

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-19T21:58:47.380
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427506703914755456
 2Mass ID (if available) : 05510511+2338240

Uranus 2033-01-19T21:58:47 K14.85 G17.91 PgtRgt

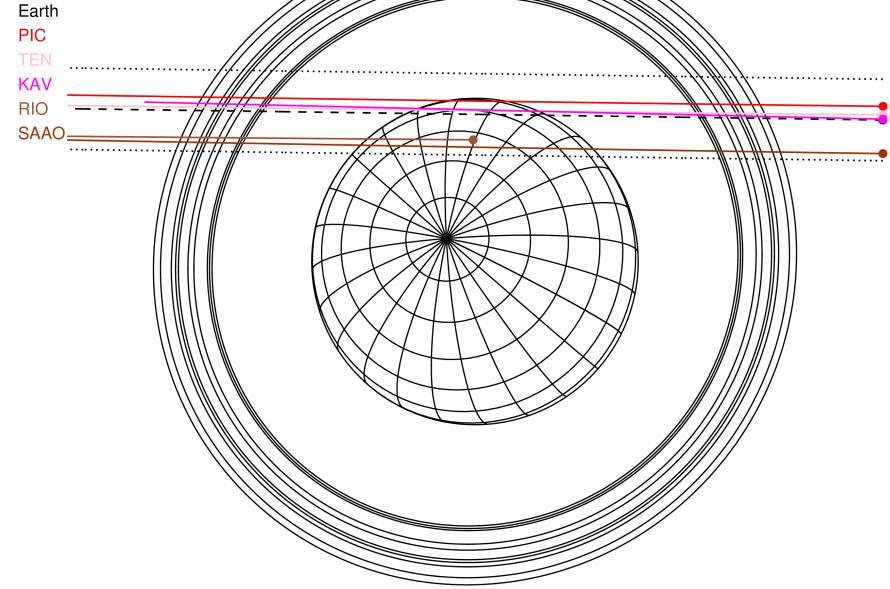
ICRS Star Coord at Epoch: 05h 51m 05.12402s +23:38:23.81983s

RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.848
 G magnitude : 17.915
 RP magnitude : 17.049
 BP magnitude : 18.744
 DUPflag : 0
 Distance (au) : 18.170
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.98
 Sun-Target sep (deg) : 148.27
 Sun-Moon sep (deg) : 80.22
 B (ring opening deg) : 77.01
 PA of pole (deg) : 51.22

Uranus 2033-01-19T21:58:47 K14.85 G17.91
 PgtRgt



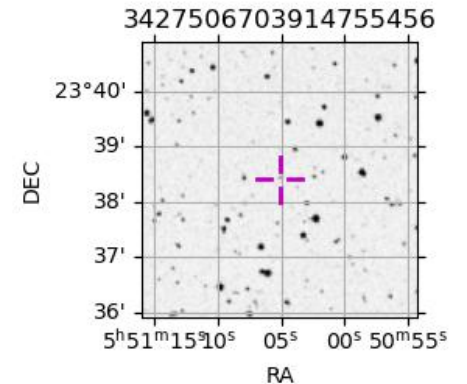
2033-01-19T21:58:47.3800 ex: 05 51 05.1240 s: +23 38 23.820 C/A 1.755° PA 179.20 deg v_sky -18.98 km/s D 18.17 AU
 Credit: Styled after SORA/Lucky Star



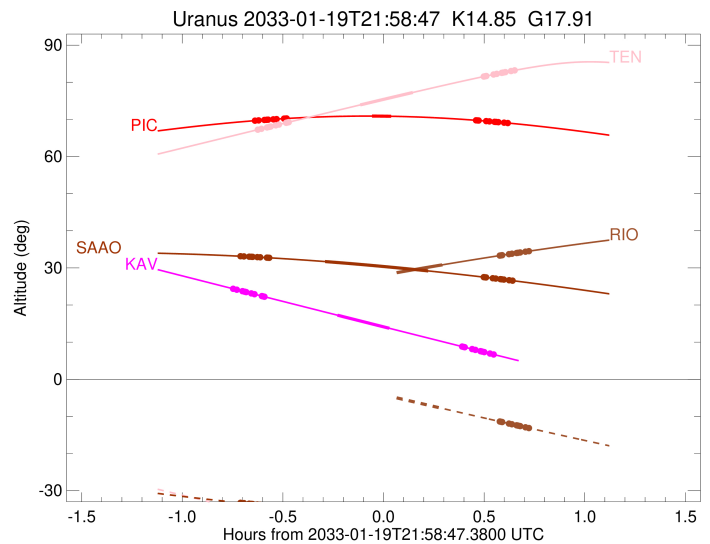
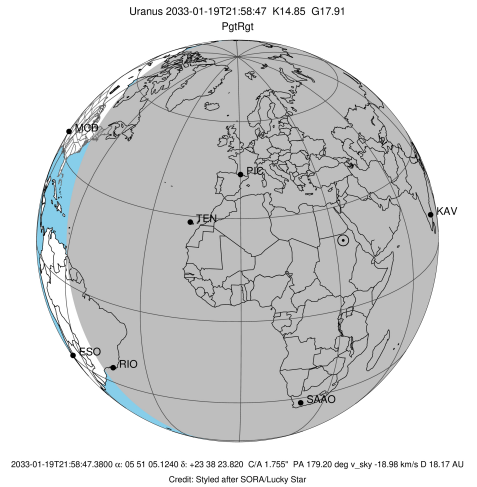
| # | a(km) | ring |
|----|---------|---------|
| 1 | 41837.2 | 6 |
| 2 | 42235.0 | 5 |
| 3 | 42571.2 | 4 |
| 4 | 44718.5 | alpha |
| 5 | 45661.1 | beta |
| 6 | 47176.1 | eta |
| 7 | 47626.3 | gamma |
| 8 | 48300.3 | delta |
| 9 | 50026.7 | lambda |
| 10 | 51149.4 | epsilon |

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 19 21:20 - JAN 19 22:36 | PieRie |
| 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 | +++++ | + + | +++++ | JAN 19 21:21 - JAN 19 22:38 | PieRie |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | | | | PnnRnn |
| KAV | Kavalur Observatory | 12.6 | 78.8 | +++++ | + + | +++++ | JAN 19 21:14 - JAN 19 22:32 | PieRie |
| RIO | Rio de Janeiro | -22.9 | 316.8 | | + | +++++ | JAN 19 22:16 - JAN 19 22:42 | PneRne |
| 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 19 21:16 - JAN 19 22:37 | PieRie |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |

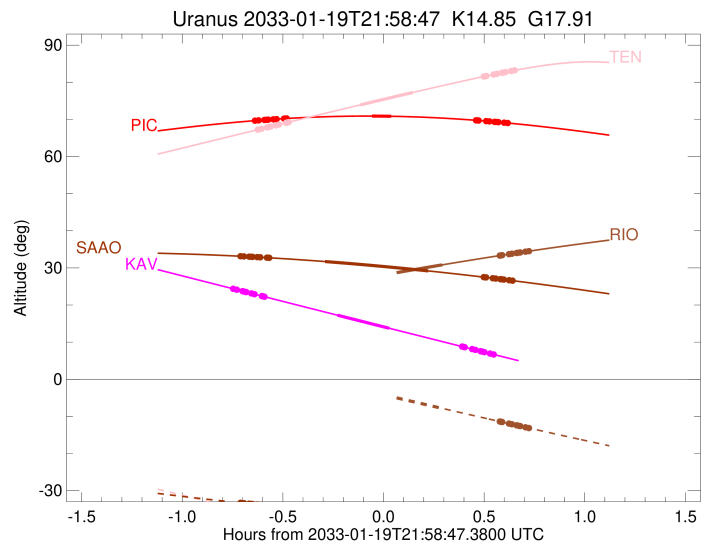
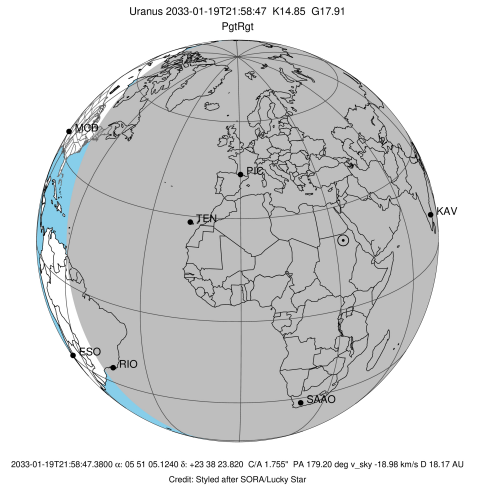


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-19T21:58:41.350
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3427506703914755456
 2Mass ID (if available) : 05510511+2338240
 ICRS Star Coord at Epoch: 05h 51m 05.12402s +23:38:23.81983s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.848
 G magnitude : 17.915
 RP magnitude : 17.049
 BP magnitude : 18.744
 DUPflag : 0
 Distance (au) : 18.170
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.98
 Sun-Target sep (deg) : 148.27
 Sun-Moon sep (deg) : 81.06
 B (ring opening deg) : 77.01
 PA of pole (deg) : 51.22
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.907
 C/A sky separation (km) : 25128.0
 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



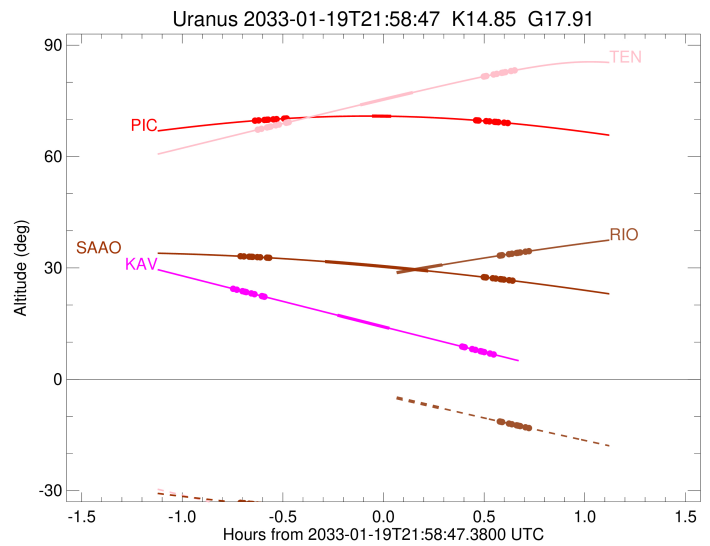
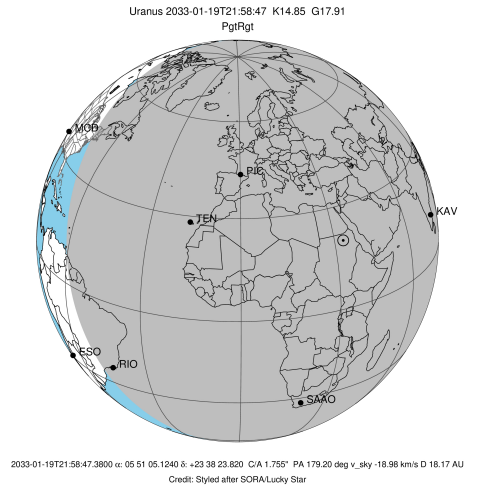
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2033-01-19T21:20:36.261 | | 69.67 | -47.94 | 51017.82 | -17.11 | | |
| lambda | I | 2033-01-19T21:21:34.632 | | 69.74 | -48.11 | 50026.71 | -16.92 | | |
| delta | I | 2033-01-19T21:23:17.288 | | 69.86 | -48.41 | 48300.35 | -16.71 | | |
| gamma | I | 2033-01-19T21:23:57.462 | | 69.90 | -48.52 | 47630.95 | -16.62 | | |
| eta | I | 2033-01-19T21:24:24.886 | | 69.93 | -48.60 | 47176.12 | -16.55 | | |
| beta | I | 2033-01-19T21:25:56.302 | | 70.03 | -48.87 | 45673.38 | -16.33 | | |
| alpha | I | 2033-01-19T21:26:54.399 | | 70.08 | -49.03 | 44728.98 | -16.18 | | |
| 4 | I | 2033-01-19T21:29:06.572 | | 70.21 | -49.41 | 42616.28 | -15.77 | | |
| 5 | I | 2033-01-19T21:29:32.614 | | 70.23 | -49.48 | 42209.26 | -15.71 | | |
| 6 | I | 2033-01-19T21:29:58.394 | | 70.25 | -49.56 | 41807.32 | -15.60 | | |
| Uranus | I | 2033-01-19T21:55:21.552 | | 70.90 | -53.79 | 25422.88 | | 6.31 | 6.60 |
| Uranus | E | 2033-01-19T22:01:05.964 | | 70.84 | -54.71 | 25282.92 | | 9.04 | 9.46 |
| 6 | E | 2033-01-19T22:26:20.143 | | 69.76 | -58.56 | 41815.85 | 15.59 | | |
| 5 | E | 2033-01-19T22:26:51.800 | | 69.72 | -58.64 | 42315.17 | 15.70 | | |
| 4 | E | 2033-01-19T22:27:08.375 | | 69.71 | -58.68 | 42563.15 | 15.76 | | |
| alpha | E | 2033-01-19T22:29:24.709 | | 69.54 | -59.00 | 44744.97 | 16.17 | | |
| beta | E | 2033-01-19T22:30:21.913 | | 69.47 | -59.14 | 45671.22 | 16.32 | | |
| eta | E | 2033-01-19T22:31:53.490 | | 69.35 | -59.35 | 47176.12 | 16.54 | | |
| gamma | E | 2033-01-19T22:32:20.666 | | 69.32 | -59.42 | 47626.50 | 16.61 | | |
| delta | E | 2033-01-19T22:33:01.137 | | 69.26 | -59.51 | 48300.35 | 16.70 | | |
| lambda | E | 2033-01-19T22:34:43.871 | | 69.12 | -59.75 | 50026.71 | 16.91 | | |
| epsilon | E | 2033-01-19T22:36:13.277 | | 68.99 | -59.96 | 51546.21 | 17.09 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-19T22:00:07.420
 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 : 3427506703914755456
 2Mass ID (if available) : 05510511+2338240
 ICRS Star Coord at Epoch: 05h 51m 05.12402s +23:38:23.81983s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.848
 G magnitude : 17.915
 RP magnitude : 17.049
 BP magnitude : 18.744
 DUPflag : 0
 Distance (au) : 18.170
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.98
 Sun-Target sep (deg) : 148.27
 Sun-Moon sep (deg) : 81.12
 B (ring opening deg) : 77.01
 PA of pole (deg) : 51.22
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.794
 C/A sky separation (km) : 23636.1
 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



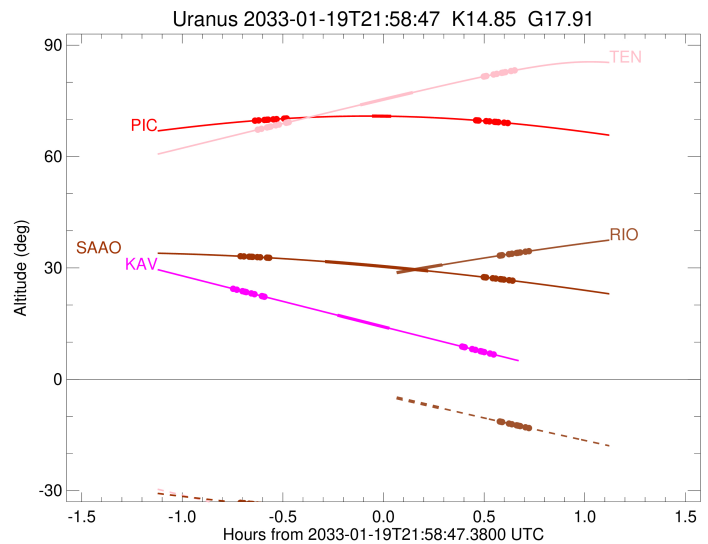
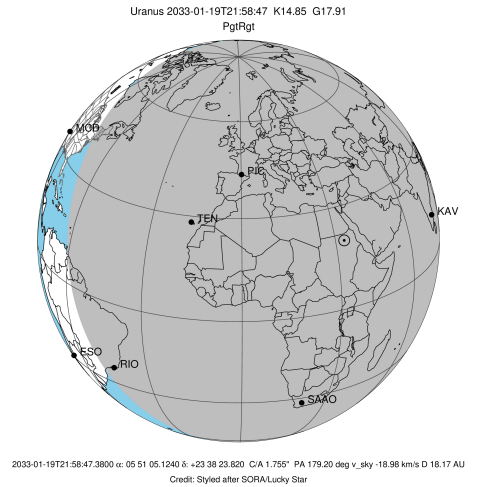
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2033-01-19T21:21:27.964 | | 67.27 | -36.20 | 51005.98 | -17.45 | | |
| lambda | I | 2033-01-19T21:22:24.453 | | 67.47 | -36.40 | 50026.71 | -17.29 | | |
| delta | I | 2033-01-19T21:24:04.852 | | 67.84 | -36.77 | 48300.35 | -17.10 | | |
| gamma | I | 2033-01-19T21:24:44.091 | | 67.99 | -36.91 | 47630.86 | -17.02 | | |
| eta | I | 2033-01-19T21:25:10.849 | | 68.08 | -37.01 | 47176.12 | -16.97 | | |
| beta | I | 2033-01-19T21:26:39.974 | | 68.41 | -37.34 | 45672.78 | -16.77 | | |
| alpha | I | 2033-01-19T21:27:36.523 | | 68.62 | -37.54 | 44727.75 | -16.64 | | |
| 4 | I | 2033-01-19T21:29:44.658 | | 69.09 | -38.01 | 42616.03 | -16.30 | | |
| 5 | I | 2033-01-19T21:30:10.062 | | 69.18 | -38.11 | 42206.14 | -16.24 | | |
| 6 | I | 2033-01-19T21:30:34.717 | | 69.27 | -38.20 | 41808.61 | -16.14 | | |
| Uranus | I | 2033-01-19T21:51:51.401 | | 73.91 | -42.88 | 25515.44 | | 3.55 | 3.72 |
| Uranus | E | 2033-01-19T22:07:31.558 | | 77.25 | -46.33 | 25154.39 | | 11.00 | 11.51 |
| 6 | E | 2033-01-19T22:28:38.775 | | 81.54 | -50.98 | 41817.58 | 16.16 | | |
| 5 | E | 2033-01-19T22:29:09.249 | | 81.64 | -51.09 | 42315.25 | 16.26 | | |
| 4 | E | 2033-01-19T22:29:25.149 | | 81.69 | -51.15 | 42561.12 | 16.31 | | |
| alpha | E | 2033-01-19T22:31:37.239 | | 82.10 | -51.64 | 44744.04 | 16.66 | | |
| beta | E | 2033-01-19T22:32:32.793 | | 82.27 | -51.84 | 45670.50 | 16.79 | | |
| eta | E | 2033-01-19T22:34:01.930 | | 82.54 | -52.17 | 47176.12 | 16.99 | | |
| gamma | E | 2033-01-19T22:34:28.391 | | 82.62 | -52.27 | 47626.30 | 17.04 | | |
| delta | E | 2033-01-19T22:35:07.855 | | 82.74 | -52.41 | 48300.35 | 17.12 | | |
| lambda | E | 2033-01-19T22:36:48.140 | | 83.03 | -52.78 | 50026.71 | 17.31 | | |
| epsilon | E | 2033-01-19T22:38:15.371 | | 83.28 | -53.10 | 51542.91 | 17.47 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-19T21:53:13.810
 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 : 3427506703914755456
 2Mass ID (if available) : 05510511+2338240
 ICRS Star Coord at Epoch: 05h 51m 05.12402s +23:38:23.81983s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.848
 G magnitude : 17.915
 RP magnitude : 17.049
 BP magnitude : 18.744
 DUPflag : 0
 Distance (au) : 18.170
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.98
 Sun-Target sep (deg) : 148.27
 Sun-Moon sep (deg) : 80.29
 B (ring opening deg) : 77.01
 PA of pole (deg) : 51.22
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.802
 C/A sky separation (km) : 23746.5
 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



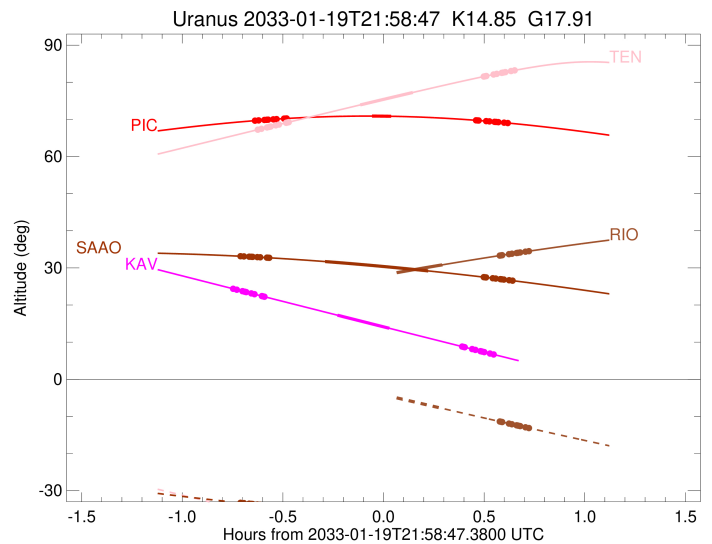
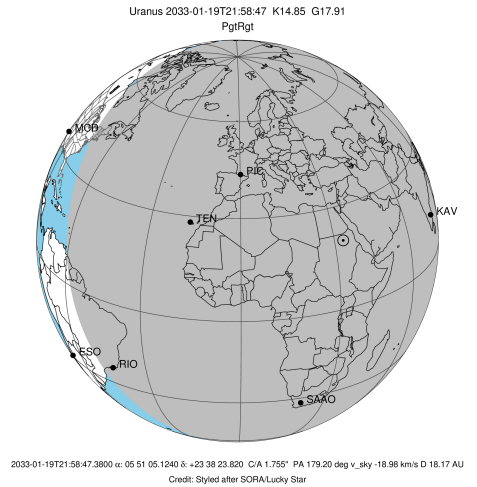
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2033-01-19T21:14:06.968 | | 24.34 | -55.96 | 51002.34 | -17.25 | | |
| lambda | I | 2033-01-19T21:15:03.911 | | 24.12 | -55.74 | 50026.71 | -17.08 | | |
| delta | I | 2033-01-19T21:16:45.519 | | 23.73 | -55.35 | 48300.35 | -16.89 | | |
| gamma | I | 2033-01-19T21:17:25.242 | | 23.58 | -55.19 | 47630.84 | -16.81 | | |
| eta | I | 2033-01-19T21:17:52.331 | | 23.48 | -55.09 | 47176.12 | -16.76 | | |
| beta | I | 2033-01-19T21:19:22.593 | | 23.13 | -54.74 | 45672.63 | -16.56 | | |
| alpha | I | 2033-01-19T21:20:19.883 | | 22.91 | -54.51 | 44727.46 | -16.43 | | |
| 4 | I | 2033-01-19T21:22:29.708 | | 22.42 | -54.01 | 42615.97 | -16.08 | | |
| 5 | I | 2033-01-19T21:22:55.504 | | 22.32 | -53.91 | 42205.49 | -16.02 | | |
| 6 | I | 2033-01-19T21:23:20.443 | | 22.22 | -53.81 | 41808.89 | -15.92 | | |
| Uranus | I | 2033-01-19T21:45:04.561 | | 17.26 | -48.73 | 25515.50 | | 3.55 | 3.72 |
| Uranus | E | 2033-01-19T22:00:30.897 | | 13.74 | -45.11 | 25166.01 | | 10.84 | 11.34 |
| 6 | E | 2033-01-19T22:22:11.463 | | 8.82 | -40.03 | 41817.06 | 15.82 | | |
| 5 | E | 2033-01-19T22:22:42.619 | | 8.70 | -39.91 | 42315.25 | 15.92 | | |
| 4 | E | 2033-01-19T22:22:58.895 | | 8.64 | -39.84 | 42561.74 | 15.97 | | |
| alpha | E | 2033-01-19T22:25:13.808 | | 8.13 | -39.32 | 44744.34 | 16.31 | | |
| beta | E | 2033-01-19T22:26:10.556 | | 7.92 | -39.09 | 45670.74 | 16.44 | | |
| eta | E | 2033-01-19T22:27:41.598 | | 7.57 | -38.74 | 47176.12 | 16.63 | | |
| gamma | E | 2033-01-19T22:28:08.634 | | 7.47 | -38.63 | 47626.37 | 16.68 | | |
| delta | E | 2033-01-19T22:28:48.947 | | 7.32 | -38.47 | 48300.35 | 16.76 | | |
| lambda | E | 2033-01-19T22:30:31.403 | | 6.93 | -38.07 | 50026.71 | 16.94 | | |
| epsilon | E | 2033-01-19T22:32:00.605 | | 6.60 | -37.72 | 51544.21 | 17.10 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-19T22:02:20.130
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3427506703914755456
 2Mass ID (if available) : 05510511+2338240
 ICRS Star Coord at Epoch: 05h 51m 05.12402s +23:38:23.81983s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.848
 G magnitude : 17.915
 RP magnitude : 17.049
 BP magnitude : 18.744
 DUPflag : 0
 Distance (au) : 18.170
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.98
 Sun-Target sep (deg) : 148.27
 Sun-Moon sep (deg) : 80.73
 B (ring opening deg) : 77.01
 PA of pole (deg) : 51.22
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.446
 C/A sky separation (km) : 19054.5
 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 | 2033-01-19T21:21:46.824 | | 21.78 | 3.73x | 50970.20 | -18.16 | | |
| lambda | I | 2033-01-19T21:22:38.999 | | 21.94 | 3.54x | 50026.71 | -18.05 | | |
| delta | I | 2033-01-19T21:24:14.912 | | 22.22 | 3.20x | 48300.35 | -17.94 | | |
| gamma | I | 2033-01-19T21:24:52.292 | | 22.33 | 3.06x | 47630.56 | -17.89 | | |
| eta | I | 2033-01-19T21:25:17.712 | | 22.41 | 2.97x | 47176.12 | -17.86 | | |
| beta | I | 2033-01-19T21:26:42.278 | | 22.66 | 2.67x | 45670.89 | -17.75 | | |
| alpha | I | 2033-01-19T21:27:35.749 | | 22.81 | 2.47x | 44723.96 | -17.67 | | |
| 4 | I | 2033-01-19T21:29:35.726 | | 23.17 | 2.04x | 42614.85 | -17.46 | | |
| 5 | I | 2033-01-19T21:29:59.961 | | 23.24 | 1.96x | 42197.11 | -17.43 | | |
| 6 | I | 2033-01-19T21:30:22.164 | | 23.30 | 1.88x | 41812.78 | -17.37 | | |
| Uranus | I | 2033-01-19T21:47:37.305 | | 26.25 | -1.81x | 25556.92 | | -0.78 | -0.81 |
| Uranus | E | 2033-01-19T22:16:20.237 | | 30.83 | -7.85 | 25023.54 | | 12.73 | 13.32 |
| 6 | E | 2033-01-19T22:33:25.687 | | 33.32 | -11.37 | 41822.75 | 17.43 | | |
| 5 | E | 2033-01-19T22:33:53.703 | | 33.38 | -11.47 | 42314.56 | 17.49 | | |
| 4 | E | 2033-01-19T22:34:08.235 | | 33.41 | -11.52 | 42555.50 | 17.52 | | |
| alpha | E | 2033-01-19T22:36:11.911 | | 33.70 | -11.94 | 44741.14 | 17.73 | | |
| beta | E | 2033-01-19T22:37:04.206 | | 33.82 | -12.11 | 45668.33 | 17.81 | | |
| eta | E | 2033-01-19T22:38:28.556 | | 34.01 | -12.40 | 47176.12 | 17.93 | | |
| gamma | E | 2033-01-19T22:38:53.602 | | 34.07 | -12.48 | 47625.70 | 17.97 | | |
| delta | E | 2033-01-19T22:39:31.099 | | 34.15 | -12.61 | 48300.35 | 18.02 | | |
| lambda | E | 2033-01-19T22:41:06.606 | | 34.37 | -12.93 | 50026.71 | 18.13 | | |
| epsilon | E | 2033-01-19T22:42:29.327 | | 34.55 | -13.21 | 51530.57 | 18.24 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-19T21:57:03.810
 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 : 3427506703914755456
 2Mass ID (if available) : 05510511+2338240
 ICRS Star Coord at Epoch: 05h 51m 05.12402s +23:38:23.81983s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 14.848
 G magnitude : 17.915
 RP magnitude : 17.049
 BP magnitude : 18.744
 DUPflag : 0
 Distance (au) : 18.170
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.98
 Sun-Target sep (deg) : 148.27
 Sun-Moon sep (deg) : 80.62
 B (ring opening deg) : 77.01
 PA of pole (deg) : 51.22
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.358
 C/A sky separation (km) : 17898.3
 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 | 2033-01-19T21:16:20.512 | | 33.13 | -33.30 | 50958.27 | -18.46 | | |
| lambda | I | 2033-01-19T21:17:11.188 | | 33.10 | -33.38 | 50026.71 | -18.36 | | |
| delta | I | 2033-01-19T21:18:45.489 | | 33.02 | -33.52 | 48300.35 | -18.26 | | |
| gamma | I | 2033-01-19T21:19:22.228 | | 32.99 | -33.57 | 47630.45 | -18.21 | | |
| eta | I | 2033-01-19T21:19:47.194 | | 32.97 | -33.61 | 47176.12 | -18.18 | | |
| beta | I | 2033-01-19T21:21:10.267 | | 32.91 | -33.73 | 45670.24 | -18.08 | | |
| alpha | I | 2033-01-19T21:22:02.770 | | 32.86 | -33.81 | 44722.71 | -18.01 | | |
| 4 | I | 2033-01-19T21:24:00.323 | | 32.76 | -33.98 | 42614.34 | -17.82 | | |
| 5 | I | 2033-01-19T21:24:24.214 | | 32.74 | -34.01 | 42194.35 | -17.80 | | |
| 6 | I | 2033-01-19T21:24:45.720 | | 32.72 | -34.05 | 41814.18 | -17.74 | | |
| Uranus | I | 2033-01-19T21:41:21.788 | | 31.71 | -35.33 | 25548.71 | -18.00 | -1.72 | -1.81 |
| Uranus | E | 2033-01-19T22:12:07.218 | | 29.19 | -37.00 | 25013.07 | -18.00 | 12.86 | 13.45 |
| 6 | E | 2033-01-19T22:28:38.650 | | 27.52 | -37.49 | 41823.66 | 17.70 | | |
| 5 | E | 2033-01-19T22:29:06.194 | | 27.47 | -37.50 | 42314.31 | 17.75 | | |
| 4 | E | 2033-01-19T22:29:20.478 | | 27.44 | -37.50 | 42554.57 | 17.78 | | |
| alpha | E | 2033-01-19T22:31:22.519 | | 27.22 | -37.54 | 44740.63 | 17.96 | | |
| beta | E | 2033-01-19T22:32:14.185 | | 27.13 | -37.56 | 45667.96 | 18.03 | | |
| eta | E | 2033-01-19T22:33:37.609 | | 26.97 | -37.58 | 47176.12 | 18.13 | | |
| gamma | E | 2033-01-19T22:34:02.386 | | 26.93 | -37.59 | 47625.61 | 18.16 | | |
| delta | E | 2033-01-19T22:34:39.506 | | 26.86 | -37.60 | 48300.35 | 18.20 | | |
| lambda | E | 2033-01-19T22:36:14.109 | | 26.68 | -37.62 | 50026.71 | 18.30 | | |
| epsilon | E | 2033-01-19T22:37:36.000 | | 26.53 | -37.63 | 51528.32 | 18.39 | | |