

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:06:52.790
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564

Uranus 2032-12-05T05:06:52 K14.86 G18.65 PgtRgt

ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s

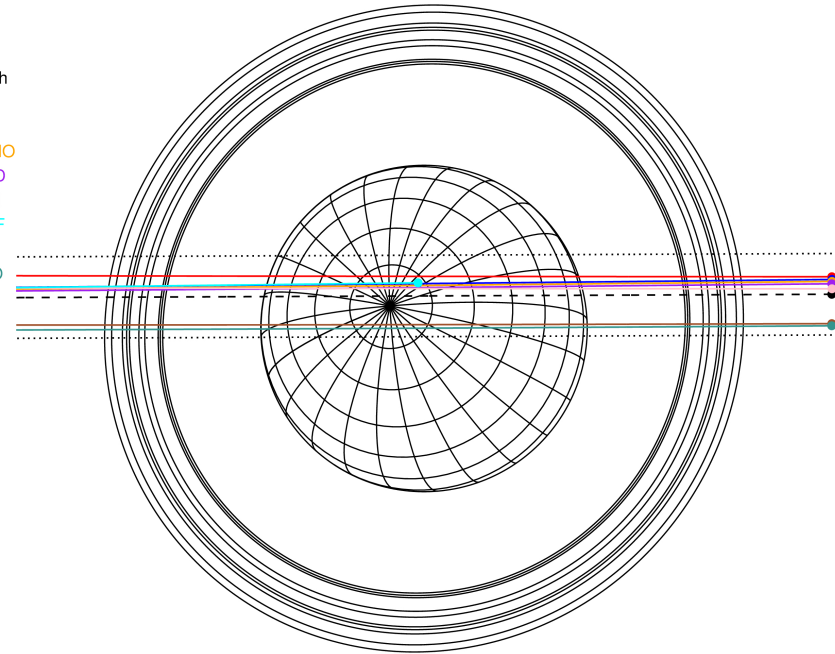
RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 165.90
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51

Uranus 2032-12-05T05:06:52 K14.86 G18.65
 PgtRgt



2032-12-05T05:06:52.7900 ra: 05 59 14.0288 s: +23 38 56.663 C/A 0.396° PA 180.23 deg v_sky -22.18 km/s D 18.08 AU
 Credit: Styled after SORA/Lucky Star

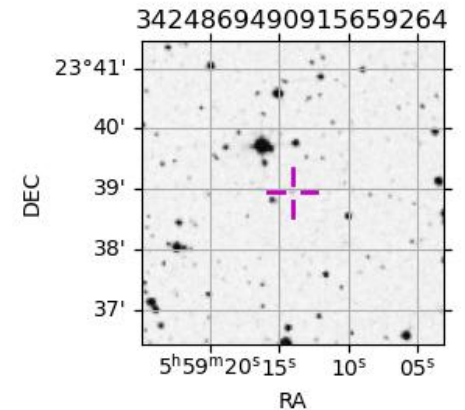
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO



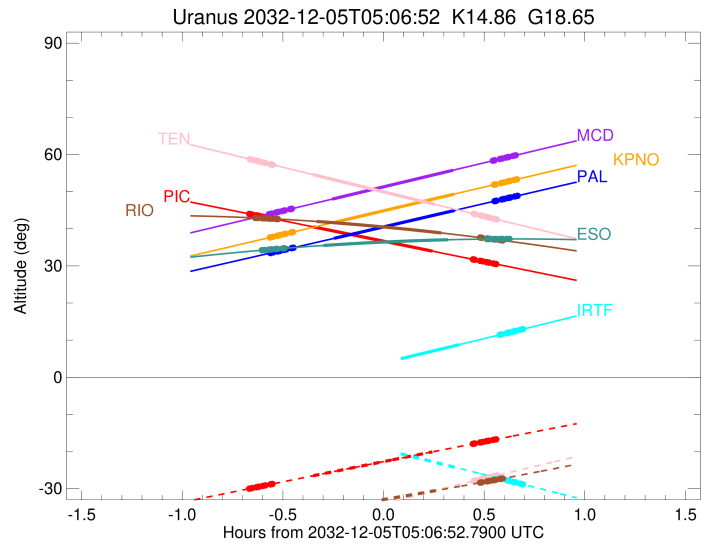
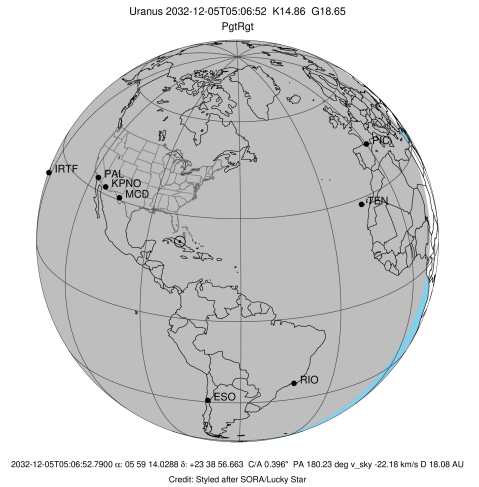
| # | a(km) | ring |
|----|---------|---------|
| 1 | 41837.2 | 6 |
| 2 | 42235.0 | 5 |
| 3 | 42571.2 | 4 |
| 4 | 44718.5 | alpha |
| 5 | 45661.1 | beta |
| 6 | 47176.1 | eta |
| 7 | 47626.3 | gamma |
| 8 | 48300.3 | delta |
| 9 | 50026.7 | lambda |
| 10 | 51149.4 | epsilon |

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 | OCode |
|------|-----------------------|-------|-------|---------|--------|---------|-----------------------------|--------|
| PIC | Pic du Midi | 42.9 | 0.1 | +++++ | + + | +++++ | DEC 05 04:26 - DEC 05 05:40 | PieRie |
| PAL | Palomar Mt (200") | 33.4 | 243.1 | +++++ | + + | +++++ | DEC 05 04:33 - DEC 05 05:46 | PieRie |
| PNO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | | | | | PnnRnn |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | +++++ | + + | +++++ | DEC 05 04:32 - DEC 05 05:46 | PieRie |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | +++++ | + + | +++++ | DEC 05 04:32 - DEC 05 05:46 | PieRie |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | +++++ | + + | +++++ | DEC 05 04:26 - DEC 05 05:40 | PieRie |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | + | +++++ | DEC 05 05:29 - DEC 05 05:48 | PneRne |
| KAV | Kavalur Observatory | 12.6 | 78.8 | | | | | PnnRnn |
| RIO | Rio de Janeiro | -22.9 | 316.8 | +++++ | + + | +++++ | DEC 05 04:28 - DEC 05 05:42 | PieRie |
| ESO | European Southern Obs | -29.3 | 289.3 | +++++ | + + | +++++ | DEC 05 04:30 - DEC 05 05:44 | PieRie |
| 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 |

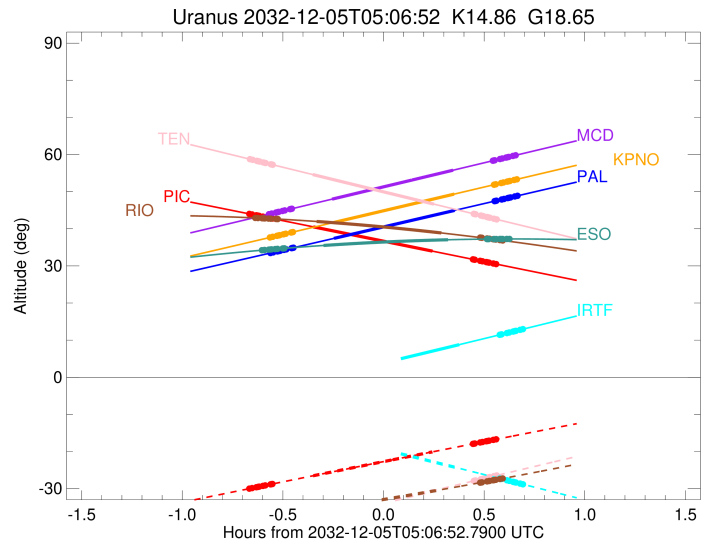
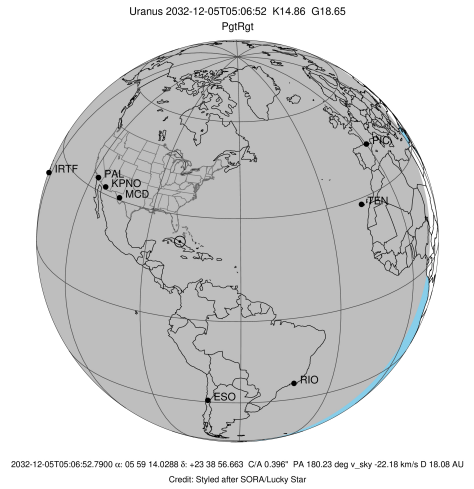


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:03:48.550
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564
 ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 165.64
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.623
 C/A sky separation (km) : 8162.6
 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



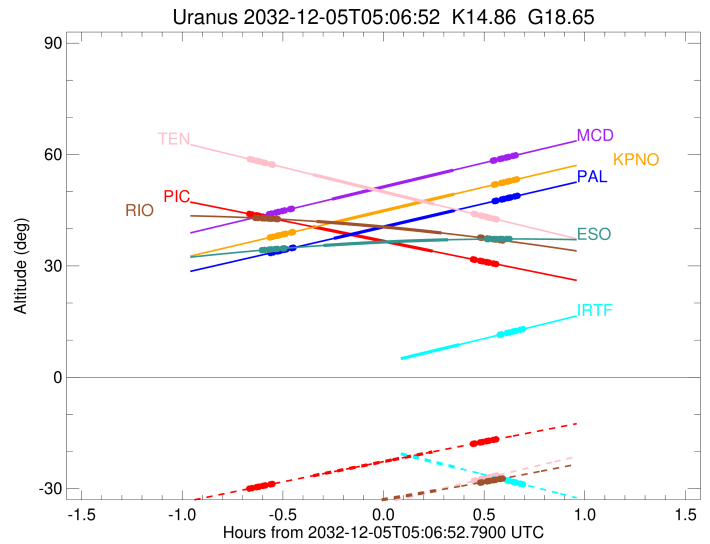
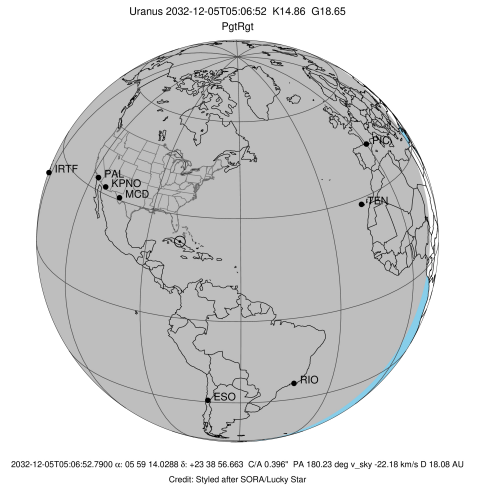
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2032-12-05T04:26:45.940 | | 44.03 | -30.02 | 51306.11 | -22.63 | | |
| lambda | I | 2032-12-05T04:27:42.559 | | 43.86 | -29.85 | 50026.71 | -22.59 | | |
| delta | I | 2032-12-05T04:28:59.028 | | 43.63 | -29.62 | 48300.35 | -22.56 | | |
| gamma | I | 2032-12-05T04:29:28.706 | | 43.54 | -29.53 | 47630.88 | -22.55 | | |
| eta | I | 2032-12-05T04:29:48.873 | | 43.47 | -29.47 | 47176.12 | -22.55 | | |
| beta | I | 2032-12-05T04:30:55.221 | | 43.27 | -29.26 | 45680.37 | -22.52 | | |
| alpha | I | 2032-12-05T04:31:36.572 | | 43.15 | -29.14 | 44752.35 | -22.50 | | |
| 4 | I | 2032-12-05T04:33:13.482 | | 42.85 | -28.84 | 42573.73 | -22.46 | | |
| 5 | I | 2032-12-05T04:33:24.991 | | 42.82 | -28.81 | 42313.38 | -22.45 | | |
| 6 | I | 2032-12-05T04:33:47.005 | | 42.75 | -28.74 | 41812.76 | -22.44 | | |
| Uranus | I | 2032-12-05T04:45:55.354 | | 40.52 | -26.52 | 25348.70 | | -8.83 | -9.24 |
| Uranus | E | 2032-12-05T05:21:28.311 | | 33.98 | -20.10 | 25043.02 | | 14.04 | 14.68 |
| 6 | E | 2032-12-05T05:33:34.345 | | 31.76 | -17.94 | 41873.28 | 22.37 | | |
| 5 | E | 2032-12-05T05:33:47.269 | | 31.72 | -17.90 | 42169.29 | 22.38 | | |
| 4 | E | 2032-12-05T05:34:03.999 | | 31.67 | -17.85 | 42551.58 | 22.38 | | |
| alpha | E | 2032-12-05T05:35:39.370 | | 31.37 | -17.57 | 44686.19 | 22.43 | | |
| beta | E | 2032-12-05T05:36:22.079 | | 31.24 | -17.44 | 45641.11 | 22.44 | | |
| eta | E | 2032-12-05T05:37:30.401 | | 31.03 | -17.24 | 47176.12 | 22.46 | | |
| gamma | E | 2032-12-05T05:37:50.203 | | 30.97 | -17.18 | 47621.03 | 22.47 | | |
| delta | E | 2032-12-05T05:38:20.427 | | 30.88 | -17.09 | 48300.35 | 22.48 | | |
| lambda | E | 2032-12-05T05:39:37.184 | | 30.65 | -16.86 | 50026.71 | 22.50 | | |
| epsilon | E | 2032-12-05T05:40:25.504 | | 30.50 | -16.72 | 51114.33 | 22.54 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:10:12.370
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564
 ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 166.77
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.537
 C/A sky separation (km) : 7035.3
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



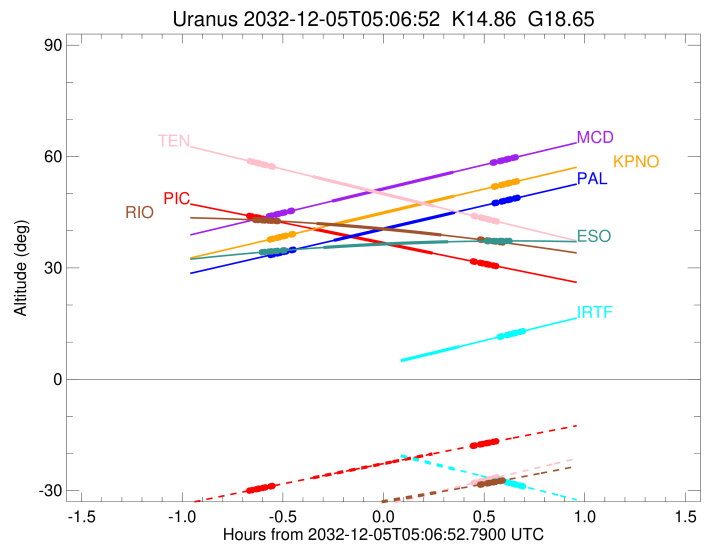
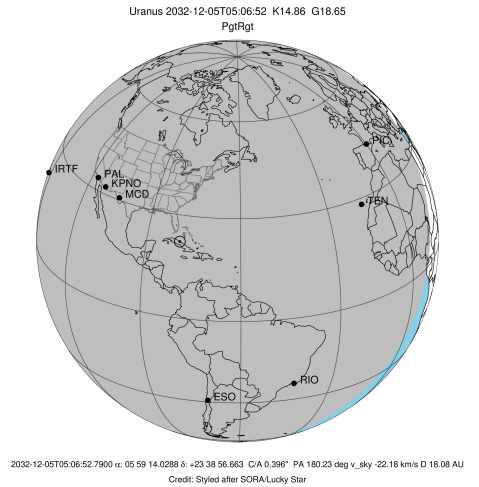
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2032-12-05T04:33:03.758 | | 33.45 | -48.04 | 51301.75 | -22.65 | | |
| lambda | I | 2032-12-05T04:34:00.114 | | 33.64 | -48.24 | 50026.71 | -22.62 | | |
| delta | I | 2032-12-05T04:35:16.459 | | 33.91 | -48.51 | 48300.35 | -22.60 | | |
| gamma | I | 2032-12-05T04:35:46.078 | | 34.01 | -48.61 | 47630.92 | -22.60 | | |
| eta | I | 2032-12-05T04:36:06.206 | | 34.08 | -48.68 | 47176.12 | -22.59 | | |
| beta | I | 2032-12-05T04:37:12.396 | | 34.31 | -48.91 | 45680.45 | -22.58 | | |
| alpha | I | 2032-12-05T04:37:53.641 | | 34.45 | -49.05 | 44752.38 | -22.57 | | |
| 4 | I | 2032-12-05T04:39:30.220 | | 34.79 | -49.39 | 42574.47 | -22.54 | | |
| 5 | I | 2032-12-05T04:39:41.725 | | 34.83 | -49.43 | 42313.09 | -22.53 | | |
| 6 | I | 2032-12-05T04:40:03.668 | | 34.90 | -49.51 | 41812.17 | -22.53 | | |
| Uranus | I | 2032-12-05T04:52:05.785 | | 37.41 | -52.02 | 25329.62 | | -9.23 | -9.66 |
| Uranus | E | 2032-12-05T05:28:05.098 | | 44.94 | -59.45 | 25059.59 | | 13.80 | 14.43 |
| 6 | E | 2032-12-05T05:40:01.603 | | 47.45 | -61.88 | 41872.39 | 22.62 | | |
| 5 | E | 2032-12-05T05:40:14.348 | | 47.50 | -61.93 | 42167.60 | 22.63 | | |
| 4 | E | 2032-12-05T05:40:31.067 | | 47.55 | -61.98 | 42553.13 | 22.63 | | |
| alpha | E | 2032-12-05T05:42:05.332 | | 47.88 | -62.30 | 44685.84 | 22.66 | | |
| beta | E | 2032-12-05T05:42:47.610 | | 48.03 | -62.44 | 45641.07 | 22.68 | | |
| eta | E | 2032-12-05T05:43:55.232 | | 48.27 | -62.67 | 47176.12 | 22.70 | | |
| gamma | E | 2032-12-05T05:44:14.834 | | 48.34 | -62.73 | 47621.07 | 22.70 | | |
| delta | E | 2032-12-05T05:44:44.750 | | 48.44 | -62.83 | 48300.35 | 22.71 | | |
| lambda | E | 2032-12-05T05:46:00.735 | | 48.71 | -63.09 | 50026.71 | 22.73 | | |
| epsilon | E | 2032-12-05T05:46:47.986 | | 48.87 | -63.25 | 51100.98 | 22.77 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:10:01.630
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564
 ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 166.74
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.514
 C/A sky separation (km) : 6742.0
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



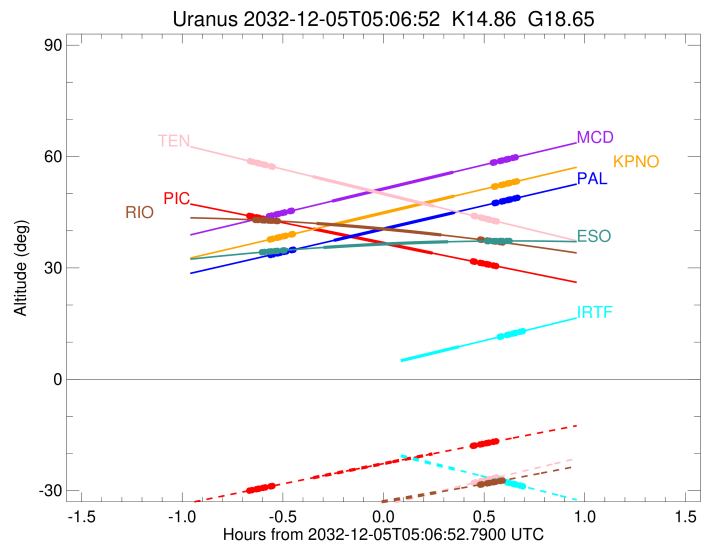
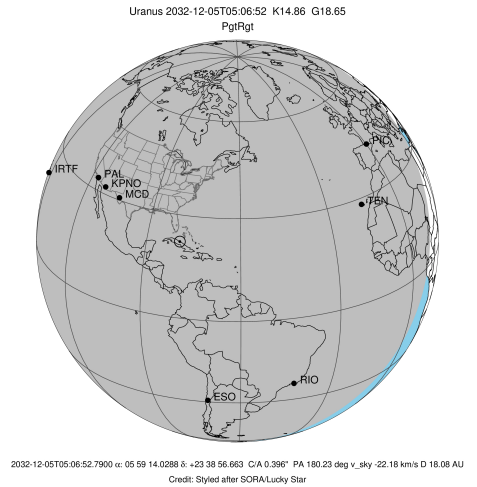
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2032-12-05T04:32:55.073 | | 37.64 | -52.53 | 51299.45 | -22.71 | | |
| lambda | I | 2032-12-05T04:33:51.194 | | 37.84 | -52.73 | 50026.71 | -22.67 | | |
| delta | I | 2032-12-05T04:35:07.355 | | 38.11 | -52.99 | 48300.35 | -22.66 | | |
| gamma | I | 2032-12-05T04:35:36.901 | | 38.21 | -53.10 | 47630.93 | -22.65 | | |
| eta | I | 2032-12-05T04:35:56.980 | | 38.28 | -53.17 | 47176.12 | -22.65 | | |
| beta | I | 2032-12-05T04:37:03.001 | | 38.51 | -53.40 | 45680.49 | -22.63 | | |
| alpha | I | 2032-12-05T04:37:44.142 | | 38.66 | -53.55 | 44752.40 | -22.63 | | |
| 4 | I | 2032-12-05T04:39:20.454 | | 39.00 | -53.89 | 42574.80 | -22.60 | | |
| 5 | I | 2032-12-05T04:39:31.945 | | 39.04 | -53.93 | 42312.95 | -22.60 | | |
| 6 | I | 2032-12-05T04:39:53.832 | | 39.12 | -54.01 | 41811.92 | -22.59 | | |
| Uranus | I | 2032-12-05T04:51:53.243 | | 41.66 | -56.54 | 25322.95 | | -9.36 | -9.80 |
| Uranus | E | 2032-12-05T05:27:56.775 | | 49.34 | -64.06 | 25063.34 | | 13.75 | 14.37 |
| 6 | E | 2032-12-05T05:39:50.951 | | 51.87 | -66.50 | 41872.22 | 22.67 | | |
| 5 | E | 2032-12-05T05:40:03.657 | | 51.92 | -66.54 | 42167.30 | 22.68 | | |
| 4 | E | 2032-12-05T05:40:20.365 | | 51.98 | -66.60 | 42553.41 | 22.68 | | |
| alpha | E | 2032-12-05T05:41:54.384 | | 52.31 | -66.91 | 44685.78 | 22.72 | | |
| beta | E | 2032-12-05T05:42:36.565 | | 52.46 | -67.06 | 45641.06 | 22.73 | | |
| eta | E | 2032-12-05T05:43:44.033 | | 52.70 | -67.28 | 47176.12 | 22.75 | | |
| gamma | E | 2032-12-05T05:44:03.591 | | 52.77 | -67.35 | 47621.07 | 22.75 | | |
| delta | E | 2032-12-05T05:44:33.440 | | 52.88 | -67.45 | 48300.35 | 22.76 | | |
| lambda | E | 2032-12-05T05:45:49.260 | | 53.15 | -67.70 | 50026.71 | 22.78 | | |
| epsilon | E | 2032-12-05T05:46:36.315 | | 53.31 | -67.86 | 51098.77 | 22.81 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:09:41.380
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564
 ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 166.67
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.489
 C/A sky separation (km) : 6406.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.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 | 2032-12-05T04:32:37.824 | | 43.91 | -59.04 | 51296.73 | -22.77 | | |
| lambda | I | 2032-12-05T04:33:33.660 | | 44.11 | -59.24 | 50026.71 | -22.74 | | |
| delta | I | 2032-12-05T04:34:49.593 | | 44.38 | -59.51 | 48300.35 | -22.73 | | |
| gamma | I | 2032-12-05T04:35:19.048 | | 44.48 | -59.62 | 47630.95 | -22.72 | | |
| eta | I | 2032-12-05T04:35:39.066 | | 44.56 | -59.69 | 47176.12 | -22.72 | | |
| beta | I | 2032-12-05T04:36:44.880 | | 44.79 | -59.92 | 45680.53 | -22.71 | | |
| alpha | I | 2032-12-05T04:37:25.893 | | 44.94 | -60.07 | 44752.41 | -22.70 | | |
| 4 | I | 2032-12-05T04:39:01.879 | | 45.28 | -60.41 | 42575.19 | -22.67 | | |
| 5 | I | 2032-12-05T04:39:13.351 | | 45.33 | -60.45 | 42312.78 | -22.67 | | |
| 6 | I | 2032-12-05T04:39:35.169 | | 45.40 | -60.53 | 41811.62 | -22.66 | | |
| Uranus | I | 2032-12-05T04:51:31.389 | | 47.98 | -63.07 | 25315.20 | | -9.52 | -9.96 |
| Uranus | E | 2032-12-05T05:27:38.877 | | 55.78 | -70.58 | 25067.67 | | 13.68 | 14.30 |
| 6 | E | 2032-12-05T05:39:30.379 | | 58.34 | -72.95 | 41872.04 | 22.74 | | |
| 5 | E | 2032-12-05T05:39:43.041 | | 58.38 | -72.99 | 42166.98 | 22.75 | | |
| 4 | E | 2032-12-05T05:39:59.733 | | 58.44 | -73.05 | 42553.72 | 22.75 | | |
| alpha | E | 2032-12-05T05:41:33.467 | | 58.78 | -73.35 | 44685.72 | 22.78 | | |
| beta | E | 2032-12-05T05:42:15.534 | | 58.93 | -73.49 | 45641.06 | 22.79 | | |
| eta | E | 2032-12-05T05:43:22.821 | | 59.17 | -73.70 | 47176.12 | 22.81 | | |
| gamma | E | 2032-12-05T05:43:42.328 | | 59.24 | -73.77 | 47621.08 | 22.81 | | |
| delta | E | 2032-12-05T05:44:12.099 | | 59.35 | -73.86 | 48300.35 | 22.82 | | |
| lambda | E | 2032-12-05T05:45:27.725 | | 59.62 | -74.11 | 50026.71 | 22.84 | | |
| epsilon | E | 2032-12-05T05:46:14.557 | | 59.79 | -74.26 | 51096.34 | 22.87 | | |

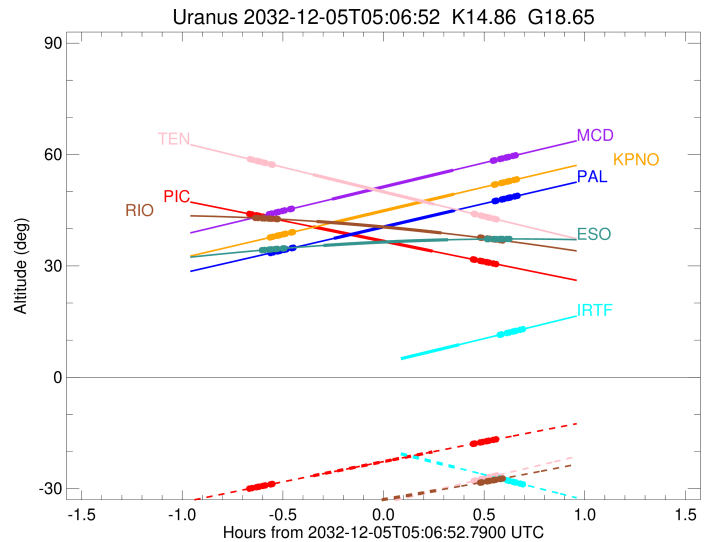
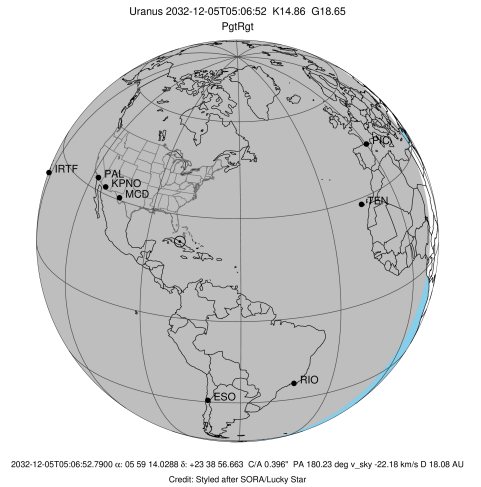
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:03:56.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564
 ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 165.60
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.477
 C/A sky separation (km) : 6253.0
 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_itrff93_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 | 2032-12-05T04:26:57.469 | | 58.77 | -42.47 | 51291.90 | -22.87 | | |
| lambda | I | 2032-12-05T04:27:52.842 | | 58.57 | -42.27 | 50026.71 | -22.84 | | |
| delta | I | 2032-12-05T04:29:08.440 | | 58.29 | -42.00 | 48300.35 | -22.83 | | |
| gamma | I | 2032-12-05T04:29:37.766 | | 58.18 | -41.89 | 47630.99 | -22.82 | | |
| eta | I | 2032-12-05T04:29:57.698 | | 58.11 | -41.82 | 47176.12 | -22.82 | | |
| beta | I | 2032-12-05T04:31:03.229 | | 57.87 | -41.58 | 45680.60 | -22.80 | | |
| alpha | I | 2032-12-05T04:31:44.074 | | 57.72 | -41.43 | 44752.42 | -22.79 | | |
| 4 | I | 2032-12-05T04:33:19.643 | | 57.36 | -41.08 | 42575.79 | -22.76 | | |
| 5 | I | 2032-12-05T04:33:31.099 | | 57.32 | -41.04 | 42312.51 | -22.76 | | |
| 6 | I | 2032-12-05T04:33:52.835 | | 57.24 | -40.96 | 41811.17 | -22.75 | | |
| Uranus | I | 2032-12-05T04:45:46.086 | | 54.61 | -38.36 | 25306.42 | | -9.69 | -10.14 |
| Uranus | E | 2032-12-05T05:21:56.847 | | 46.63 | -30.48 | 25066.50 | | 13.70 | 14.32 |
| 6 | E | 2032-12-05T05:33:49.384 | | 44.02 | -27.92 | 41872.18 | 22.69 | | |
| 5 | E | 2032-12-05T05:34:02.082 | | 43.97 | -27.87 | 42167.23 | 22.69 | | |
| 4 | E | 2032-12-05T05:34:18.790 | | 43.91 | -27.81 | 42553.48 | 22.69 | | |
| alpha | E | 2032-12-05T05:35:52.783 | | 43.57 | -27.48 | 44685.78 | 22.72 | | |
| beta | E | 2032-12-05T05:36:34.965 | | 43.42 | -27.32 | 45641.06 | 22.73 | | |
| eta | E | 2032-12-05T05:37:42.446 | | 43.17 | -27.08 | 47176.12 | 22.74 | | |
| gamma | E | 2032-12-05T05:38:02.011 | | 43.10 | -27.01 | 47621.07 | 22.74 | | |
| delta | E | 2032-12-05T05:38:31.873 | | 42.99 | -26.90 | 48300.35 | 22.75 | | |
| lambda | E | 2032-12-05T05:39:47.739 | | 42.71 | -26.63 | 50026.71 | 22.76 | | |
| epsilon | E | 2032-12-05T05:40:34.839 | | 42.54 | -26.46 | 51098.96 | 22.79 | | |

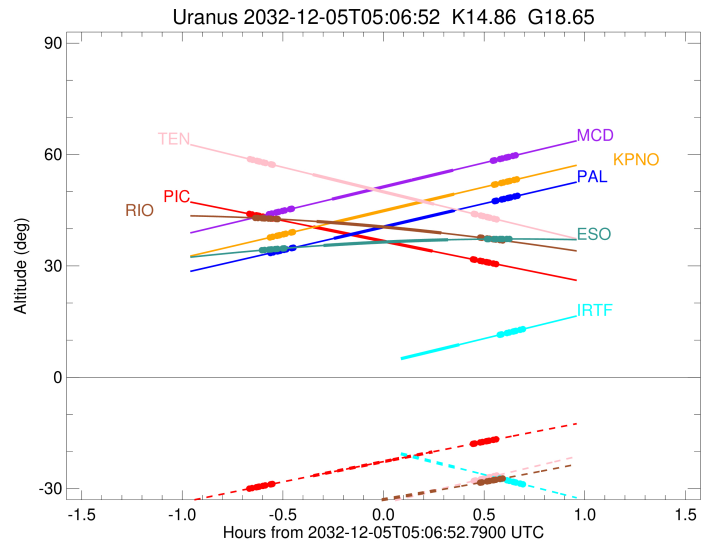
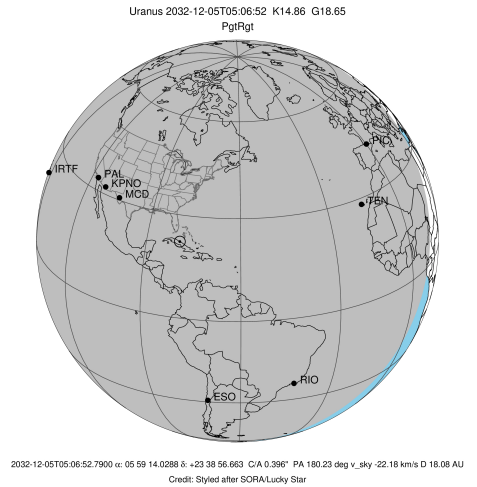
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-12-05T05:11:26.370
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg)  : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 3424869490915659264
2Mass ID (if available) : 05591403+2338564
ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
RUWE (>1.4 is poor) : 1.01
K magnitude          : 14.860
G magnitude          : 18.653
RP magnitude         : 17.733
BP magnitude         : 19.598
DUPflag             : 0
Distance (au)       : 18.076
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -22.18
Sun-Target sep (deg) : 163.33
Sun-Moon sep (deg)  : 166.87
B (ring opening deg) : 75.50
PA of pole (deg)    : 56.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.547
C/A sky separation (km) : 7164.8
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.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
    
```



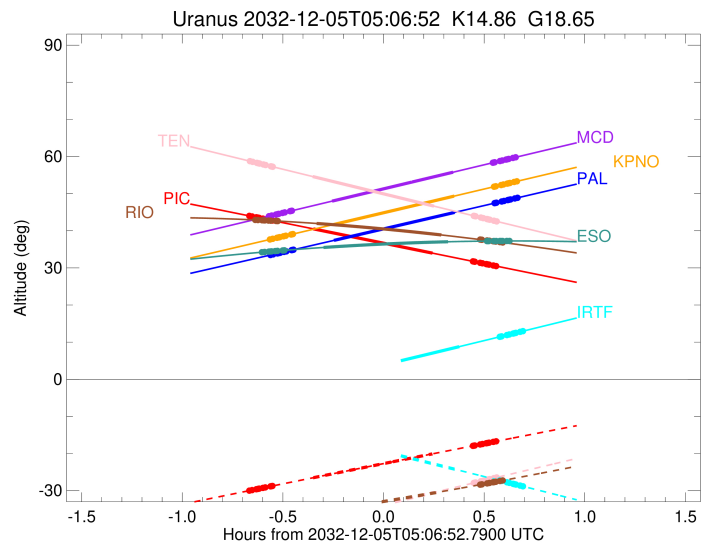
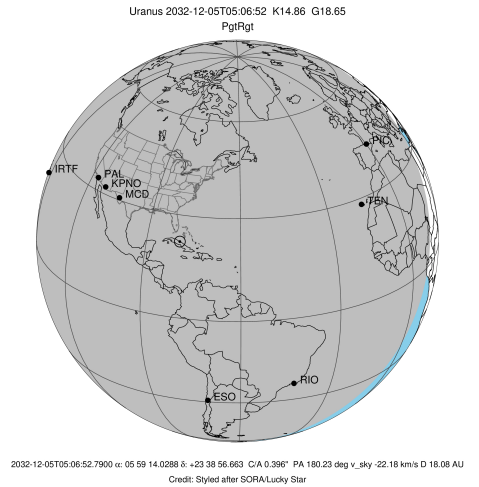
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|--------|--------|----------|--------|-------|---------|--------------|
| epsilon | I | 2032-12-05T04:33:52.217 | -3.18x | -12.09 | 51303.44 | -22.38 | | | |
| lambda | I | 2032-12-05T04:34:49.349 | -2.98x | -12.30 | 50026.71 | -22.34 | | | |
| delta | I | 2032-12-05T04:36:06.646 | -2.70x | -12.59 | 48300.35 | -22.33 | | | |
| gamma | I | 2032-12-05T04:36:36.634 | -2.60x | -12.70 | 47630.90 | -22.32 | | | |
| eta | I | 2032-12-05T04:36:57.012 | -2.53x | -12.78 | 47176.12 | -22.32 | | | |
| beta | I | 2032-12-05T04:38:04.029 | -2.29x | -13.02 | 45680.42 | -22.30 | | | |
| alpha | I | 2032-12-05T04:38:45.787 | -2.14x | -13.18 | 44752.38 | -22.29 | | | |
| 4 | I | 2032-12-05T04:40:23.581 | -1.80x | -13.54 | 42574.24 | -22.26 | | | |
| 5 | I | 2032-12-05T04:40:35.219 | -1.76x | -13.58 | 42313.18 | -22.26 | | | |
| 6 | I | 2032-12-05T04:40:57.434 | -1.68x | -13.67 | 41812.35 | -22.25 | | | |
| Uranus | I | 2032-12-05T04:53:08.872 | 0.92x | -16.38 | 25333.63 | | | -9.14 | -9.57 |
| Uranus | E | 2032-12-05T05:29:29.115 | 8.79 | -24.54 | 25058.68 | | | 13.81 | 14.44 |
| 6 | E | 2032-12-05T05:41:33.886 | 11.44 | -27.27 | 41872.41 | 22.37 | | | |
| 5 | E | 2032-12-05T05:41:46.772 | 11.49 | -27.32 | 42167.63 | 22.38 | | | |
| 4 | E | 2032-12-05T05:42:03.672 | 11.55 | -27.38 | 42553.10 | 22.38 | | | |
| alpha | E | 2032-12-05T05:43:38.969 | 11.90 | -27.74 | 44685.85 | 22.42 | | | |
| beta | E | 2032-12-05T05:44:21.706 | 12.06 | -27.90 | 45641.07 | 22.43 | | | |
| eta | E | 2032-12-05T05:45:30.058 | 12.31 | -28.16 | 47176.12 | 22.45 | | | |
| gamma | E | 2032-12-05T05:45:49.870 | 12.38 | -28.24 | 47621.07 | 22.46 | | | |
| delta | E | 2032-12-05T05:46:20.108 | 12.49 | -28.35 | 48300.35 | 22.47 | | | |
| lambda | E | 2032-12-05T05:47:36.904 | 12.78 | -28.64 | 50026.71 | 22.49 | | | |
| epsilon | E | 2032-12-05T05:48:24.658 | 12.95 | -28.82 | 51101.00 | 22.53 | | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:05:31.870
 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 : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564
 ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 165.56
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.046
 C/A sky separation (km) : 603.9
 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 | 2032-12-05T04:28:34.805 | | 42.92 | -38.09 | 51249.72 | -23.11 | | |
| lambda | I | 2032-12-05T04:29:27.721 | | 42.89 | -37.99 | 50026.71 | -23.11 | | |
| delta | I | 2032-12-05T04:30:42.417 | | 42.84 | -37.84 | 48300.35 | -23.11 | | |
| gamma | I | 2032-12-05T04:31:11.369 | | 42.81 | -37.78 | 47631.24 | -23.11 | | |
| eta | I | 2032-12-05T04:31:31.062 | | 42.80 | -37.74 | 47176.12 | -23.11 | | |
| beta | I | 2032-12-05T04:32:35.717 | | 42.75 | -37.60 | 45681.06 | -23.11 | | |
| alpha | I | 2032-12-05T04:33:16.045 | | 42.72 | -37.52 | 44752.26 | -23.11 | | |
| 4 | I | 2032-12-05T04:34:50.019 | | 42.64 | -37.33 | 42581.68 | -23.11 | | |
| 5 | I | 2032-12-05T04:35:01.622 | | 42.64 | -37.30 | 42309.07 | -23.11 | | |
| 6 | I | 2032-12-05T04:35:23.052 | | 42.62 | -37.26 | 41806.92 | -23.10 | | |
| Uranus | I | 2032-12-05T04:46:57.488 | | 41.97 | -35.75 | 25186.60 | | -11.84 | -12.39 |
| Uranus | E | 2032-12-05T05:24:05.605 | | 38.88 | -30.27 | 25162.36 | | 12.23 | 12.80 |
| 6 | E | 2032-12-05T05:35:42.856 | | 37.63 | -28.39 | 41868.48 | 23.08 | | |
| 5 | E | 2032-12-05T05:35:55.268 | | 37.61 | -28.36 | 42161.97 | 23.08 | | |
| 4 | E | 2032-12-05T05:36:12.273 | | 37.57 | -28.31 | 42559.34 | 23.08 | | |
| alpha | E | 2032-12-05T05:37:44.418 | | 37.40 | -28.05 | 44684.91 | 23.08 | | |
| beta | E | 2032-12-05T05:38:25.987 | | 37.32 | -27.94 | 45641.15 | 23.08 | | |
| eta | E | 2032-12-05T05:39:32.454 | | 37.19 | -27.75 | 47176.12 | 23.08 | | |
| gamma | E | 2032-12-05T05:39:51.740 | | 37.15 | -27.70 | 47621.25 | 23.08 | | |
| delta | E | 2032-12-05T05:40:21.164 | | 37.10 | -27.62 | 48300.35 | 23.08 | | |
| lambda | E | 2032-12-05T05:41:35.963 | | 36.95 | -27.41 | 50026.71 | 23.08 | | |
| epsilon | E | 2032-12-05T05:42:20.445 | | 36.86 | -27.28 | 51053.35 | 23.08 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-12-05T05:07:32.900
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : 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 : 3424869490915659264
 2Mass ID (if available) : 05591403+2338564
 ICRS Star Coord at Epoch: 05h 59m 14.02883s +23:38:56.66288s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.860
 G magnitude : 18.653
 RP magnitude : 17.733
 BP magnitude : 19.598
 DUPflag : 0
 Distance (au) : 18.076
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.18
 Sun-Target sep (deg) : 163.33
 Sun-Moon sep (deg) : 165.88
 B (ring opening deg) : 75.50
 PA of pole (deg) : 56.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.004
 C/A sky separation (km) : 49.0
 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 | 2032-12-05T04:30:33.987 | | 34.22 | -38.47 | 51246.74 | -23.07 | | |
| lambda | I | 2032-12-05T04:31:26.866 | | 34.29 | -38.48 | 50026.71 | -23.07 | | |
| delta | I | 2032-12-05T04:32:41.690 | | 34.39 | -38.48 | 48300.35 | -23.07 | | |
| gamma | I | 2032-12-05T04:33:10.689 | | 34.42 | -38.48 | 47631.25 | -23.07 | | |
| eta | I | 2032-12-05T04:33:30.415 | | 34.45 | -38.48 | 47176.12 | -23.07 | | |
| beta | I | 2032-12-05T04:34:35.175 | | 34.53 | -38.48 | 45681.09 | -23.07 | | |
| alpha | I | 2032-12-05T04:35:15.569 | | 34.58 | -38.48 | 44752.22 | -23.07 | | |
| 4 | I | 2032-12-05T04:36:49.670 | | 34.70 | -38.47 | 42582.11 | -23.08 | | |
| 5 | I | 2032-12-05T04:37:01.317 | | 34.71 | -38.47 | 42308.76 | -23.07 | | |
| 6 | I | 2032-12-05T04:37:22.777 | | 34.74 | -38.47 | 41806.62 | -23.07 | | |
| Uranus | I | 2032-12-05T04:48:57.835 | | 35.50 | -38.35 | 25177.21 | | -11.99 | -12.55 |
| Uranus | E | 2032-12-05T05:26:07.507 | | 37.04 | -36.95 | 25174.97 | | 12.03 | 12.58 |
| 6 | E | 2032-12-05T05:37:44.553 | | 37.22 | -36.21 | 41867.99 | 23.09 | | |
| 5 | E | 2032-12-05T05:37:56.953 | | 37.22 | -36.20 | 42161.43 | 23.10 | | |
| 4 | E | 2032-12-05T05:38:14.010 | | 37.22 | -36.18 | 42560.07 | 23.10 | | |
| alpha | E | 2032-12-05T05:39:46.040 | | 37.24 | -36.07 | 44684.84 | 23.10 | | |
| beta | E | 2032-12-05T05:40:27.576 | | 37.24 | -36.02 | 45641.19 | 23.10 | | |
| eta | E | 2032-12-05T05:41:33.982 | | 37.25 | -35.94 | 47176.12 | 23.10 | | |
| gamma | E | 2032-12-05T05:41:53.252 | | 37.25 | -35.91 | 47621.27 | 23.10 | | |
| delta | E | 2032-12-05T05:42:22.647 | | 37.25 | -35.88 | 48300.35 | 23.10 | | |
| lambda | E | 2032-12-05T05:43:37.373 | | 37.25 | -35.79 | 50026.71 | 23.10 | | |
| epsilon | E | 2032-12-05T05:44:21.566 | | 37.26 | -35.73 | 51047.70 | 23.10 | | |