

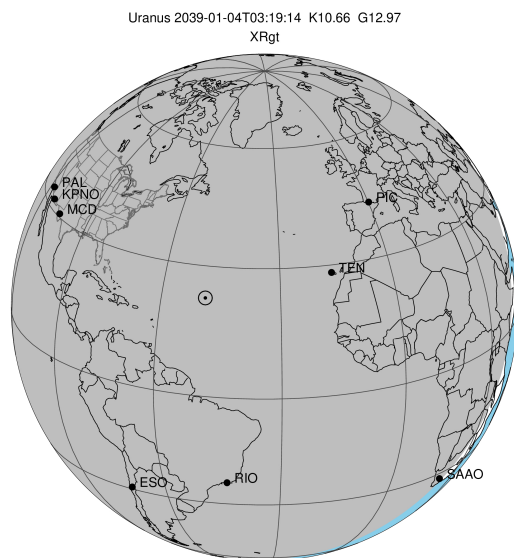
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-04T03:19:14.480
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 673943766757131648
 2Mass ID (if available) : 07553628+2120220

ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s

RUWE (>1.4 is poor) : 6.78
 K magnitude : 10.659
 G magnitude : 12.967
 RP magnitude : 12.215
 BP magnitude : 13.510
 DUPflag : 0
 Distance (au) : 17.690
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.41
 Sun-Target sep (deg) : 166.30
 Sun-Moon sep (deg) : 83.82
 B (ring opening deg) : 50.14
 PA of pole (deg) : 88.31

a(km) ring

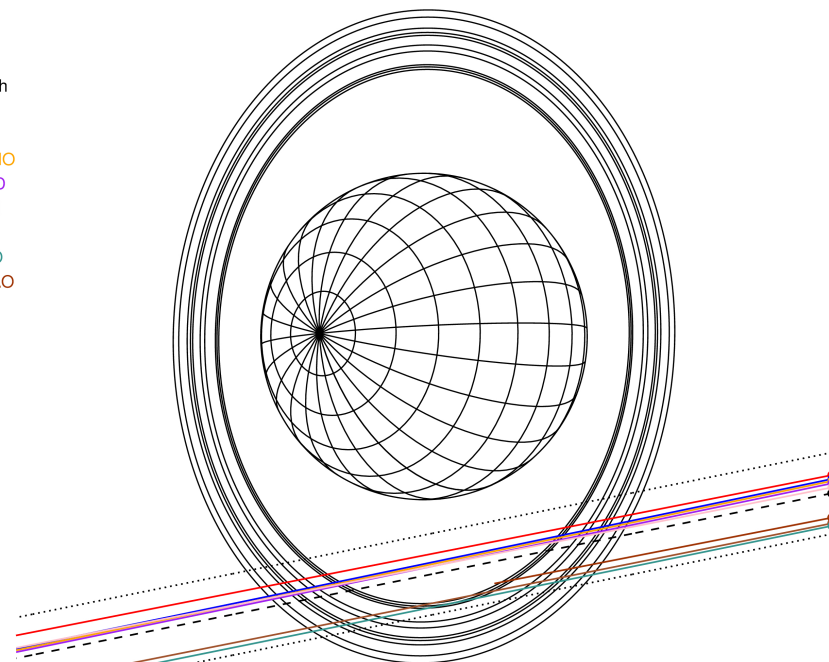
 1 41837.2 6
 2 42235.0 5
 3 42571.2 4
 4 44718.5 alpha
 5 45661.1 beta
 6 47176.1 eta
 7 47626.3 gamma
 8 48300.3 delta
 9 50026.7 lambda
 10 51149.4 epsilon



2039-01-04T03:19:14.4800 α: 07 55 36.2444 δ: +21 20 21.274 C/A 2.853° PA 11.44 deg v_sky -22.41 km/s D 17.69 AU
 Credit: Styled after SORA/Lucky Star

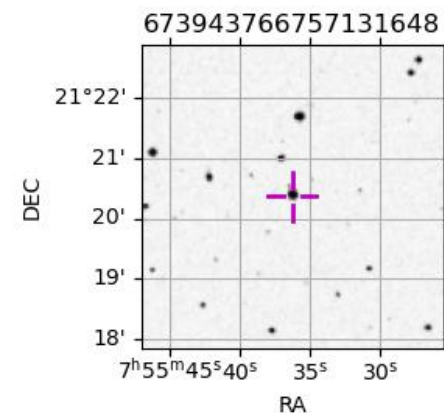
Uranus 2039-01-04T03:19:14 K10.66 G12.97 XRgt

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 RIO
 ESO
 SAAO

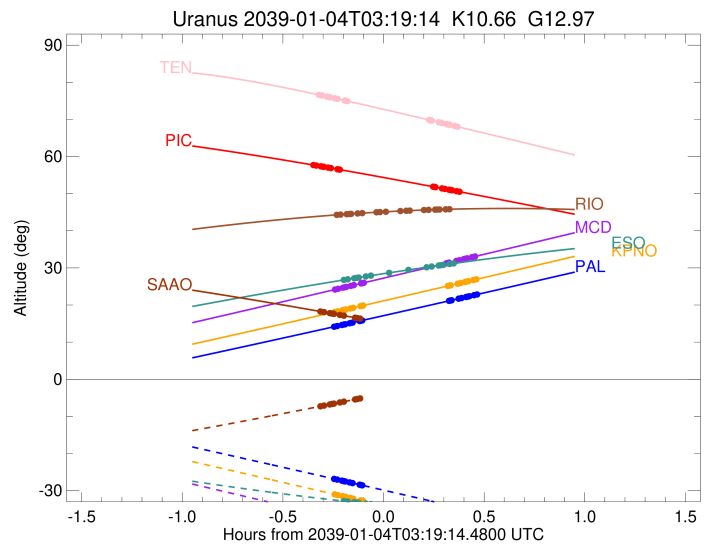
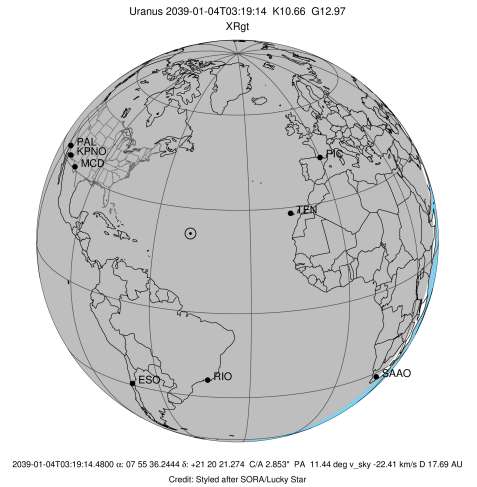


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| Obs | Location | lat | Elon | Rings I | Planet | Rings E | Observed Events Interval | OEcode |
|------|-----------------------|-------|-------|---------|--------|---------|-----------------------------|--------|
| PIC | Pic du Midi | 42.9 | 0.1 | +++++ | | +++++ | JAN 04 02:58 - JAN 04 03:42 | PnnRie |
| PAL | Palomar Mt (200") | 33.4 | 243.1 | +++++ | | +++++ | JAN 04 03:04 - JAN 04 03:47 | PnnRie |
| PNO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | | | | | PnnRnn |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | +++++ | | +++++ | JAN 04 03:04 - JAN 04 03:47 | PnnRie |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | +++++ | | +++++ | JAN 04 03:04 - JAN 04 03:46 | PnnRie |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | +++++ | | +++++ | JAN 04 03:00 - JAN 04 03:41 | PnnRie |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | | | | PnnRnn |
| KAV | Kavalur Observatory | 12.6 | 78.8 | | | | | PnnRnn |
| RIO | Rio de Janeiro | -22.9 | 316.8 | +++++ | | +++++ | JAN 04 03:05 - JAN 04 03:39 | PnnRie |
| ESO | European Southern Obs | -29.3 | 289.3 | +++++ | | +++++ | JAN 04 03:07 - JAN 04 03:40 | PnnRie |
| AAT | Siding Spring (AAT) | -31.3 | 149.1 | | | | | PnnRnn |
| SAAO | So. Afr. Astro. Obs. | -32.4 | 20.8 | +++++ | | | JAN 04 03:00 - JAN 04 03:12 | PnnRin |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-04T03:17:52.690
 Event type : XRgt
 : No Uranus occs
 : 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 : 673943766757131648
 2Mass ID (if available) : 07553628+2120220
 ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
 RUWE (>1.4 is poor) : 6.78
 K magnitude : 10.659
 G magnitude : 12.967
 RP magnitude : 12.215
 BP magnitude : 13.510
 DUPflag : 0
 Distance (au) : 17.690
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.41
 Sun-Target sep (deg) : 166.30
 Sun-Moon sep (deg) : 84.58
 B (ring opening deg) : 50.14
 PA of pole (deg) : 88.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.622
 C/A sky separation (km) : 33636.6
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

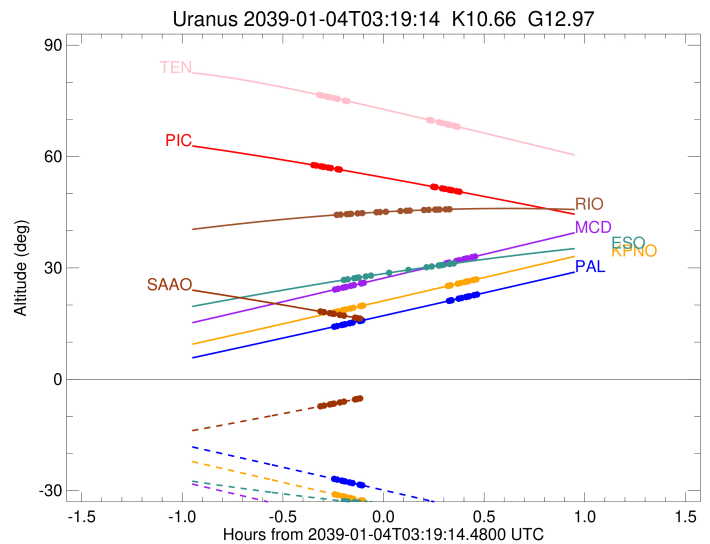
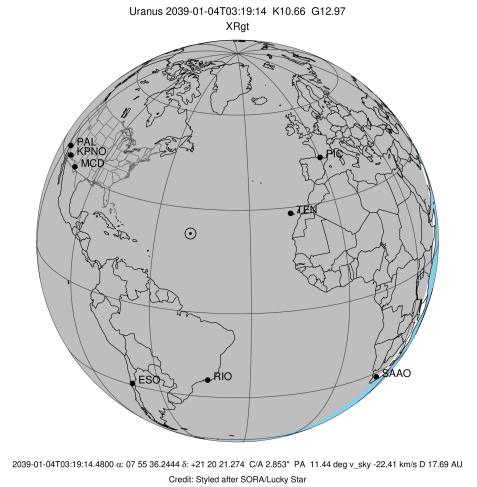


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-01-04T02:58:22.117 | | 57.70 | -48.86 | 51118.93 | -22.01 | | |
| lambda | I | 2039-01-04T02:59:12.530 | | 57.57 | -48.71 | 50026.71 | -21.47 | | |
| delta | I | 2039-01-04T03:00:34.208 | | 57.36 | -48.46 | 48300.35 | -20.79 | | |
| gamma | I | 2039-01-04T03:01:06.675 | | 57.27 | -48.37 | 47630.07 | -20.50 | | |
| eta | I | 2039-01-04T03:01:28.932 | | 57.22 | -48.30 | 47176.12 | -20.29 | | |
| beta | I | 2039-01-04T03:02:45.716 | | 57.02 | -48.07 | 45648.82 | -19.54 | | |
| alpha | I | 2039-01-04T03:03:35.045 | | 56.89 | -47.93 | 44696.69 | -19.01 | | |
| 4 | I | 2039-01-04T03:05:29.286 | | 56.58 | -47.59 | 42615.53 | -17.66 | | |
| 5 | I | 2039-01-04T03:05:53.126 | | 56.52 | -47.52 | 42208.71 | -17.39 | | |
| 6 | I | 2039-01-04T03:06:14.105 | | 56.47 | -47.45 | 41798.85 | -17.03 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-01-04T03:34:02.524 | | 51.87 | -42.43 | 41842.23 | 17.02 | | |
| 5 | E | 2039-01-04T03:34:29.446 | | 51.79 | -42.35 | 42299.82 | 17.38 | | |
| 4 | E | 2039-01-04T03:34:45.846 | | 51.75 | -42.30 | 42592.49 | 17.64 | | |
| alpha | E | 2039-01-04T03:36:43.238 | | 51.41 | -41.95 | 44740.81 | 18.99 | | |
| beta | E | 2039-01-04T03:37:31.435 | | 51.27 | -41.80 | 45675.61 | 19.52 | | |
| eta | E | 2039-01-04T03:38:46.877 | | 51.06 | -41.57 | 47176.12 | 20.27 | | |
| gamma | E | 2039-01-04T03:39:09.161 | | 51.00 | -41.50 | 47630.03 | 20.47 | | |
| delta | E | 2039-01-04T03:39:41.670 | | 50.90 | -41.40 | 48300.35 | 20.76 | | |
| lambda | E | 2039-01-04T03:41:03.458 | | 50.67 | -41.16 | 50026.71 | 21.44 | | |
| epsilon | E | 2039-01-04T03:42:13.839 | | 50.46 | -40.94 | 51554.60 | 21.98 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-04T03:23:23.360
 Event type : XRgt
 : No Uranus occs
 : 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 : 673943766757131648
 2Mass ID (if available) : 07553628+2120220
 ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
 RUWE (>1.4 is poor) : 6.78
 K magnitude : 10.659
 G magnitude : 12.967
 RP magnitude : 12.215
 BP magnitude : 13.510
 DUPflag : 0
 Distance (au) : 17.690
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.41
 Sun-Target sep (deg) : 166.30
 Sun-Moon sep (deg) : 84.00
 B (ring opening deg) : 50.14
 PA of pole (deg) : 88.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.718
 C/A sky separation (km) : 34877.8
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



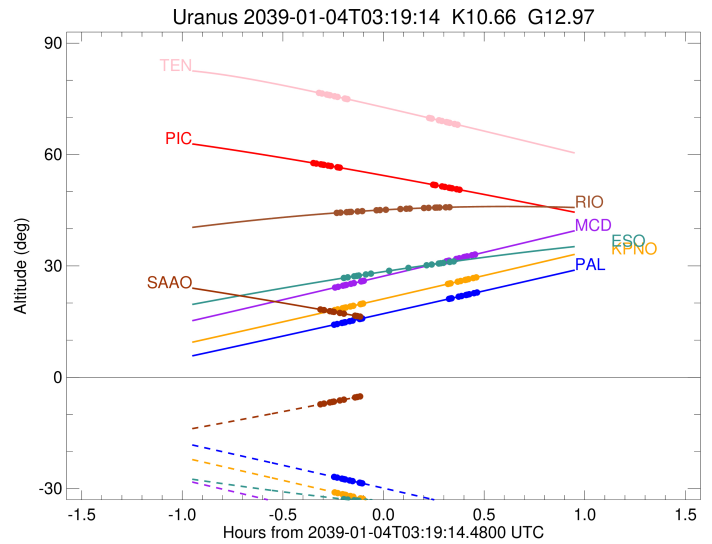
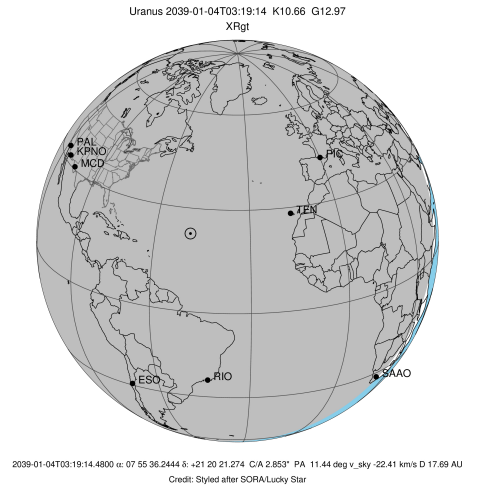
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-01-04T03:04:32.988 | | 14.16 | -26.85 | 51129.26 | -21.10 | | |
| lambda | I | 2039-01-04T03:05:26.165 | | 14.34 | -27.03 | 50026.71 | -20.52 | | |
| delta | I | 2039-01-04T03:06:51.843 | | 14.63 | -27.32 | 48300.35 | -19.77 | | |
| gamma | I | 2039-01-04T03:07:26.020 | | 14.74 | -27.44 | 47630.18 | -19.45 | | |
| eta | I | 2039-01-04T03:07:49.507 | | 14.82 | -27.52 | 47176.12 | -19.22 | | |
| beta | I | 2039-01-04T03:09:10.815 | | 15.10 | -27.80 | 45649.38 | -18.38 | | |
| alpha | I | 2039-01-04T03:10:03.394 | | 15.27 | -27.98 | 44697.67 | -17.79 | | |
| 4 | I | 2039-01-04T03:12:06.423 | | 15.69 | -28.40 | 42615.91 | -16.25 | | |
| 5 | I | 2039-01-04T03:12:32.176 | | 15.77 | -28.49 | 42212.14 | -15.95 | | |
| 6 | I | 2039-01-04T03:12:55.440 | | 15.85 | -28.57 | 41799.74 | -15.54 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-01-04T03:38:46.984 | | 21.12 | -33.92 | 41839.55 | 15.57 | | |
| 5 | E | 2039-01-04T03:39:16.353 | | 21.22 | -34.02 | 42296.77 | 15.98 | | |
| 4 | E | 2039-01-04T03:39:34.510 | | 21.28 | -34.09 | 42594.87 | 16.29 | | |
| alpha | E | 2039-01-04T03:41:40.242 | | 21.71 | -34.52 | 44739.39 | 17.83 | | |
| beta | E | 2039-01-04T03:42:31.493 | | 21.89 | -34.70 | 45674.87 | 18.43 | | |
| eta | E | 2039-01-04T03:43:51.129 | | 22.16 | -34.97 | 47176.12 | 19.27 | | |
| gamma | E | 2039-01-04T03:44:14.550 | | 22.24 | -35.06 | 47630.21 | 19.51 | | |
| delta | E | 2039-01-04T03:44:48.625 | | 22.36 | -35.17 | 48300.35 | 19.83 | | |
| lambda | E | 2039-01-04T03:46:14.036 | | 22.65 | -35.47 | 50026.71 | 20.58 | | |
| epsilon | E | 2039-01-04T03:47:27.234 | | 22.90 | -35.72 | 51555.24 | 21.17 | | |

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2039-01-04T03:23:20.680
Event type            : XRgt
: No Uranus occs
: 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        : 673943766757131648
2Mass ID (if available) : 07553628+2120220
ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
RUWE (>1.4 is poor)  : 6.78
K magnitude           : 10.659
G magnitude           : 12.967
RP magnitude          : 12.215
BP magnitude          : 13.510
DUPflag               : 0
Distance (au)         : 17.690
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -22.41
Sun-Target sep (deg)  : 166.30
Sun-Moon sep (deg)    : 84.06
B (ring opening deg)  : 50.14
PA of pole (deg)      : 88.31
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.741
C/A sky separation (km) : 35171.5
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

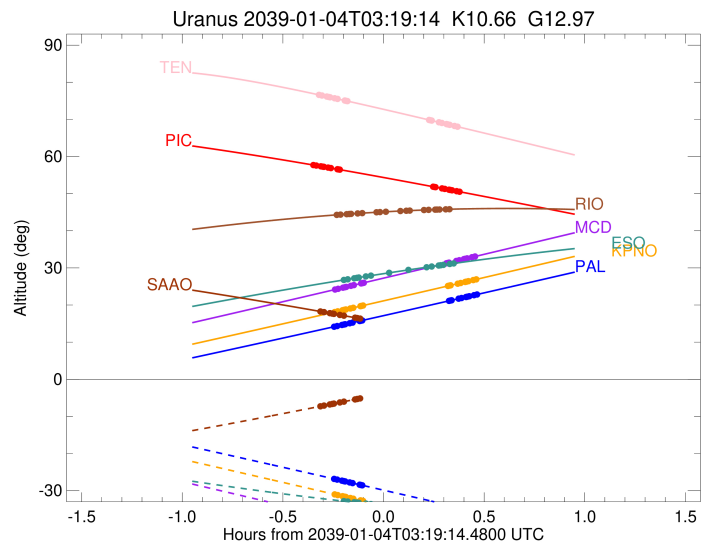
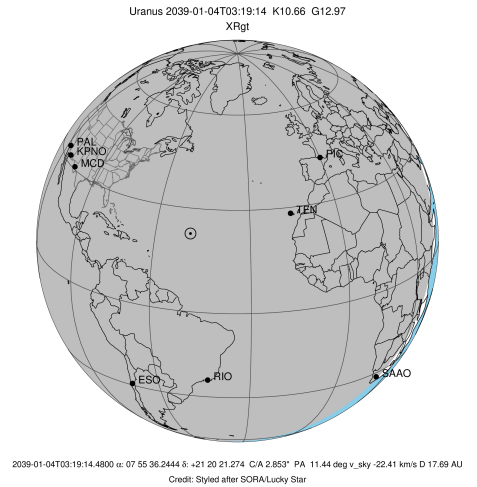


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-01-04T03:04:42.792 | | 18.11 | -31.02 | 51132.59 | -20.98 | | |
| lambda | I | 2039-01-04T03:05:36.472 | | 18.30 | -31.20 | 50026.71 | -20.38 | | |
| delta | I | 2039-01-04T03:07:02.787 | | 18.60 | -31.50 | 48300.35 | -19.61 | | |
| gamma | I | 2039-01-04T03:07:37.250 | | 18.71 | -31.63 | 47630.22 | -19.28 | | |
| eta | I | 2039-01-04T03:08:00.950 | | 18.80 | -31.71 | 47176.12 | -19.04 | | |
| beta | I | 2039-01-04T03:09:23.068 | | 19.08 | -32.00 | 45649.56 | -18.18 | | |
| alpha | I | 2039-01-04T03:10:16.266 | | 19.26 | -32.18 | 44697.97 | -17.57 | | |
| 4 | I | 2039-01-04T03:12:21.101 | | 19.69 | -32.62 | 42616.00 | -15.98 | | |
| 5 | I | 2039-01-04T03:12:47.249 | | 19.78 | -32.71 | 42213.15 | -15.66 | | |
| 6 | I | 2039-01-04T03:13:11.054 | | 19.87 | -32.79 | 41800.01 | -15.24 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-01-04T03:38:27.640 | | 25.14 | -38.13 | 41838.99 | 15.27 | | |
| 5 | E | 2039-01-04T03:38:57.567 | | 25.24 | -38.23 | 42296.12 | 15.70 | | |
| 4 | E | 2039-01-04T03:39:16.123 | | 25.31 | -38.30 | 42595.34 | 16.01 | | |
| alpha | E | 2039-01-04T03:41:23.655 | | 25.75 | -38.75 | 44739.11 | 17.61 | | |
| beta | E | 2039-01-04T03:42:15.525 | | 25.94 | -38.93 | 45674.72 | 18.23 | | |
| eta | E | 2039-01-04T03:43:35.976 | | 26.22 | -39.21 | 47176.12 | 19.10 | | |
| gamma | E | 2039-01-04T03:43:59.610 | | 26.30 | -39.30 | 47630.24 | 19.34 | | |
| delta | E | 2039-01-04T03:44:33.973 | | 26.42 | -39.42 | 48300.35 | 19.67 | | |
| lambda | E | 2039-01-04T03:46:00.025 | | 26.72 | -39.72 | 50026.71 | 20.44 | | |
| epsilon | E | 2039-01-04T03:47:13.691 | | 26.98 | -39.98 | 51555.28 | 21.05 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-04T03:23:12.130
 Event type : XRgt
 : No Uranus occs
 : 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 : 673943766757131648
 2Mass ID (if available) : 07553628+2120220
 ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
 RUWE (>1.4 is poor) : 6.78
 K magnitude : 10.659
 G magnitude : 12.967
 RP magnitude : 12.215
 BP magnitude : 13.510
 DUPflag : 0
 Distance (au) : 17.690
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.41
 Sun-Target sep (deg) : 166.30
 Sun-Moon sep (deg) : 84.15
 B (ring opening deg) : 50.14
 PA of pole (deg) : 88.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.767
 C/A sky separation (km) : 35505.8
 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

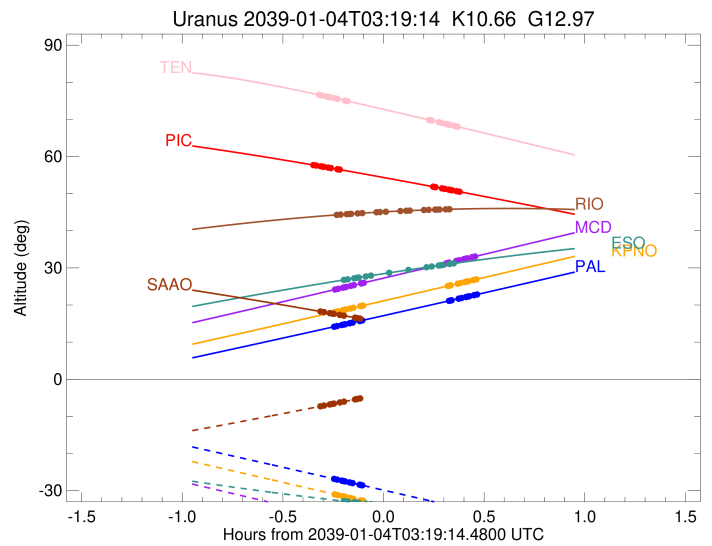
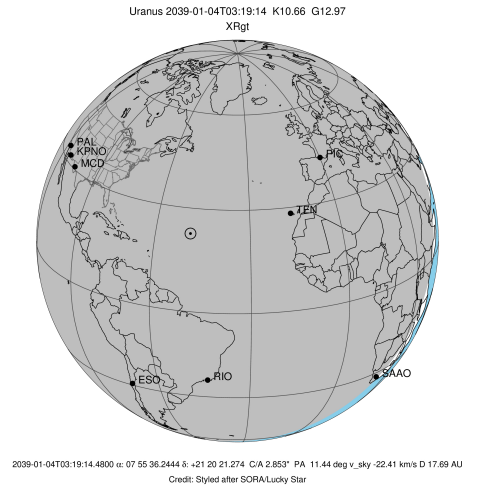


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-01-04T03:04:48.887 | | 24.18 | -37.29 | 51136.48 | -20.84 | | |
| lambda | I | 2039-01-04T03:05:43.136 | | 24.37 | -37.48 | 50026.71 | -20.23 | | |
| delta | I | 2039-01-04T03:07:10.166 | | 24.67 | -37.79 | 48300.35 | -19.43 | | |
| gamma | I | 2039-01-04T03:07:44.954 | | 24.80 | -37.91 | 47630.26 | -19.09 | | |
| eta | I | 2039-01-04T03:08:08.895 | | 24.88 | -38.00 | 47176.12 | -18.85 | | |
| beta | I | 2039-01-04T03:09:31.943 | | 25.18 | -38.30 | 45649.76 | -17.95 | | |
| alpha | I | 2039-01-04T03:10:25.859 | | 25.37 | -38.49 | 44698.32 | -17.32 | | |
| 4 | I | 2039-01-04T03:12:32.824 | | 25.82 | -38.94 | 42616.11 | -15.66 | | |
| 5 | I | 2039-01-04T03:12:59.443 | | 25.91 | -39.04 | 42214.34 | -15.33 | | |
| 6 | I | 2039-01-04T03:13:23.902 | | 26.00 | -39.12 | 41800.35 | -14.89 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-01-04T03:37:59.109 | | 31.24 | -44.40 | 41838.36 | 14.92 | | |
| 5 | E | 2039-01-04T03:38:29.707 | | 31.35 | -44.51 | 42295.37 | 15.36 | | |
| 4 | E | 2039-01-04T03:38:48.743 | | 31.42 | -44.58 | 42595.87 | 15.69 | | |
| alpha | E | 2039-01-04T03:40:58.405 | | 31.88 | -45.04 | 44738.79 | 17.36 | | |
| beta | E | 2039-01-04T03:41:50.998 | | 32.07 | -45.23 | 45674.55 | 18.00 | | |
| eta | E | 2039-01-04T03:43:12.390 | | 32.36 | -45.52 | 47176.12 | 18.90 | | |
| gamma | E | 2039-01-04T03:43:36.269 | | 32.45 | -45.61 | 47630.28 | 19.14 | | |
| delta | E | 2039-01-04T03:44:10.960 | | 32.57 | -45.73 | 48300.35 | 19.49 | | |
| lambda | E | 2039-01-04T03:45:37.736 | | 32.88 | -46.05 | 50026.71 | 20.29 | | |
| epsilon | E | 2039-01-04T03:46:51.926 | | 33.14 | -46.31 | 51555.29 | 20.91 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-04T03:18:17.920
 Event type : XRgt
 : No Uranus occs
 : 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 : 673943766757131648
 2Mass ID (if available) : 07553628+2120220
 ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
 RUWE (>1.4 is poor) : 6.78
 K magnitude : 10.659
 G magnitude : 12.967
 RP magnitude : 12.215
 BP magnitude : 13.510
 DUPflag : 0
 Distance (au) : 17.690
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.41
 Sun-Target sep (deg) : 166.30
 Sun-Moon sep (deg) : 84.70
 B (ring opening deg) : 50.14
 PA of pole (deg) : 88.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.771
 C/A sky separation (km) : 35553.8
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

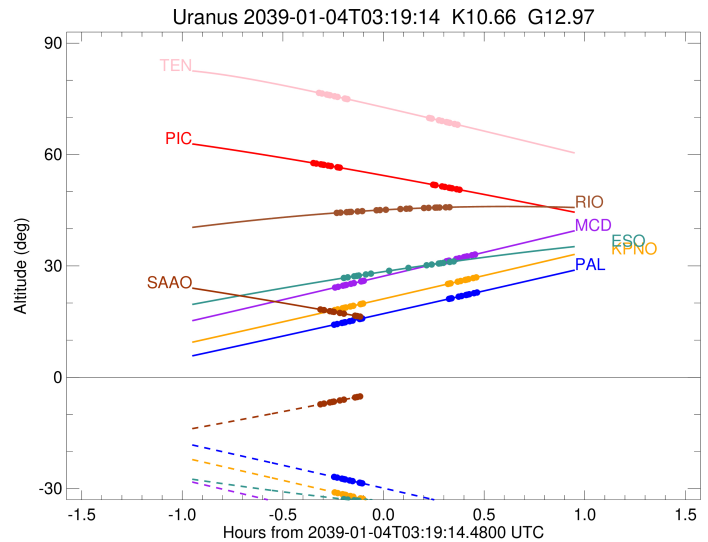
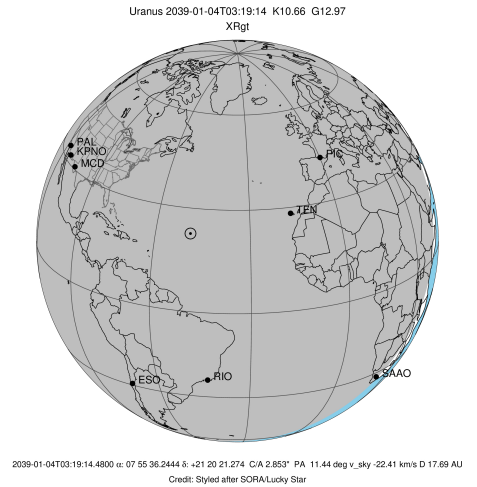


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-01-04T03:00:01.302 | | 76.61 | -64.78 | 51139.76 | -21.08 | | |
| lambda | I | 2039-01-04T03:00:55.096 | | 76.44 | -64.58 | 50026.71 | -20.46 | | |
| delta | I | 2039-01-04T03:02:21.157 | | 76.16 | -64.27 | 48300.35 | -19.65 | | |
| gamma | I | 2039-01-04T03:02:55.562 | | 76.04 | -64.14 | 47630.29 | -19.30 | | |
| eta | I | 2039-01-04T03:03:19.244 | | 75.96 | -64.05 | 47176.12 | -19.05 | | |
| beta | I | 2039-01-04T03:04:41.389 | | 75.69 | -63.75 | 45649.90 | -18.15 | | |
| alpha | I | 2039-01-04T03:05:34.735 | | 75.52 | -63.56 | 44698.55 | -17.50 | | |
| 4 | I | 2039-01-04T03:07:40.394 | | 75.09 | -63.10 | 42616.16 | -15.82 | | |
| 5 | I | 2039-01-04T03:08:06.705 | | 75.01 | -63.00 | 42214.98 | -15.49 | | |
| 6 | I | 2039-01-04T03:08:30.987 | | 74.92 | -62.91 | 41800.52 | -15.04 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-01-04T03:32:50.103 | | 69.86 | -57.56 | 41838.65 | 15.03 | | |
| 5 | E | 2039-01-04T03:33:20.474 | | 69.75 | -57.45 | 42295.73 | 15.48 | | |
| 4 | E | 2039-01-04T03:33:39.322 | | 69.68 | -57.38 | 42595.61 | 15.81 | | |
| alpha | E | 2039-01-04T03:35:48.040 | | 69.22 | -56.91 | 44738.98 | 17.49 | | |
| beta | E | 2039-01-04T03:36:40.226 | | 69.04 | -56.72 | 45674.66 | 18.14 | | |
| eta | E | 2039-01-04T03:38:00.999 | | 68.75 | -56.42 | 47176.12 | 19.04 | | |
| gamma | E | 2039-01-04T03:38:24.697 | | 68.66 | -56.33 | 47630.25 | 19.29 | | |
| delta | E | 2039-01-04T03:38:59.130 | | 68.54 | -56.21 | 48300.35 | 19.63 | | |
| lambda | E | 2039-01-04T03:40:25.260 | | 68.23 | -55.89 | 50026.71 | 20.44 | | |
| epsilon | E | 2039-01-04T03:41:38.903 | | 67.97 | -55.62 | 51555.29 | 21.07 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-04T03:19:21.010
 Event type : XRgt
 : No Uranus occs
 : 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 : 673943766757131648
 2Mass ID (if available) : 07553628+2120220
 ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
 RUWE (>1.4 is poor) : 6.78
 K magnitude : 10.659
 G magnitude : 12.967
 RP magnitude : 12.215
 BP magnitude : 13.510
 DUPflag : 0
 Distance (au) : 17.690
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.41
 Sun-Target sep (deg) : 166.30
 Sun-Moon sep (deg) : 84.45
 B (ring opening deg) : 50.14
 PA of pole (deg) : 88.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.213
 C/A sky separation (km) : 41228.7
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

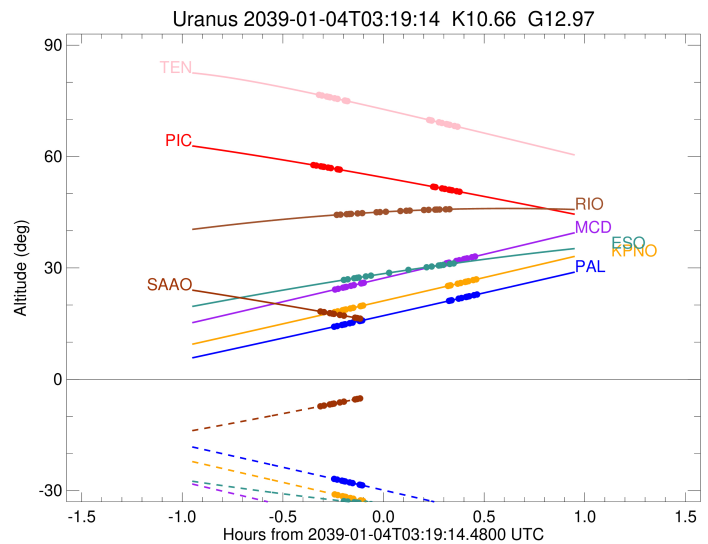
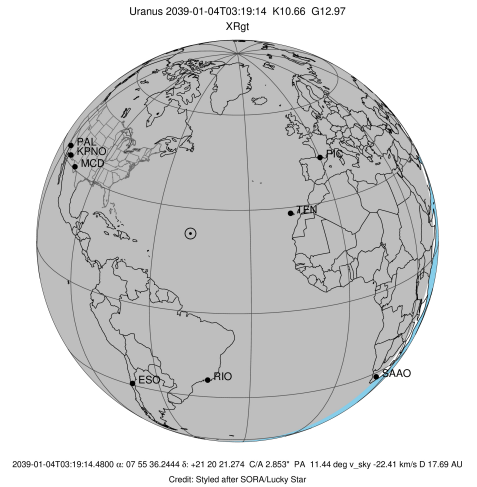


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-01-04T03:05:15.297 | | 44.28 | -44.47 | 51208.41 | -17.30 | | |
| lambda | I | 2039-01-04T03:06:26.042 | | 44.36 | -44.45 | 50026.71 | -16.29 | | |
| delta | I | 2039-01-04T03:08:16.699 | | 44.48 | -44.43 | 48300.35 | -14.89 | | |
| gamma | I | 2039-01-04T03:09:02.619 | | 44.52 | -44.42 | 47630.92 | -14.26 | | |
| eta | I | 2039-01-04T03:09:35.021 | | 44.56 | -44.41 | 47176.12 | -13.81 | | |
| beta | I | 2039-01-04T03:11:32.762 | | 44.68 | -44.38 | 45654.21 | -12.05 | | |
| alpha | I | 2039-01-04T03:12:56.275 | | 44.76 | -44.35 | 44706.40 | -10.69 | | |
| 4 | I | 2039-01-04T03:17:03.416 | | 44.98 | -44.26 | 42615.47 | -6.18 | | |
| 5 | I | 2039-01-04T03:18:11.386 | | 45.04 | -44.23 | 42245.66 | -4.91 | | |
| 6 | I | 2039-01-04T03:20:03.492 | | 45.13 | -44.18 | 41813.44 | -2.56 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-01-04T03:24:11.622 | | 45.32 | -44.05 | 41819.93 | 2.57 | | |
| 5 | E | 2039-01-04T03:26:10.342 | | 45.40 | -43.98 | 42271.27 | 4.92 | | |
| 4 | E | 2039-01-04T03:27:10.690 | | 45.44 | -43.94 | 42607.48 | 6.18 | | |
| alpha | E | 2039-01-04T03:31:20.649 | | 45.59 | -43.77 | 44731.07 | 10.70 | | |
| beta | E | 2039-01-04T03:32:42.910 | | 45.64 | -43.71 | 45670.63 | 12.05 | | |
| eta | E | 2039-01-04T03:34:39.175 | | 45.69 | -43.62 | 47176.12 | 13.81 | | |
| gamma | E | 2039-01-04T03:35:11.565 | | 45.71 | -43.59 | 47630.90 | 14.27 | | |
| delta | E | 2039-01-04T03:35:57.468 | | 45.73 | -43.56 | 48300.35 | 14.90 | | |
| lambda | E | 2039-01-04T03:37:48.078 | | 45.78 | -43.46 | 50026.71 | 16.30 | | |
| epsilon | E | 2039-01-04T03:39:18.601 | | 45.81 | -43.39 | 51549.66 | 17.31 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-04T03:20:56.530
 Event type : XRgt
 : No Uranus occs
 : 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 : 673943766757131648
 2Mass ID (if available) : 07553628+2120220
 ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
 RUWE (>1.4 is poor) : 6.78
 K magnitude : 10.659
 G magnitude : 12.967
 RP magnitude : 12.215
 BP magnitude : 13.510
 DUPflag : 0
 Distance (au) : 17.690
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.41
 Sun-Target sep (deg) : 166.30
 Sun-Moon sep (deg) : 84.21
 B (ring opening deg) : 50.14
 PA of pole (deg) : 88.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.259
 C/A sky separation (km) : 41816.7
 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



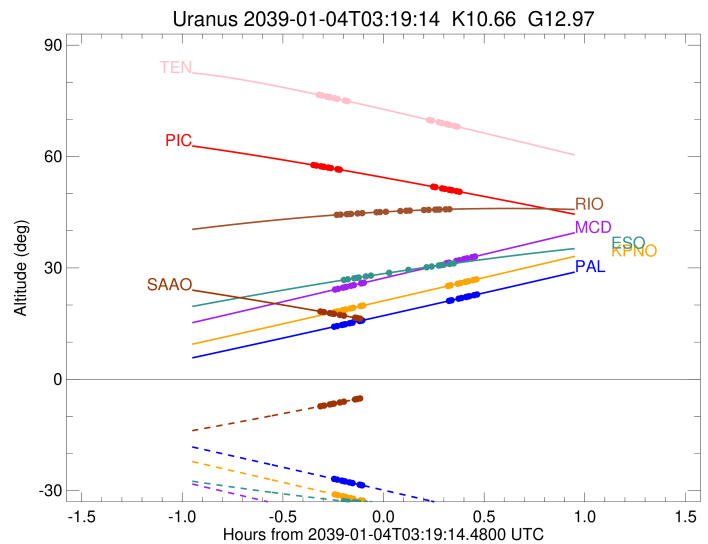
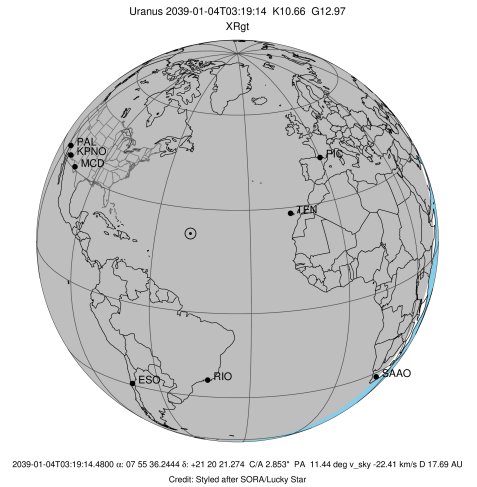
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-01-04T03:07:21.417 | | 26.75 | -32.83 | 51215.55 | -16.73 | | |
| lambda | I | 2039-01-04T03:08:35.205 | | 26.93 | -32.95 | 50026.71 | -15.67 | | |
| delta | I | 2039-01-04T03:10:30.776 | | 27.21 | -33.15 | 48300.35 | -14.18 | | |
| gamma | I | 2039-01-04T03:11:19.122 | | 27.32 | -33.22 | 47630.98 | -13.51 | | |
| eta | I | 2039-01-04T03:11:53.422 | | 27.40 | -33.28 | 47176.12 | -13.01 | | |
| beta | I | 2039-01-04T03:13:59.649 | | 27.70 | -33.48 | 45654.80 | -11.09 | | |
| alpha | I | 2039-01-04T03:15:31.562 | | 27.92 | -33.63 | 44707.57 | -9.56 | | |
| 4 | I | 2039-01-04T03:20:44.627 | | 28.65 | -34.11 | 42614.51 | -3.71 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 4 | E | 2039-01-04T03:26:51.556 | | 29.48 | -34.65 | 42609.73 | 3.71 | | |
| alpha | E | 2039-01-04T03:32:07.305 | | 30.18 | -35.08 | 44729.73 | 9.57 | | |
| beta | E | 2039-01-04T03:33:37.906 | | 30.38 | -35.20 | 45669.98 | 11.10 | | |
| eta | E | 2039-01-04T03:35:42.558 | | 30.64 | -35.36 | 47176.12 | 13.03 | | |
| gamma | E | 2039-01-04T03:36:16.817 | | 30.72 | -35.40 | 47630.98 | 13.53 | | |
| delta | E | 2039-01-04T03:37:05.105 | | 30.82 | -35.46 | 48300.35 | 14.20 | | |
| lambda | E | 2039-01-04T03:39:00.519 | | 31.06 | -35.60 | 50026.71 | 15.69 | | |
| epsilon | E | 2039-01-04T03:40:34.124 | | 31.26 | -35.72 | 51547.98 | 16.76 | | |


```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2039-01-04T03:15:37.870
Event type             : XRgt
: No Uranus occs
: 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        : 673943766757131648
2Mass ID (if available) : 07553628+2120220
ICRS Star Coord at Epoch: 07h 55m 36.24439s +21:20:21.27402s
RUWE (>1.4 is poor)  : 6.78
K magnitude            : 10.659
G magnitude           : 12.967
RP magnitude          : 12.215
BP magnitude          : 13.510
DUPflag               : 0
Distance (au)         : 17.690
f0 (km)                : 0.000
g0 (km)                : 0.000
skyplane vel. (km/s)  : -22.41
Sun-Target sep (deg)  : 166.30
Sun-Moon sep (deg)    : 84.12
B (ring opening deg)  : 50.14
PA of pole (deg)      : 88.31
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.124
C/A sky separation (km) : 40080.3
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_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 | 2039-01-04T03:00:24.067 | | 18.27 | -7.29 | 51194.44 | -18.05 | | |
| lambda | I | 2039-01-04T03:01:30.742 | | 18.09 | -7.09 | 50026.71 | -17.15 | | |
| delta | I | 2039-01-04T03:03:15.081 | | 17.81 | -6.78 | 48300.35 | -15.92 | | |
| gamma | I | 2039-01-04T03:03:57.860 | | 17.69 | -6.65 | 47630.80 | -15.38 | | |
| eta | I | 2039-01-04T03:04:27.807 | | 17.61 | -6.56 | 47176.12 | -14.98 | | |
| beta | I | 2039-01-04T03:06:14.776 | | 17.33 | -6.24 | 45653.17 | -13.50 | | |
| alpha | I | 2039-01-04T03:07:28.159 | | 17.13 | -6.02 | 44704.42 | -12.39 | | |
| 4 | I | 2039-01-04T03:10:42.548 | | 16.60 | -5.44 | 42616.25 | -9.11 | | |
| 5 | I | 2039-01-04T03:11:27.048 | | 16.48 | -5.31 | 42236.10 | -8.36 | | |
| 6 | I | 2039-01-04T03:12:18.554 | | 16.33 | -5.15 | 41808.04 | -7.31 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-01-04T03:24:18.046 | | 14.33 | -2.96x | 41826.72 | 7.30 | | |
| 5 | E | 2039-01-04T03:25:16.137 | | 14.17 | -2.78x | 42279.98 | 8.35 | | |
| 4 | E | 2039-01-04T03:25:53.017 | | 14.06 | -2.67x | 42604.31 | 9.10 | | |
| alpha | E | 2039-01-04T03:29:10.546 | | 13.50 | -2.06x | 44733.24 | 12.38 | | |
| beta | E | 2039-01-04T03:30:22.789 | | 13.30 | -1.83x | 45671.72 | 13.48 | | |
| eta | E | 2039-01-04T03:32:08.471 | | 12.99 | -1.51x | 47176.12 | 14.96 | | |
| gamma | E | 2039-01-04T03:32:38.464 | | 12.91 | -1.41x | 47630.76 | 15.36 | | |
| delta | E | 2039-01-04T03:33:21.318 | | 12.78 | -1.28x | 48300.35 | 15.89 | | |
| lambda | E | 2039-01-04T03:35:05.849 | | 12.48 | -0.95x | 50026.71 | 17.12 | | |
| epsilon | E | 2039-01-04T03:36:32.600 | | 12.23 | -0.68x | 51552.10 | 18.01 | | |