

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:38:29.330
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114

Uranus 2037-02-01T09:38:29 K13.64 G14.93 PgtRgt

ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s

RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 37.87
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17

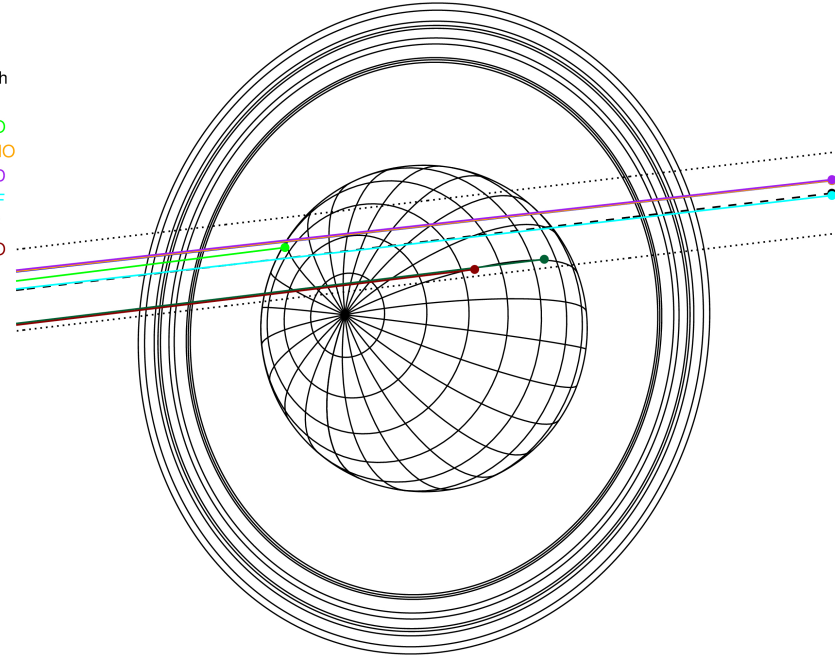
a(km) ring

- 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



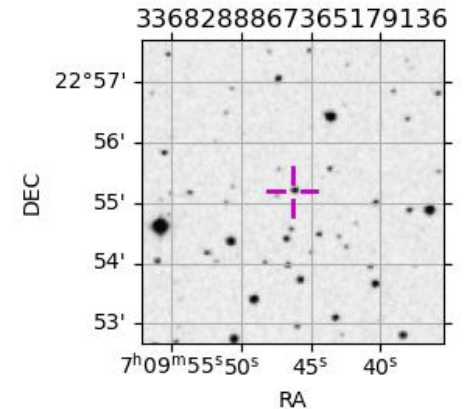
2037-02-01T09:38:29.3300 α: 07 09 46.2765 s: +22 55 11.311 C/A 1.049° PA 186.78 deg v_sky -20.23 km/s D 17.87 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 AAT
 MSO

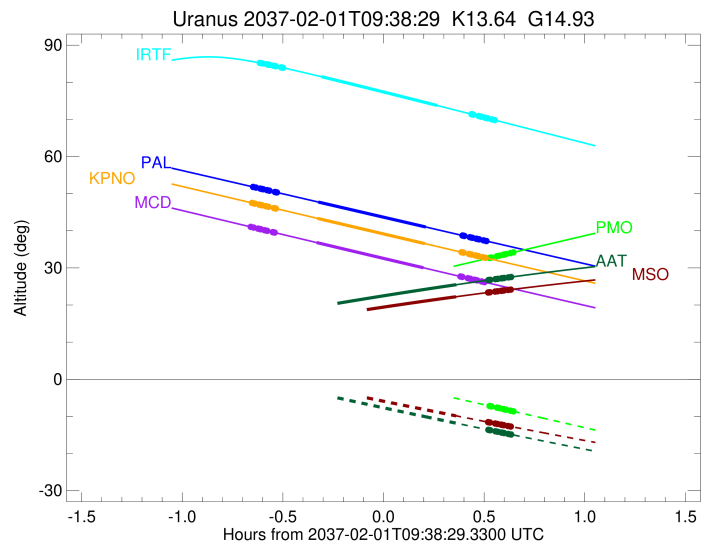
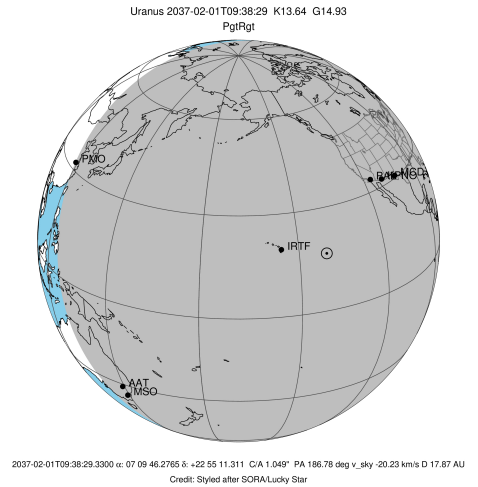


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| 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 | +++++ | + + | +++++ | FEB 01 08:59 - FEB 01 10:08 | PieRie |
| PMO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | | + | +++++ | FEB 01 09:59 - FEB 01 10:16 | PneRne |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | +++++ | + + | +++++ | FEB 01 08:59 - FEB 01 10:08 | PieRie |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | +++++ | + + | +++++ | FEB 01 08:58 - FEB 01 10:08 | PieRie |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | | | | | PnnRnn |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | +++++ | + + | +++++ | FEB 01 09:01 - FEB 01 10:11 | PieRie |
| 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 | | + | +++++ | FEB 01 10:00 - FEB 01 10:16 | PneRne |
| SAAO | So. Afr. Astro. Obs. | -32.4 | 20.8 | | | | | PnnRnn |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | + | +++++ | FEB 01 10:00 - FEB 01 10:16 | PneRne |

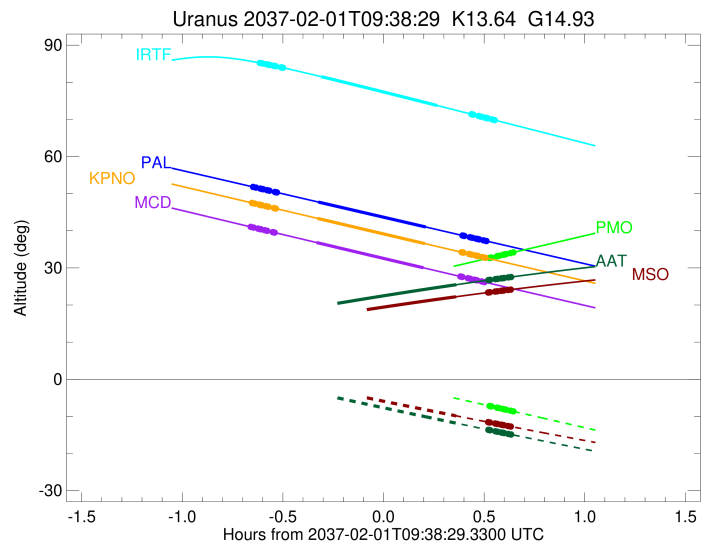
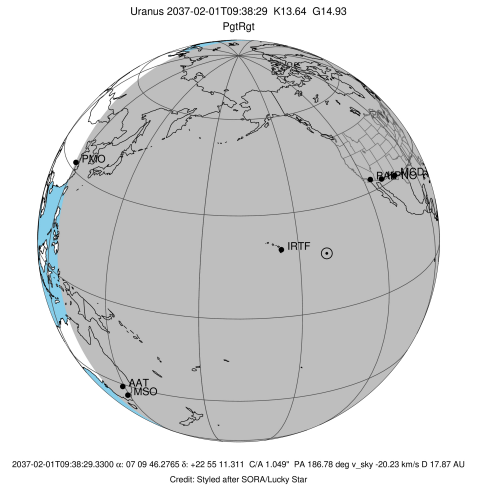


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:35:12.080
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114
 ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s
 RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 37.79
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.226
 C/A sky separation (km) : 15893.2
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



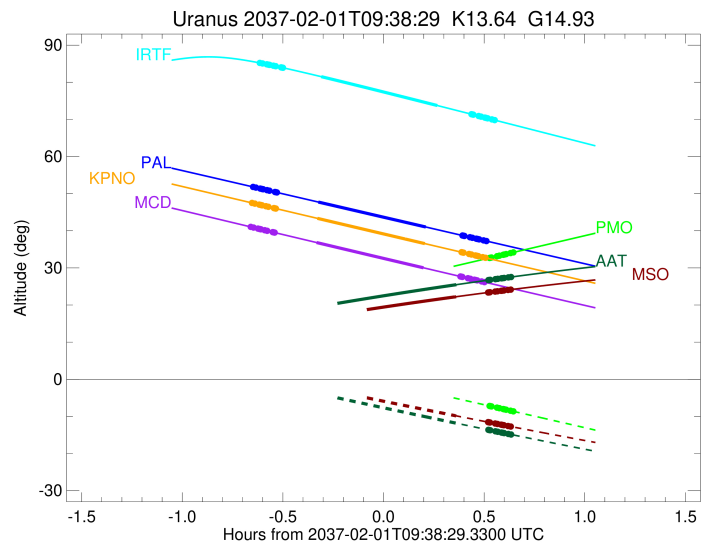
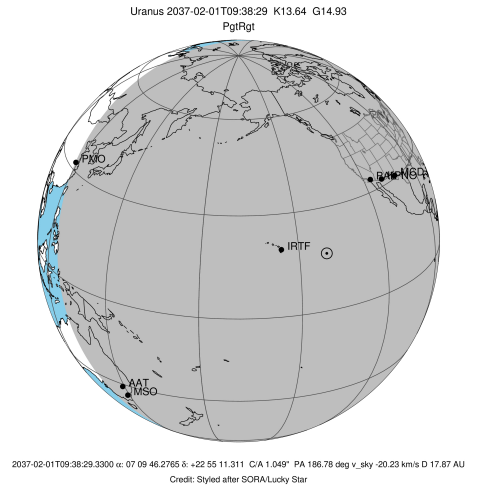
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2037-02-01T08:59:21.444 | | 51.87 | -69.12 | 51499.60 | -22.13 | | |
| lambda | I | 2037-02-01T09:00:28.013 | | 51.63 | -68.96 | 50026.71 | -22.09 | | |
| delta | I | 2037-02-01T09:01:46.335 | | 51.36 | -68.77 | 48300.35 | -21.99 | | |
| gamma | I | 2037-02-01T09:02:17.062 | | 51.25 | -68.70 | 47625.18 | -21.95 | | |
| eta | I | 2037-02-01T09:02:37.529 | | 51.18 | -68.65 | 47176.12 | -21.93 | | |
| beta | I | 2037-02-01T09:03:47.754 | | 50.94 | -68.48 | 45641.06 | -21.83 | | |
| alpha | I | 2037-02-01T09:04:29.509 | | 50.79 | -68.37 | 44732.17 | -21.77 | | |
| 4 | I | 2037-02-01T09:06:10.142 | | 50.44 | -68.12 | 42555.55 | -21.59 | | |
| 5 | I | 2037-02-01T09:06:26.193 | | 50.39 | -68.08 | 42220.27 | -21.59 | | |
| 6 | I | 2037-02-01T09:06:41.007 | | 50.33 | -68.05 | 41879.17 | -21.53 | | |
| Uranus | I | 2037-02-01T09:19:03.533 | | 47.74 | -66.08 | 25410.12 | | -16.41 | -17.14 |
| Uranus | E | 2037-02-01T09:51:07.437 | | 41.01 | -60.39 | 25181.73 | | 26.93 | 28.01 |
| 6 | E | 2037-02-01T10:01:59.451 | | 38.74 | -58.33 | 41802.77 | 21.44 | | |
| 5 | E | 2037-02-01T10:02:22.398 | | 38.66 | -58.26 | 42300.92 | 21.50 | | |
| 4 | E | 2037-02-01T10:02:34.424 | | 38.61 | -58.22 | 42552.60 | 21.49 | | |
| alpha | E | 2037-02-01T10:04:15.598 | | 38.26 | -57.89 | 44729.20 | 21.67 | | |
| beta | E | 2037-02-01T10:04:59.446 | | 38.11 | -57.75 | 45676.53 | 21.73 | | |
| eta | E | 2037-02-01T10:06:08.412 | | 37.87 | -57.53 | 47176.12 | 21.82 | | |
| gamma | E | 2037-02-01T10:06:29.217 | | 37.80 | -57.46 | 47630.41 | 21.85 | | |
| delta | E | 2037-02-01T10:06:59.852 | | 37.69 | -57.36 | 48300.35 | 21.89 | | |
| lambda | E | 2037-02-01T10:08:18.563 | | 37.41 | -57.11 | 50026.71 | 21.98 | | |
| epsilon | E | 2037-02-01T10:08:51.271 | | 37.30 | -57.00 | 50746.12 | 22.02 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:43:00.520
 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 : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114
 ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s
 RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 38.82
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.179
 C/A sky separation (km) : 15288.1
 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



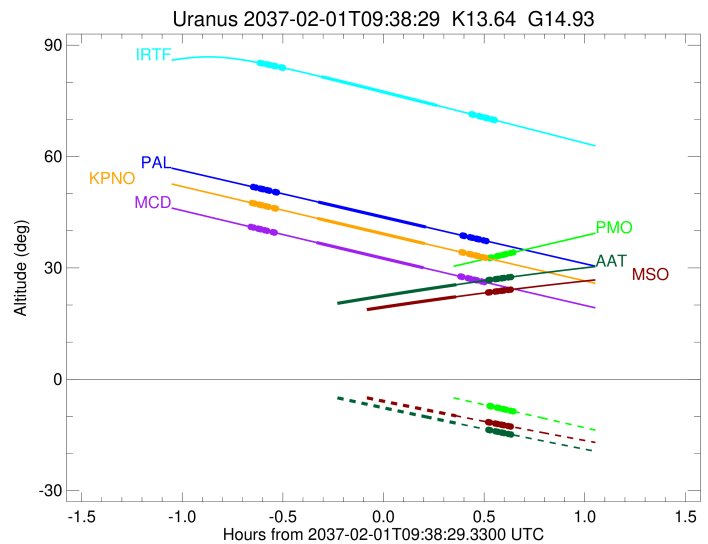
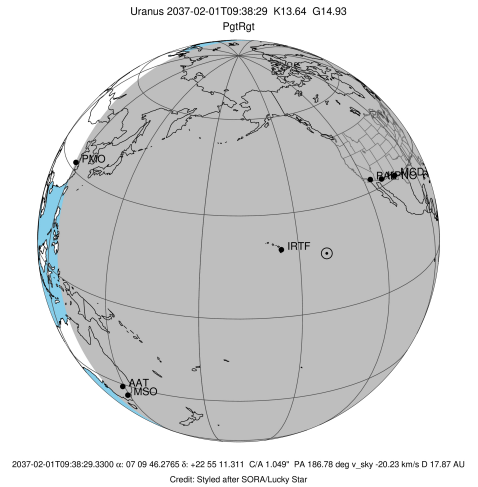
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2037-02-01T09:06:44.538 | | 19.48 | 5.46x | 51499.64 | -21.99 | | |
| lambda | I | 2037-02-01T09:07:51.529 | | 19.71 | 5.24x | 50026.71 | -21.95 | | |
| delta | I | 2037-02-01T09:09:10.308 | | 19.98 | 4.99x | 48300.35 | -21.87 | | |
| gamma | I | 2037-02-01T09:09:41.202 | | 20.09 | 4.89x | 47625.17 | -21.84 | | |
| eta | I | 2037-02-01T09:10:01.777 | | 20.16 | 4.82x | 47176.12 | -21.81 | | |
| beta | I | 2037-02-01T09:11:12.348 | | 20.40 | 4.59x | 45641.06 | -21.73 | | |
| alpha | I | 2037-02-01T09:11:54.294 | | 20.54 | 4.46x | 44732.09 | -21.68 | | |
| 4 | I | 2037-02-01T09:13:35.308 | | 20.89 | 4.13x | 42555.70 | -21.51 | | |
| 5 | I | 2037-02-01T09:13:51.432 | | 20.95 | 4.08x | 42220.00 | -21.52 | | |
| 6 | I | 2037-02-01T09:14:06.280 | | 21.00 | 4.03x | 41879.20 | -21.46 | | |
| Uranus | I | 2037-02-01T09:26:23.980 | | 23.54 | 1.61x | 25403.19 | | -16.80 | -17.55 |
| Uranus | E | 2037-02-01T09:59:21.466 | | 30.42 | -5.00 | 25168.72 | | 27.44 | 28.53 |
| 6 | E | 2037-02-01T10:10:03.406 | | 32.67 | -7.18 | 41802.11 | 21.55 | | |
| 5 | E | 2037-02-01T10:10:26.169 | | 32.75 | -7.26 | 42299.66 | 21.60 | | |
| 4 | E | 2037-02-01T10:10:38.263 | | 32.79 | -7.30 | 42553.71 | 21.60 | | |
| alpha | E | 2037-02-01T10:12:18.881 | | 33.14 | -7.64 | 44728.37 | 21.77 | | |
| beta | E | 2037-02-01T10:13:02.589 | | 33.29 | -7.79 | 45676.86 | 21.82 | | |
| eta | E | 2037-02-01T10:14:11.250 | | 33.54 | -8.03 | 47176.12 | 21.91 | | |
| gamma | E | 2037-02-01T10:14:31.966 | | 33.61 | -8.10 | 47630.33 | 21.94 | | |
| delta | E | 2037-02-01T10:15:02.482 | | 33.72 | -8.20 | 48300.35 | 21.97 | | |
| lambda | E | 2037-02-01T10:16:20.885 | | 33.99 | -8.47 | 50026.71 | 22.06 | | |
| epsilon | E | 2037-02-01T10:16:53.424 | | 34.11 | -8.58 | 50745.14 | 22.10 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:34:54.350
 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 : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114
 ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s
 RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 37.71
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.231
 C/A sky separation (km) : 15949.6
 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



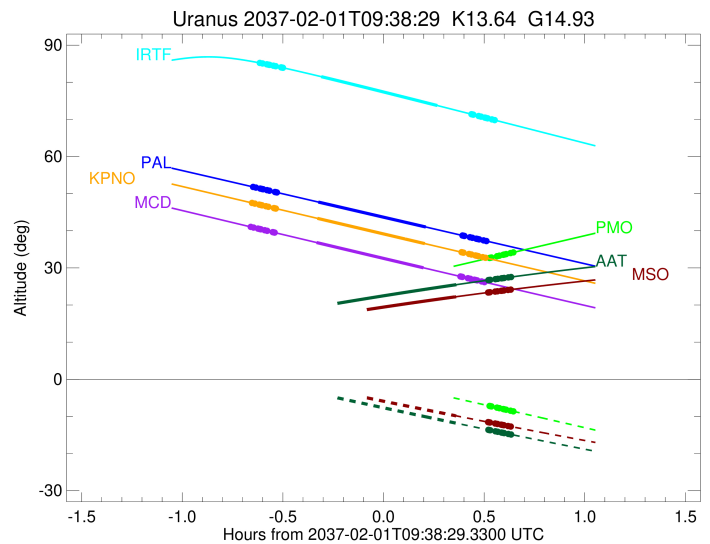
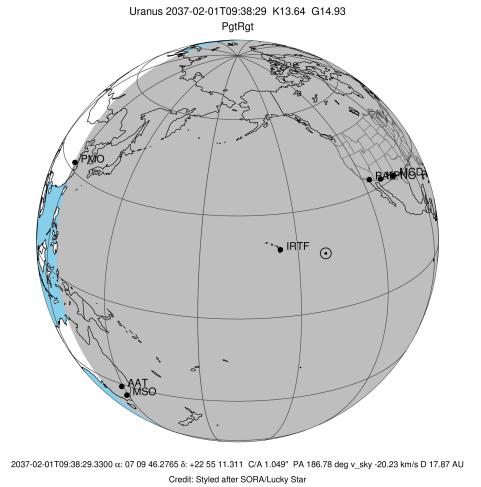
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2037-02-01T08:59:01.921 | | 47.56 | -66.74 | 51499.43 | -22.10 | | |
| lambda | I | 2037-02-01T09:00:08.578 | | 47.32 | -66.54 | 50026.71 | -22.06 | | |
| delta | I | 2037-02-01T09:01:27.016 | | 47.04 | -66.31 | 48300.35 | -21.96 | | |
| gamma | I | 2037-02-01T09:01:57.788 | | 46.93 | -66.22 | 47625.18 | -21.92 | | |
| eta | I | 2037-02-01T09:02:18.287 | | 46.86 | -66.16 | 47176.12 | -21.89 | | |
| beta | I | 2037-02-01T09:03:28.620 | | 46.61 | -65.95 | 45641.06 | -21.79 | | |
| alpha | I | 2037-02-01T09:04:10.439 | | 46.46 | -65.83 | 44732.20 | -21.73 | | |
| 4 | I | 2037-02-01T09:05:51.239 | | 46.10 | -65.53 | 42555.51 | -21.55 | | |
| 5 | I | 2037-02-01T09:06:07.310 | | 46.04 | -65.48 | 42220.36 | -21.55 | | |
| 6 | I | 2037-02-01T09:06:22.154 | | 45.99 | -65.44 | 41879.16 | -21.49 | | |
| Uranus | I | 2037-02-01T09:18:46.754 | | 43.35 | -63.15 | 25411.15 | | -16.35 | -17.08 |
| Uranus | E | 2037-02-01T09:50:48.778 | | 36.54 | -56.89 | 25182.74 | | 26.89 | 27.97 |
| 6 | E | 2037-02-01T10:01:42.713 | | 34.24 | -54.68 | 41802.82 | 21.40 | | |
| 5 | E | 2037-02-01T10:02:05.710 | | 34.16 | -54.60 | 42300.99 | 21.45 | | |
| 4 | E | 2037-02-01T10:02:17.752 | | 34.11 | -54.56 | 42552.53 | 21.45 | | |
| alpha | E | 2037-02-01T10:03:59.129 | | 33.76 | -54.21 | 44729.26 | 21.63 | | |
| beta | E | 2037-02-01T10:04:43.059 | | 33.60 | -54.06 | 45676.52 | 21.69 | | |
| eta | E | 2037-02-01T10:05:52.156 | | 33.36 | -53.83 | 47176.12 | 21.78 | | |
| gamma | E | 2037-02-01T10:06:13.001 | | 33.29 | -53.76 | 47630.42 | 21.81 | | |
| delta | E | 2037-02-01T10:06:43.693 | | 33.18 | -53.65 | 48300.35 | 21.85 | | |
| lambda | E | 2037-02-01T10:08:02.550 | | 32.90 | -53.38 | 50026.71 | 21.94 | | |
| epsilon | E | 2037-02-01T10:08:35.321 | | 32.79 | -53.27 | 50746.18 | 21.98 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:34:33.950
 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 : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114
 ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s
 RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 37.60
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.243
 C/A sky separation (km) : 16112.3
 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 | 2037-02-01T08:58:39.134 | | 41.10 | -61.72 | 51498.81 | -22.04 | | |
| lambda | I | 2037-02-01T08:59:45.964 | | 40.86 | -61.50 | 50026.71 | -21.99 | | |
| delta | I | 2037-02-01T09:01:04.644 | | 40.58 | -61.23 | 48300.35 | -21.89 | | |
| gamma | I | 2037-02-01T09:01:35.514 | | 40.47 | -61.13 | 47625.20 | -21.85 | | |
| eta | I | 2037-02-01T09:01:56.080 | | 40.40 | -61.06 | 47176.12 | -21.82 | | |
| beta | I | 2037-02-01T09:03:06.644 | | 40.14 | -60.83 | 45641.06 | -21.72 | | |
| alpha | I | 2037-02-01T09:03:48.599 | | 39.99 | -60.69 | 44732.31 | -21.66 | | |
| 4 | I | 2037-02-01T09:05:29.766 | | 39.63 | -60.35 | 42555.35 | -21.47 | | |
| 5 | I | 2037-02-01T09:05:45.873 | | 39.57 | -60.29 | 42220.66 | -21.47 | | |
| 6 | I | 2037-02-01T09:06:00.787 | | 39.52 | -60.24 | 41879.13 | -21.41 | | |
| Uranus | I | 2037-02-01T09:18:30.606 | | 36.84 | -57.69 | 25414.41 | | -16.17 | -16.89 |
| Uranus | E | 2037-02-01T09:50:24.055 | | 30.03 | -51.03 | 25185.46 | | 26.78 | 27.86 |
| 6 | E | 2037-02-01T10:01:22.419 | | 27.70 | -48.70 | 41802.93 | 21.31 | | |
| 5 | E | 2037-02-01T10:01:45.521 | | 27.62 | -48.62 | 42301.19 | 21.37 | | |
| 4 | E | 2037-02-01T10:01:57.590 | | 27.58 | -48.58 | 42552.35 | 21.37 | | |
| alpha | E | 2037-02-01T10:03:39.379 | | 27.22 | -48.22 | 44729.39 | 21.55 | | |
| beta | E | 2037-02-01T10:04:23.467 | | 27.06 | -48.06 | 45676.46 | 21.60 | | |
| eta | E | 2037-02-01T10:05:32.823 | | 26.82 | -47.81 | 47176.12 | 21.70 | | |
| gamma | E | 2037-02-01T10:05:53.744 | | 26.75 | -47.74 | 47630.43 | 21.73 | | |
| delta | E | 2037-02-01T10:06:24.547 | | 26.64 | -47.63 | 48300.35 | 21.77 | | |
| lambda | E | 2037-02-01T10:07:43.683 | | 26.36 | -47.35 | 50026.71 | 21.86 | | |
| epsilon | E | 2037-02-01T10:08:16.577 | | 26.24 | -47.23 | 50746.36 | 21.90 | | |

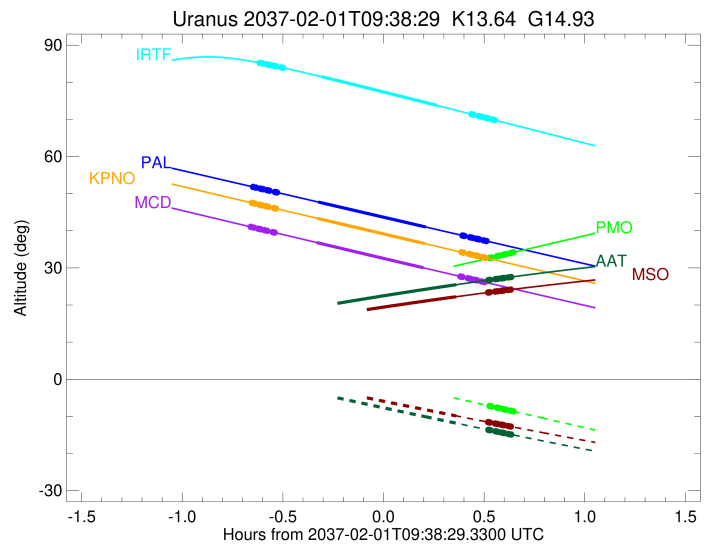
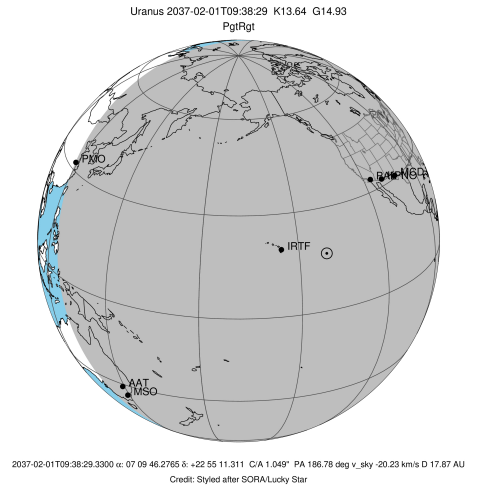
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:37:19.340
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114
 ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s
 RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 38.31
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.031
 C/A sky separation (km) : 13367.7
 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_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

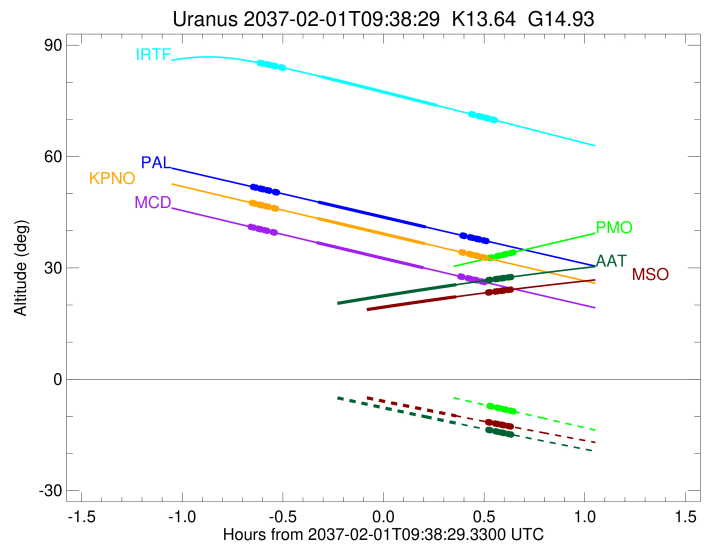
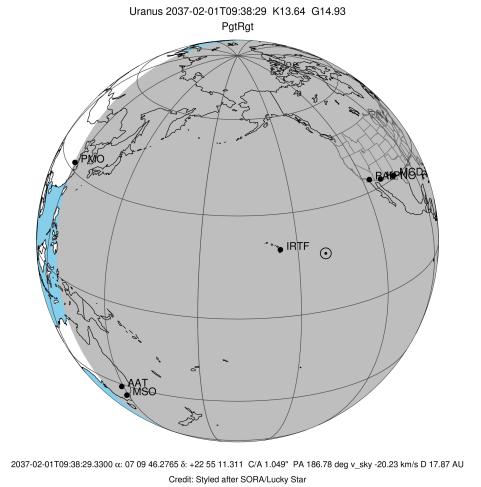
| Ring | I/E | UTC | b? alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|--------|---------|----------|--------|---------|--------------|
| epsilon | I | 2037-02-01T09:01:21.244 | 85.26 | -67.53 | 51509.28 | -22.65 | | |
| lambda | I | 2037-02-01T09:02:26.698 | 85.07 | -67.79 | 50026.71 | -22.62 | | |
| delta | I | 2037-02-01T09:03:43.113 | 84.84 | -68.09 | 48300.35 | -22.56 | | |
| gamma | I | 2037-02-01T09:04:13.073 | 84.74 | -68.20 | 47624.90 | -22.53 | | |
| eta | I | 2037-02-01T09:04:32.999 | 84.68 | -68.28 | 47176.12 | -22.51 | | |
| beta | I | 2037-02-01T09:05:41.352 | 84.47 | -68.55 | 45641.06 | -22.44 | | |
| alpha | I | 2037-02-01T09:06:22.034 | 84.33 | -68.71 | 44730.36 | -22.40 | | |
| 4 | I | 2037-02-01T09:07:59.502 | 84.02 | -69.09 | 42558.18 | -22.28 | | |
| 5 | I | 2037-02-01T09:08:15.398 | 83.96 | -69.15 | 42215.43 | -22.28 | | |
| 6 | I | 2037-02-01T09:08:29.515 | 83.92 | -69.21 | 41879.52 | -22.24 | | |
| Uranus | I | 2037-02-01T09:19:55.998 | 81.52 | -71.89 | 25359.25 | | -19.13 | -19.97 |
| Uranus | E | 2037-02-01T09:54:31.205 | 73.74 | -79.91 | 25147.84 | | 28.24 | 29.36 |
| 6 | E | 2037-02-01T10:04:40.006 | 71.42 | -82.20 | 41801.18 | 22.20 | | |
| 5 | E | 2037-02-01T10:05:02.002 | 71.33 | -82.28 | 42297.73 | 22.24 | | |
| 4 | E | 2037-02-01T10:05:13.933 | 71.29 | -82.32 | 42555.37 | 22.24 | | |
| alpha | E | 2037-02-01T10:06:51.651 | 70.91 | -82.68 | 44727.17 | 22.36 | | |
| beta | E | 2037-02-01T10:07:34.282 | 70.75 | -82.84 | 45677.30 | 22.40 | | |
| eta | E | 2037-02-01T10:08:41.190 | 70.49 | -83.08 | 47176.12 | 22.47 | | |
| gamma | E | 2037-02-01T10:09:01.393 | 70.42 | -83.16 | 47630.21 | 22.49 | | |
| delta | E | 2037-02-01T10:09:31.178 | 70.30 | -83.26 | 48300.35 | 22.51 | | |
| lambda | E | 2037-02-01T10:10:47.750 | 70.01 | -83.54 | 50026.71 | 22.58 | | |
| epsilon | E | 2037-02-01T10:11:19.514 | 69.89 | -83.65 | 50744.22 | 22.60 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:41:01.120
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114
 ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s
 RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 38.52
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.654
 C/A sky separation (km) : 8471.8
 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 | 2037-02-01T09:04:15.016 | | 17.25 | -0.93x | 51525.06 | -22.96 | | |
| lambda | I | 2037-02-01T09:05:20.280 | | 17.42 | -1.15x | 50026.71 | -22.95 | | |
| delta | I | 2037-02-01T09:06:35.546 | | 17.62 | -1.40x | 48300.35 | -22.92 | | |
| gamma | I | 2037-02-01T09:07:05.039 | | 17.70 | -1.50x | 47624.39 | -22.91 | | |
| eta | I | 2037-02-01T09:07:24.605 | | 17.75 | -1.56x | 47176.12 | -22.91 | | |
| beta | I | 2037-02-01T09:08:31.715 | | 17.93 | -1.78x | 45641.25 | -22.88 | | |
| alpha | I | 2037-02-01T09:09:11.772 | | 18.04 | -1.92x | 44726.88 | -22.87 | | |
| 4 | I | 2037-02-01T09:10:46.748 | | 18.29 | -2.23x | 42563.19 | -22.82 | | |
| 5 | I | 2037-02-01T09:11:02.873 | | 18.33 | -2.29x | 42206.66 | -22.83 | | |
| 6 | I | 2037-02-01T09:11:16.284 | | 18.37 | -2.33x | 41879.74 | -22.81 | | |
| Uranus | I | 2037-02-01T09:21:41.258 | | 19.98 | -4.40x | 25269.35 | | -23.31 | -24.29 |
| Uranus | E | 2037-02-01T10:00:12.094 | | 25.48 | -11.84 | 25117.07 | | 29.41 | 30.55 |
| 6 | E | 2037-02-01T10:09:43.136 | | 26.70 | -13.62 | 41798.59 | 22.87 | | |
| 5 | E | 2037-02-01T10:10:04.127 | | 26.75 | -13.69 | 42290.84 | 22.90 | | |
| 4 | E | 2037-02-01T10:10:16.326 | | 26.77 | -13.72 | 42560.86 | 22.88 | | |
| alpha | E | 2037-02-01T10:11:51.028 | | 26.97 | -14.02 | 44723.16 | 22.94 | | |
| beta | E | 2037-02-01T10:12:32.828 | | 27.05 | -14.15 | 45678.59 | 22.95 | | |
| eta | E | 2037-02-01T10:13:38.133 | | 27.19 | -14.35 | 47176.12 | 22.98 | | |
| gamma | E | 2037-02-01T10:13:57.873 | | 27.23 | -14.41 | 47629.79 | 22.99 | | |
| delta | E | 2037-02-01T10:14:27.038 | | 27.29 | -14.50 | 48300.35 | 23.00 | | |
| lambda | E | 2037-02-01T10:15:42.062 | | 27.44 | -14.73 | 50026.71 | 23.02 | | |
| epsilon | E | 2037-02-01T10:16:13.206 | | 27.50 | -14.82 | 50743.95 | 23.03 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-02-01T09:40:51.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 3368288867365179136
 2Mass ID (if available) : 07094628+2255114
 ICRS Star Coord at Epoch: 07h 09m 46.27653s +22:55:11.31063s
 RUWE (>1.4 is poor) : 3.53
 K magnitude : 13.639
 G magnitude : 14.932
 RP magnitude : 14.458
 BP magnitude : 15.213
 DUPflag : 0
 Distance (au) : 17.872
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.23
 Sun-Target sep (deg) : 153.67
 Sun-Moon sep (deg) : 38.47
 B (ring opening deg) : 60.55
 PA of pole (deg) : 80.17
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.634
 C/A sky separation (km) : 8221.6
 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 | 2037-02-01T09:04:03.144 | | 14.49 | 0.57x | 51525.84 | -22.96 | | |
| lambda | I | 2037-02-01T09:05:08.426 | | 14.65 | 0.36x | 50026.71 | -22.95 | | |
| delta | I | 2037-02-01T09:06:23.669 | | 14.84 | 0.12x | 48300.35 | -22.93 | | |
| gamma | I | 2037-02-01T09:06:53.153 | | 14.92 | 0.03x | 47624.37 | -22.92 | | |
| eta | I | 2037-02-01T09:07:12.711 | | 14.97 | -0.04x | 47176.12 | -22.92 | | |
| beta | I | 2037-02-01T09:08:19.792 | | 15.13 | -0.25x | 45641.26 | -22.89 | | |
| alpha | I | 2037-02-01T09:08:59.841 | | 15.23 | -0.38x | 44726.69 | -22.88 | | |
| 4 | I | 2037-02-01T09:10:34.746 | | 15.47 | -0.68x | 42563.47 | -22.84 | | |
| 5 | I | 2037-02-01T09:10:50.893 | | 15.51 | -0.73x | 42206.20 | -22.85 | | |
| 6 | I | 2037-02-01T09:11:04.278 | | 15.54 | -0.77x | 41879.74 | -22.82 | | |
| Uranus | I | 2037-02-01T09:21:26.972 | | 17.06 | -2.74x | 25264.92 | | -23.50 | -24.49 |
| Uranus | E | 2037-02-01T10:00:07.744 | | 22.23 | -9.85 | 25116.65 | | 29.43 | 30.57 |
| 6 | E | 2037-02-01T10:09:38.005 | | 23.37 | -11.54 | 41798.48 | 22.88 | | |
| 5 | E | 2037-02-01T10:09:58.967 | | 23.41 | -11.60 | 42290.49 | 22.91 | | |
| 4 | E | 2037-02-01T10:10:11.189 | | 23.44 | -11.64 | 42561.13 | 22.90 | | |
| alpha | E | 2037-02-01T10:11:45.833 | | 23.62 | -11.91 | 44722.98 | 22.94 | | |
| beta | E | 2037-02-01T10:12:27.629 | | 23.70 | -12.04 | 45678.65 | 22.96 | | |
| eta | E | 2037-02-01T10:13:32.914 | | 23.82 | -12.23 | 47176.12 | 22.98 | | |
| gamma | E | 2037-02-01T10:13:52.648 | | 23.86 | -12.29 | 47629.76 | 22.99 | | |
| delta | E | 2037-02-01T10:14:21.809 | | 23.92 | -12.37 | 48300.35 | 23.00 | | |
| lambda | E | 2037-02-01T10:15:36.822 | | 24.06 | -12.59 | 50026.71 | 23.03 | | |
| epsilon | E | 2037-02-01T10:16:07.967 | | 24.12 | -12.68 | 50744.05 | 23.04 | | |