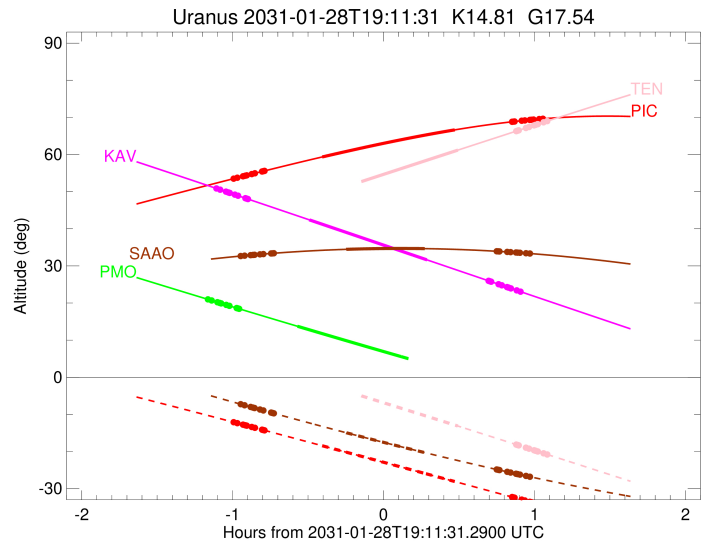
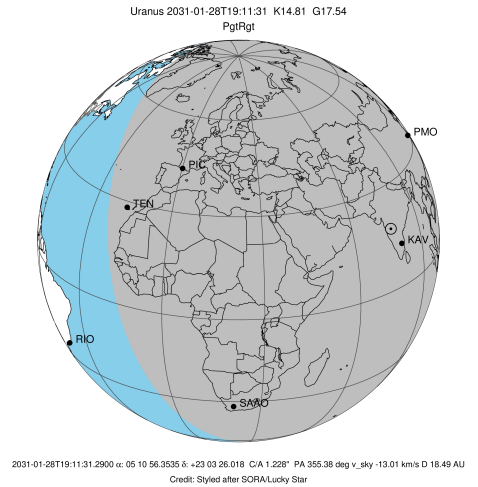
| # | a(km) | ring |
|----|---------|---------|
| 1 | 41837.2 | 6 |
| 2 | 42235.0 | 5 |
| 3 | 42571.2 | 4 |
| 4 | 44718.5 | alpha |
| 5 | 45661.1 | beta |
| 6 | 47176.1 | eta |
| 7 | 47626.3 | gamma |
| 8 | 48300.3 | delta |
| 9 | 50026.7 | lambda |
| 10 | 51149.4 | epsilon |

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 28 18:12 - JAN 28 20:15 | PieRie |
| PAL | Palomar Mt (200") | 33.4 | 243.1 | | | | | PnnRnn |
| PMO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | +++++ | + | | JAN 28 18:01 - JAN 28 18:37 | PinRin |
| 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 28 19:41 - JAN 28 20:17 | PneRne |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | | | | PnnRnn |
| KAV | Kavalur Observatory | 12.6 | 78.8 | +++++ | + + | +++++ | JAN 28 18:05 - JAN 28 20:06 | 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 | +++++ | + + | +++++ | JAN 28 18:14 - JAN 28 20:10 | PieRie |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |

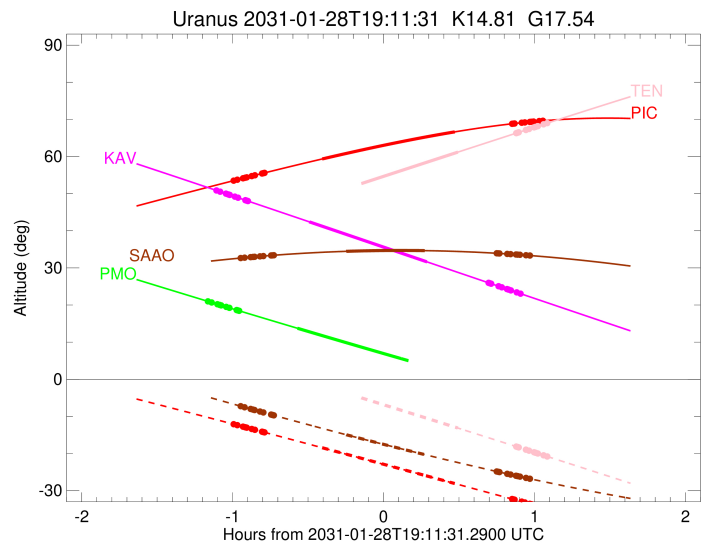
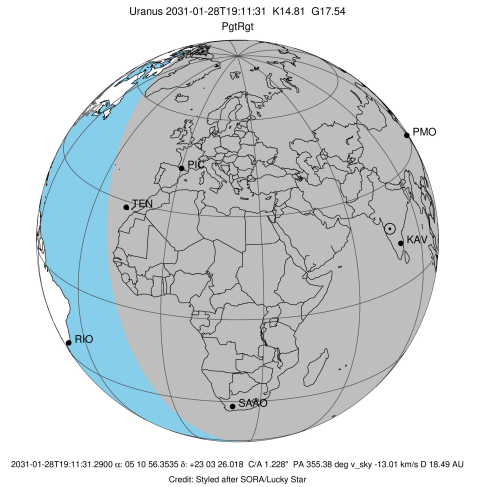


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-28T19:13:25.150
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3415769829603416576
 2Mass ID (if available) : 05105634+2303259
 ICRS Star Coord at Epoch: 05h 10m 56.35353s +23:03:26.01776s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.806
 G magnitude : 17.538
 RP magnitude : 16.733
 BP magnitude : 18.237
 DUPflag : 0
 Distance (au) : 18.492
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.01
 Sun-Target sep (deg) : 130.50
 Sun-Moon sep (deg) : 58.52
 B (ring opening deg) : 82.11
 PA of pole (deg) : 2.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.055
 C/A sky separation (km) : 14146.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.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



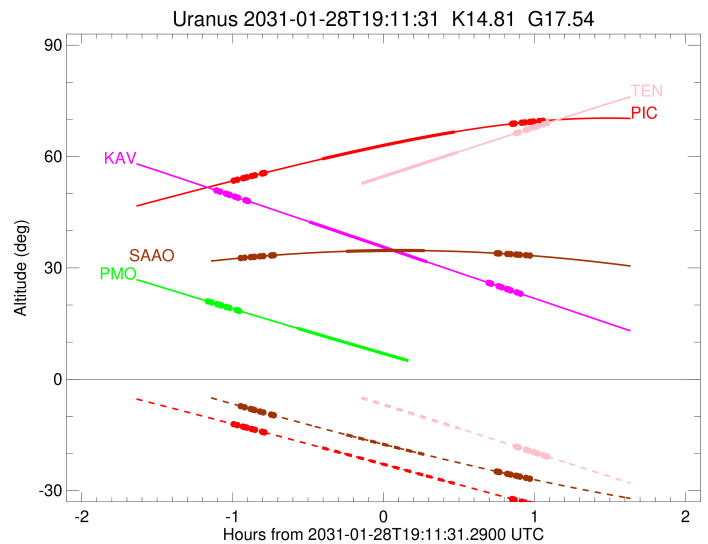
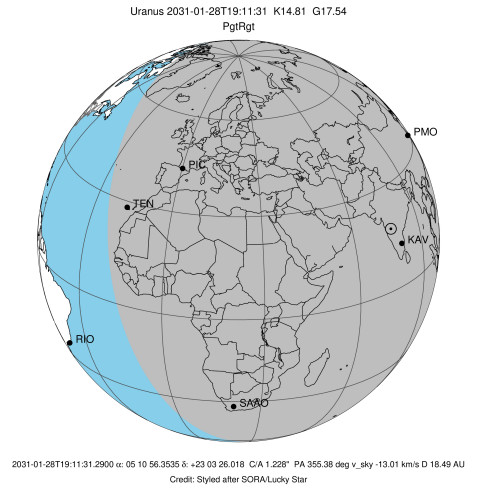
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2031-01-28T18:12:09.372 | | 53.54 | -12.14 | 51004.33 | -12.78 | | |
| lambda | I | 2031-01-28T18:13:26.075 | | 53.76 | -12.37 | 50026.71 | -12.74 | | |
| delta | I | 2031-01-28T18:15:41.846 | | 54.15 | -12.77 | 48300.35 | -12.69 | | |
| gamma | I | 2031-01-28T18:16:35.106 | | 54.30 | -12.93 | 47624.66 | -12.68 | | |
| eta | I | 2031-01-28T18:17:10.502 | | 54.40 | -13.04 | 47176.12 | -12.67 | | |
| beta | I | 2031-01-28T18:19:09.951 | | 54.74 | -13.39 | 45665.51 | -12.62 | | |
| alpha | I | 2031-01-28T18:20:22.449 | | 54.94 | -13.61 | 44751.51 | -12.60 | | |
| 4 | I | 2031-01-28T18:23:12.550 | | 55.42 | -14.12 | 42615.20 | -12.52 | | |
| 5 | I | 2031-01-28T18:23:37.575 | | 55.49 | -14.19 | 42300.22 | -12.51 | | |
| 6 | I | 2031-01-28T18:24:14.431 | | 55.60 | -14.30 | 41839.01 | -12.49 | | |
| Uranus | I | 2031-01-28T18:47:09.315 | | 59.35 | -18.45 | 25304.28 | | -5.19 | -5.44 |
| Uranus | E | 2031-01-28T19:39:52.452 | | 66.65 | -28.09 | 25441.66 | | -3.51 | -3.67 |
| 6 | E | 2031-01-28T20:02:35.038 | | 68.82 | -32.25 | 41808.74 | 12.52 | | |
| 5 | E | 2031-01-28T20:03:02.798 | | 68.85 | -32.33 | 42154.99 | 12.54 | | |
| 4 | E | 2031-01-28T20:03:33.774 | | 68.89 | -32.43 | 42543.96 | 12.55 | | |
| alpha | E | 2031-01-28T20:06:24.845 | | 69.10 | -32.95 | 44696.88 | 12.63 | | |
| beta | E | 2031-01-28T20:07:39.921 | | 69.19 | -33.18 | 45646.03 | 12.65 | | |
| eta | E | 2031-01-28T20:09:40.621 | | 69.32 | -33.54 | 47176.12 | 12.70 | | |
| gamma | E | 2031-01-28T20:10:16.383 | | 69.36 | -33.65 | 47630.46 | 12.71 | | |
| delta | E | 2031-01-28T20:11:09.050 | | 69.42 | -33.81 | 48300.35 | 12.73 | | |
| lambda | E | 2031-01-28T20:13:24.461 | | 69.55 | -34.23 | 50026.71 | 12.77 | | |
| epsilon | E | 2031-01-28T20:15:17.412 | | 69.66 | -34.57 | 51470.83 | 12.82 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-28T19:04:31.320
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415769829603416576
 2Mass ID (if available) : 05105634+2303259
 ICRS Star Coord at Epoch: 05h 10m 56.35353s +23:03:26.01776s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.806
 G magnitude : 17.538
 RP magnitude : 16.733
 BP magnitude : 18.237
 DUPflag : 0
 Distance (au) : 18.492
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.01
 Sun-Target sep (deg) : 130.50
 Sun-Moon sep (deg) : 58.46
 B (ring opening deg) : 82.11
 PA of pole (deg) : 2.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.022
 C/A sky separation (km) : 13709.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.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



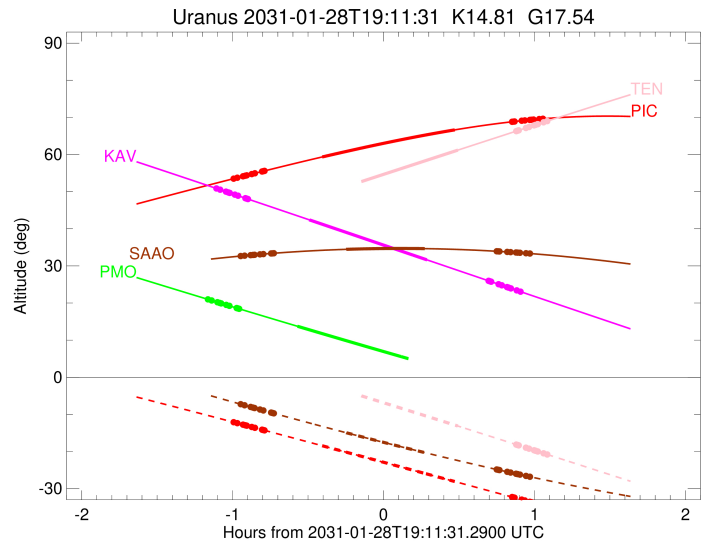
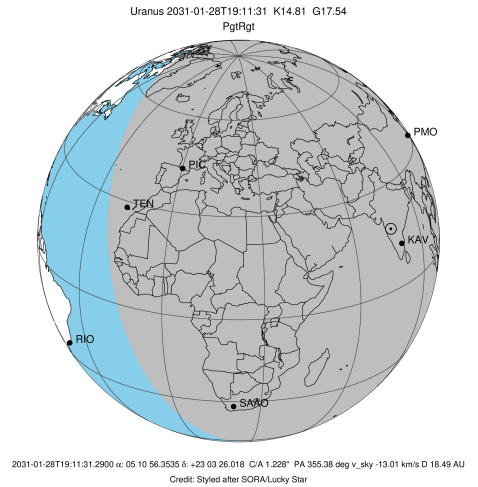
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|--------|---------|----------|--------|---------|--------------|
| epsilon | I | 2031-01-28T18:01:55.659 | | 20.95 | -62.76 | 51007.83 | -12.65 | | |
| lambda | I | 2031-01-28T18:03:13.447 | | 20.68 | -62.50 | 50026.71 | -12.60 | | |
| delta | I | 2031-01-28T18:05:30.671 | | 20.21 | -62.06 | 48300.35 | -12.56 | | |
| gamma | I | 2031-01-28T18:06:24.507 | | 20.03 | -61.88 | 47624.71 | -12.54 | | |
| eta | I | 2031-01-28T18:07:00.294 | | 19.90 | -61.77 | 47176.12 | -12.53 | | |
| beta | I | 2031-01-28T18:09:01.075 | | 19.49 | -61.37 | 45665.35 | -12.48 | | |
| alpha | I | 2031-01-28T18:10:14.366 | | 19.24 | -61.13 | 44751.56 | -12.46 | | |
| 4 | I | 2031-01-28T18:13:06.389 | | 18.65 | -60.56 | 42615.28 | -12.38 | | |
| 5 | I | 2031-01-28T18:13:31.728 | | 18.57 | -60.48 | 42299.89 | -12.37 | | |
| 6 | I | 2031-01-28T18:14:09.003 | | 18.44 | -60.36 | 41838.72 | -12.35 | | |
| Uranus | I | 2031-01-28T18:37:17.748 | | 13.74 | -55.68 | 25305.88 | | -5.18 | -5.42 |
| Uranus | E | 2031-01-28T19:32:05.752 | | 2.94x | -44.24 | 25458.99 | | -3.24 | -3.39 |
| 6 | E | 2031-01-28T19:55:20.153 | | -1.46x | -39.32 | 41809.63 | 12.16 | | |
| 5 | E | 2031-01-28T19:55:48.628 | | -1.55x | -39.22 | 42154.88 | 12.18 | | |
| 4 | E | 2031-01-28T19:56:20.456 | | -1.65x | -39.10 | 42542.97 | 12.19 | | |
| alpha | E | 2031-01-28T19:59:16.686 | | -2.20x | -38.48 | 44696.19 | 12.25 | | |
| beta | E | 2031-01-28T20:00:34.153 | | -2.44x | -38.21 | 45646.39 | 12.27 | | |
| eta | E | 2031-01-28T20:02:38.579 | | -2.82x | -37.77 | 47176.12 | 12.31 | | |
| gamma | E | 2031-01-28T20:03:15.460 | | -2.94x | -37.64 | 47630.38 | 12.32 | | |
| delta | E | 2031-01-28T20:04:09.801 | | -3.10x | -37.44 | 48300.35 | 12.34 | | |
| lambda | E | 2031-01-28T20:06:29.554 | | -3.53x | -36.95 | 50026.71 | 12.37 | | |
| epsilon | E | 2031-01-28T20:08:25.665 | | -3.89x | -36.54 | 51464.40 | 12.41 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-28T19:15:39.150
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3415769829603416576
 2Mass ID (if available) : 05105634+2303259
 ICRS Star Coord at Epoch: 05h 10m 56.35353s +23:03:26.01776s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.806
 G magnitude : 17.538
 RP magnitude : 16.733
 BP magnitude : 18.237
 DUPflag : 0
 Distance (au) : 18.492
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.01
 Sun-Target sep (deg) : 130.50
 Sun-Moon sep (deg) : 58.32
 B (ring opening deg) : 82.11
 PA of pole (deg) : 2.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.138
 C/A sky separation (km) : 15259.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.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



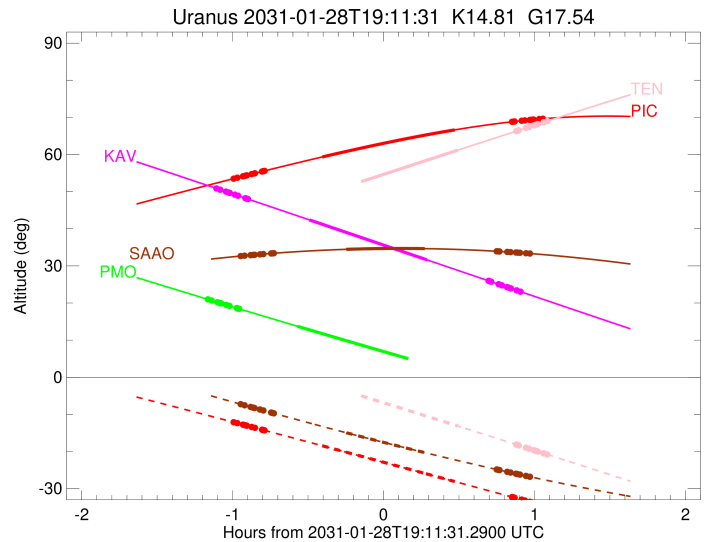
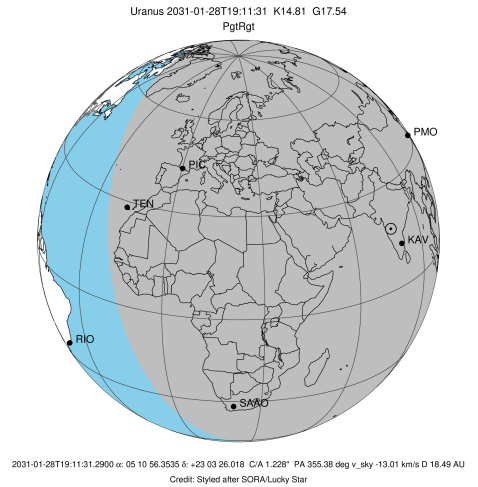
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2031-01-28T18:14:44.801 | | 42.14 | 4.88x | 51011.68 | -12.67 | | |
| lambda | I | 2031-01-28T18:16:02.808 | | 42.42 | 4.62x | 50026.71 | -12.61 | | |
| delta | I | 2031-01-28T18:18:19.909 | | 42.92 | 4.16x | 48300.35 | -12.57 | | |
| gamma | I | 2031-01-28T18:19:13.701 | | 43.12 | 3.97x | 47624.77 | -12.55 | | |
| eta | I | 2031-01-28T18:19:49.472 | | 43.25 | 3.85x | 47176.12 | -12.54 | | |
| beta | I | 2031-01-28T18:21:50.233 | | 43.69 | 3.44x | 45665.07 | -12.49 | | |
| alpha | I | 2031-01-28T18:23:03.490 | | 43.96 | 3.20x | 44751.68 | -12.46 | | |
| 4 | I | 2031-01-28T18:25:55.600 | | 44.59 | 2.61x | 42615.46 | -12.37 | | |
| 5 | I | 2031-01-28T18:26:21.038 | | 44.69 | 2.53x | 42299.04 | -12.35 | | |
| 6 | I | 2031-01-28T18:26:58.357 | | 44.82 | 2.40x | 41837.94 | -12.33 | | |
| Uranus | I | 2031-01-28T18:50:25.330 | | 49.99 | -2.44x | 25274.86 | | -5.49 | -5.75 |
| Uranus | E | 2031-01-28T19:41:03.559 | | 61.18 | -13.13 | 25413.33 | | -3.91 | -4.10 |
| 6 | E | 2031-01-28T20:04:13.783 | | 66.29 | -18.12 | 41807.73 | 12.41 | | |
| 5 | E | 2031-01-28T20:04:41.905 | | 66.39 | -18.22 | 42155.19 | 12.43 | | |
| 4 | E | 2031-01-28T20:05:13.211 | | 66.51 | -18.33 | 42545.12 | 12.45 | | |
| alpha | E | 2031-01-28T20:08:05.584 | | 67.14 | -18.96 | 44697.69 | 12.54 | | |
| beta | E | 2031-01-28T20:09:21.080 | | 67.41 | -19.23 | 45645.65 | 12.57 | | |
| eta | E | 2031-01-28T20:11:22.568 | | 67.86 | -19.67 | 47176.12 | 12.62 | | |
| gamma | E | 2031-01-28T20:11:58.547 | | 67.99 | -19.80 | 47630.55 | 12.64 | | |
| delta | E | 2031-01-28T20:12:51.501 | | 68.18 | -19.99 | 48300.35 | 12.66 | | |
| lambda | E | 2031-01-28T20:15:07.603 | | 68.68 | -20.48 | 50026.71 | 12.71 | | |
| epsilon | E | 2031-01-28T20:17:01.573 | | 69.09 | -20.89 | 51477.32 | 12.77 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-28T19:05:14.630
 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 : 3415769829603416576
 2Mass ID (if available) : 05105634+2303259
 ICRS Star Coord at Epoch: 05h 10m 56.35353s +23:03:26.01776s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.806
 G magnitude : 17.538
 RP magnitude : 16.733
 BP magnitude : 18.237
 DUPflag : 0
 Distance (au) : 18.492
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.01
 Sun-Target sep (deg) : 130.50
 Sun-Moon sep (deg) : 58.80
 B (ring opening deg) : 82.11
 PA of pole (deg) : 2.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.274
 C/A sky separation (km) : 17081.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.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 | 2031-01-28T18:05:16.972 | | 50.83 | -76.20 | 51033.28 | -12.63 | | |
| lambda | I | 2031-01-28T18:06:37.023 | | 50.52 | -76.50 | 50026.71 | -12.56 | | |
| delta | I | 2031-01-28T18:08:54.864 | | 50.00 | -77.00 | 48300.35 | -12.49 | | |
| gamma | I | 2031-01-28T18:09:48.983 | | 49.79 | -77.19 | 47625.08 | -12.46 | | |
| eta | I | 2031-01-28T18:10:25.032 | | 49.66 | -77.32 | 47176.12 | -12.44 | | |
| beta | I | 2031-01-28T18:12:26.866 | | 49.19 | -77.76 | 45663.85 | -12.37 | | |
| alpha | I | 2031-01-28T18:13:40.683 | | 48.91 | -78.02 | 44752.06 | -12.33 | | |
| 4 | I | 2031-01-28T18:16:34.734 | | 48.25 | -78.64 | 42616.01 | -12.22 | | |
| 5 | I | 2031-01-28T18:17:00.775 | | 48.15 | -78.73 | 42295.74 | -12.19 | | |
| 6 | I | 2031-01-28T18:17:38.580 | | 48.00 | -78.86 | 41835.13 | -12.16 | | |
| Uranus | I | 2031-01-28T18:42:00.731 | | 42.41 | -83.26 | 25209.43 | | -6.11 | -6.39 |
| Uranus | E | 2031-01-28T19:28:49.877 | | 31.62 | -80.62 | 25373.66 | | -4.42 | -4.63 |
| 6 | E | 2031-01-28T19:53:13.966 | | 26.00 | -75.48 | 41806.85 | 12.00 | | |
| 5 | E | 2031-01-28T19:53:43.141 | | 25.89 | -75.37 | 42155.45 | 12.03 | | |
| 4 | E | 2031-01-28T19:54:15.537 | | 25.76 | -75.25 | 42546.18 | 12.05 | | |
| alpha | E | 2031-01-28T19:57:13.411 | | 25.08 | -74.59 | 44698.38 | 12.16 | | |
| beta | E | 2031-01-28T19:58:31.160 | | 24.78 | -74.30 | 45645.34 | 12.20 | | |
| eta | E | 2031-01-28T20:00:36.351 | | 24.30 | -73.82 | 47176.12 | 12.26 | | |
| gamma | E | 2031-01-28T20:01:13.406 | | 24.16 | -73.69 | 47630.63 | 12.27 | | |
| delta | E | 2031-01-28T20:02:07.916 | | 23.95 | -73.48 | 48300.35 | 12.30 | | |
| lambda | E | 2031-01-28T20:04:27.966 | | 23.41 | -72.95 | 50026.71 | 12.35 | | |
| epsilon | E | 2031-01-28T20:06:25.539 | | 22.96 | -72.50 | 51481.82 | 12.42 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-28T19:12:08.960
 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 : 3415769829603416576
 2Mass ID (if available) : 05105634+2303259
 ICRS Star Coord at Epoch: 05h 10m 56.35353s +23:03:26.01776s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.806
 G magnitude : 17.538
 RP magnitude : 16.733
 BP magnitude : 18.237
 DUPflag : 0
 Distance (au) : 18.492
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.01
 Sun-Target sep (deg) : 130.50
 Sun-Moon sep (deg) : 58.38
 B (ring opening deg) : 82.11
 PA of pole (deg) : 2.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.623
 C/A sky separation (km) : 21761.7
 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 | 2031-01-28T18:14:53.000 | | 32.66 | -7.27 | 51067.90 | -12.13 | | |
| lambda | I | 2031-01-28T18:16:19.338 | | 32.75 | -7.55 | 50026.71 | -12.03 | | |
| delta | I | 2031-01-28T18:18:43.455 | | 32.90 | -8.00 | 48300.35 | -11.93 | | |
| gamma | I | 2031-01-28T18:19:40.141 | | 32.95 | -8.18 | 47625.58 | -11.88 | | |
| eta | I | 2031-01-28T18:20:18.021 | | 32.99 | -8.29 | 47176.12 | -11.85 | | |
| beta | I | 2031-01-28T18:22:26.384 | | 33.11 | -8.69 | 45661.79 | -11.74 | | |
| alpha | I | 2031-01-28T18:23:44.103 | | 33.19 | -8.94 | 44752.40 | -11.67 | | |
| 4 | I | 2031-01-28T18:26:48.755 | | 33.35 | -9.51 | 42616.52 | -11.47 | | |
| 5 | I | 2031-01-28T18:27:17.020 | | 33.37 | -9.60 | 42289.33 | -11.43 | | |
| 6 | I | 2031-01-28T18:27:57.290 | | 33.41 | -9.72 | 41830.22 | -11.39 | | |
| Uranus | I | 2031-01-28T18:56:40.530 | | 34.46 | -14.94 | 25064.65 | | -7.30 | -7.64 |
| Uranus | E | 2031-01-28T19:27:57.069 | | 34.65 | -20.30 | 25194.98 | | -6.23 | -6.53 |
| 6 | E | 2031-01-28T19:56:27.600 | | 33.94 | -24.83 | 41803.00 | 11.37 | | |
| 5 | E | 2031-01-28T19:56:59.008 | | 33.92 | -24.91 | 42157.58 | 11.42 | | |
| 4 | E | 2031-01-28T19:57:33.334 | | 33.90 | -25.00 | 42551.57 | 11.46 | | |
| alpha | E | 2031-01-28T20:00:39.605 | | 33.77 | -25.46 | 44702.07 | 11.65 | | |
| beta | E | 2031-01-28T20:02:00.175 | | 33.71 | -25.67 | 45643.90 | 11.72 | | |
| eta | E | 2031-01-28T20:04:10.264 | | 33.61 | -25.99 | 47176.12 | 11.83 | | |
| gamma | E | 2031-01-28T20:04:48.653 | | 33.58 | -26.08 | 47630.96 | 11.86 | | |
| delta | E | 2031-01-28T20:05:44.973 | | 33.54 | -26.22 | 48300.35 | 11.91 | | |
| lambda | E | 2031-01-28T20:08:09.315 | | 33.42 | -26.57 | 50026.71 | 12.01 | | |
| epsilon | E | 2031-01-28T20:10:12.034 | | 33.31 | -26.87 | 51505.71 | 12.11 | | |