

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-21T00:10:41.510
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3416339617145524096
 2Mass ID (if available) : 05221066+2314290

Uranus 2030-11-21T00:10:41 K14.86 G18.15 PgtRgt

ICRS Star Coord at Epoch: 05h 22m 10.65431s +23:14:29.18719s

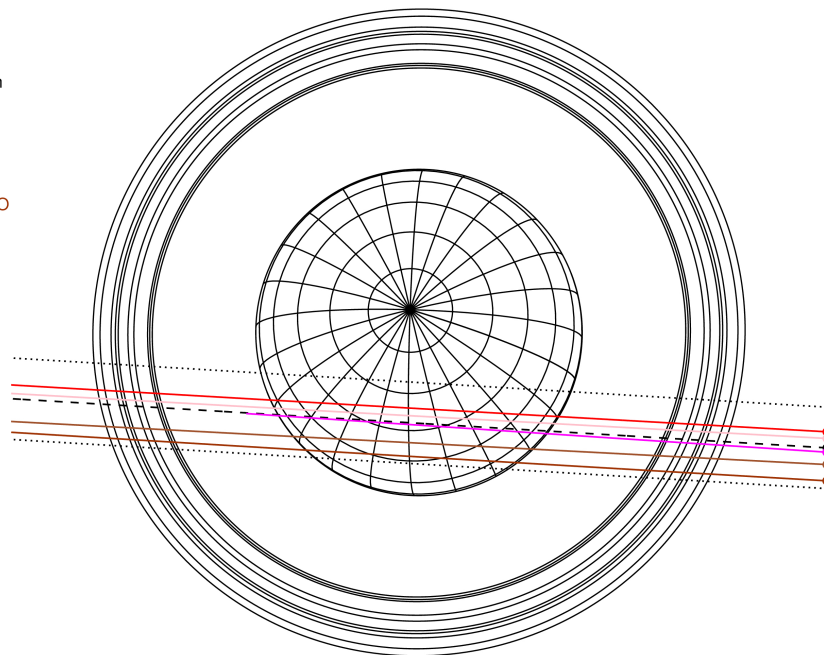
RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.860
 G magnitude : 18.153
 RP magnitude : 17.153
 BP magnitude : 19.191
 DUPflag : 0
 Distance (au) : 18.246
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.08
 Sun-Target sep (deg) : 156.97
 Sun-Moon sep (deg) : 99.03
 B (ring opening deg) : 81.38
 PA of pole (deg) : 21.29

Uranus 2030-11-21T00:10:41 K14.86 G18.15
 PgtRgt



2030-11-21T00:10:41.5100 ex: 05 22 10.6543 s: +23 14 29.187 C/A 1.066° PA 356.55 deg v_sky -21.08 km/s D 18.25 AU
 Credit: Styled after SORA/Lucky Star

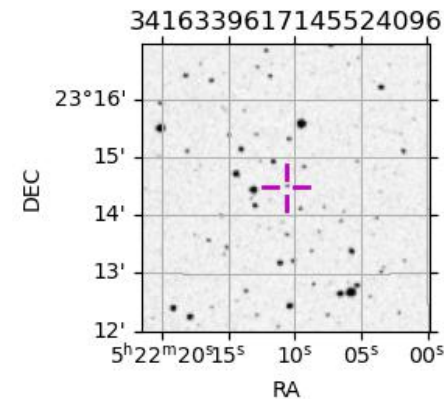
Earth
 PIC
 TEN
 KAV
 RIO
 SAAO



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

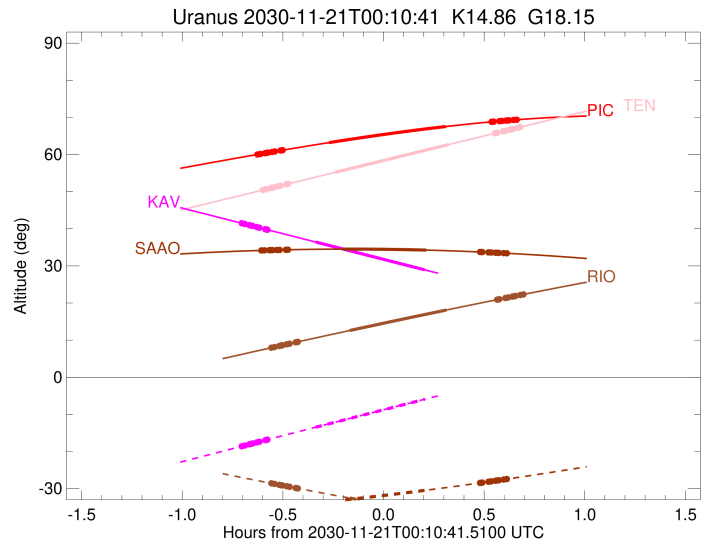
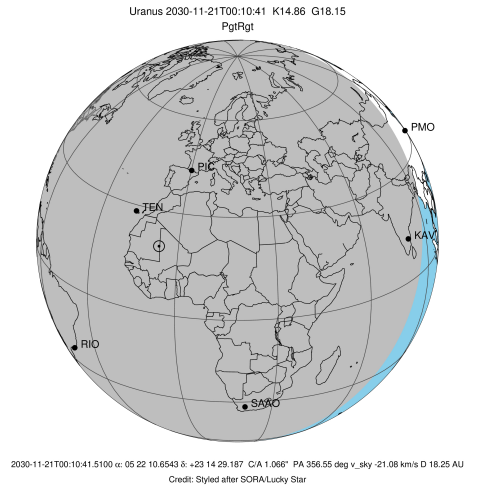
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| Obs | Location | lat | Elon | Rings I | Planet | Rings E | Observed Events Interval | OEcode |
|------|-----------------------|-------|-------|---------|--------|---------|-----------------------------|--------|
| PIC | Pic du Midi | 42.9 | 0.1 | +++++ | + + | +++++ | NOV 20 23:33 - NOV 21 00:50 | PieRie |
| PAL | Palomar Mt (200") | 33.4 | 243.1 | | | | | PnnRnn |
| PMO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | | | | | PnnRnn |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | | | | | PnnRnn |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | | | | | PnnRnn |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | +++++ | + + | +++++ | NOV 20 23:35 - NOV 21 00:51 | PieRie |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | | | | PnnRnn |
| KAV | Kavalur Observatory | 12.6 | 78.8 | +++++ | + + | | NOV 20 23:28 - NOV 21 00:23 | PieRin |
| RIO | Rio de Janeiro | -22.9 | 316.8 | +++++ | + + | +++++ | NOV 20 23:37 - NOV 21 00:52 | PieRie |
| ESO | European Southern Obs | -29.3 | 289.3 | | | | | PnnRnn |
| AAT | Siding Spring (AAT) | -31.3 | 149.1 | | | | | PnnRnn |
| SAAO | So. Afr. Astro. Obs. | -32.4 | 20.8 | +++++ | + + | +++++ | NOV 20 23:34 - NOV 21 00:47 | PieRie |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |



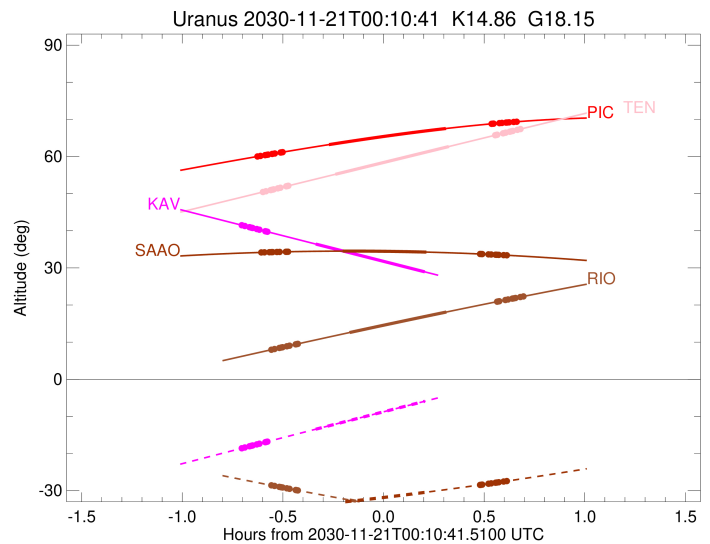
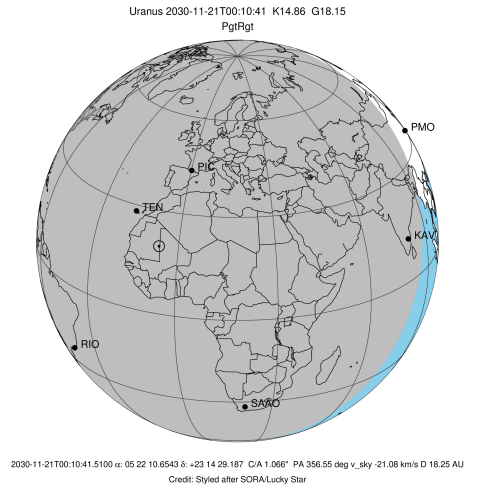
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2030-11-21T00:11:42.050
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        : 3416339617145524096
2Mass ID (if available) : 05221066+2314290
ICRS Star Coord at Epoch: 05h 22m 10.65431s +23:14:29.18719s
RUWE (>1.4 is poor)  : 0.91
K magnitude           : 14.860
G magnitude           : 18.153
RP magnitude          : 17.153
BP magnitude          : 19.191
DUPflag              : 0
Distance (au)         : 18.246
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -21.08
Sun-Target sep (deg)  : 156.97
Sun-Moon sep (deg)    : 99.86
B (ring opening deg)  : 81.38
PA of pole (deg)      : 21.29
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.899
C/A sky separation (km) : 11901.6
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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 | 2030-11-20T23:33:24.599 | | 60.07 | -66.99 | 50786.26 | -20.78 | | |
| lambda | I | 2030-11-20T23:34:01.136 | | 60.16 | -67.00 | 50026.71 | -20.78 | | |
| delta | I | 2030-11-20T23:35:24.306 | | 60.38 | -67.03 | 48300.35 | -20.73 | | |
| gamma | I | 2030-11-20T23:35:56.995 | | 60.46 | -67.04 | 47622.91 | -20.71 | | |
| eta | I | 2030-11-20T23:36:18.571 | | 60.52 | -67.05 | 47176.12 | -20.70 | | |
| beta | I | 2030-11-20T23:37:31.424 | | 60.70 | -67.06 | 45669.60 | -20.66 | | |
| alpha | I | 2030-11-20T23:38:19.076 | | 60.83 | -67.08 | 44685.54 | -20.62 | | |
| 4 | I | 2030-11-20T23:40:03.951 | | 61.09 | -67.10 | 42527.65 | -20.53 | | |
| 5 | I | 2030-11-20T23:40:21.757 | | 61.14 | -67.10 | 42164.70 | -20.53 | | |
| 6 | I | 2030-11-20T23:40:38.286 | | 61.18 | -67.10 | 41825.82 | -20.51 | | |
| Uranus | I | 2030-11-20T23:54:24.150 | | 63.21 | -67.04 | 25191.60 | | -6.86 | -7.18 |
| Uranus | E | 2030-11-21T00:29:18.752 | | 67.55 | -65.31 | 25557.19 | | -0.47 | -0.50 |
| 6 | E | 2030-11-21T00:42:55.918 | | 68.81 | -64.10 | 41869.18 | 20.55 | | |
| 5 | E | 2030-11-21T00:43:17.653 | | 68.84 | -64.07 | 42315.05 | 20.57 | | |
| 4 | E | 2030-11-21T00:43:31.555 | | 68.86 | -64.04 | 42601.26 | 20.57 | | |
| alpha | E | 2030-11-21T00:45:15.818 | | 69.00 | -63.87 | 44750.84 | 20.66 | | |
| beta | E | 2030-11-21T00:45:59.921 | | 69.06 | -63.79 | 45663.05 | 20.70 | | |
| eta | E | 2030-11-21T00:47:12.941 | | 69.15 | -63.67 | 47176.12 | 20.74 | | |
| gamma | E | 2030-11-21T00:47:34.678 | | 69.17 | -63.63 | 47627.20 | 20.76 | | |
| delta | E | 2030-11-21T00:48:07.090 | | 69.21 | -63.57 | 48300.35 | 20.78 | | |
| lambda | E | 2030-11-21T00:49:30.078 | | 69.31 | -63.43 | 50026.71 | 20.83 | | |
| epsilon | E | 2030-11-21T00:50:35.337 | | 69.39 | -63.31 | 51386.90 | 20.83 | | |

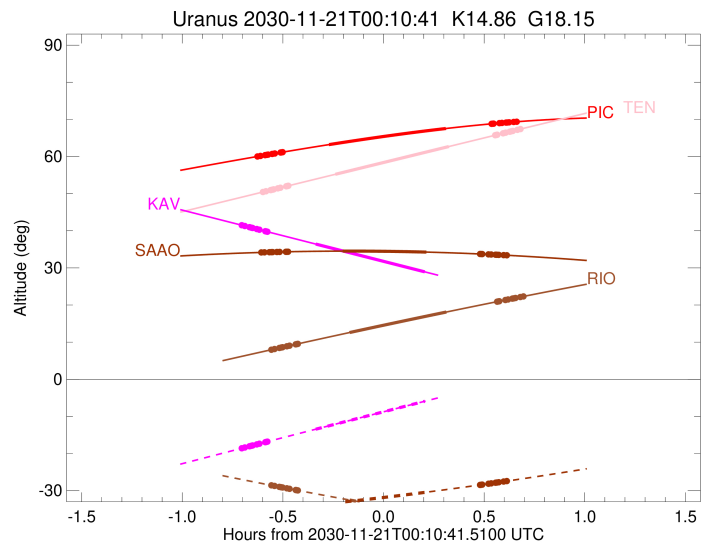
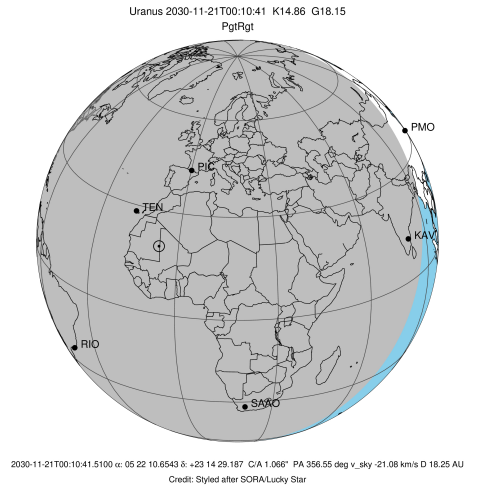
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-21T00:13:05.450
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3416339617145524096
 2Mass ID (if available) : 05221066+2314290
 ICRS Star Coord at Epoch: 05h 22m 10.65431s +23:14:29.18719s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.860
 G magnitude : 18.153
 RP magnitude : 17.153
 BP magnitude : 19.191
 DUPflag : 0
 Distance (au) : 18.246
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.08
 Sun-Target sep (deg) : 156.97
 Sun-Moon sep (deg) : 99.76
 B (ring opening deg) : 81.38
 PA of pole (deg) : 21.29
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.989
 C/A sky separation (km) : 13091.1
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

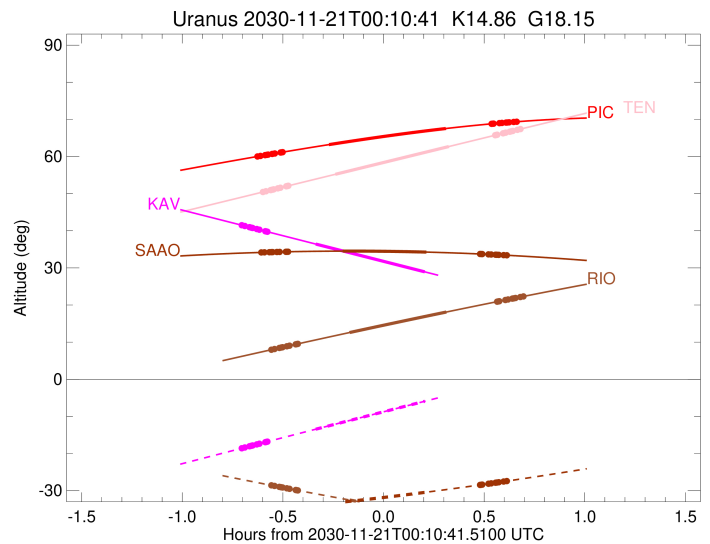
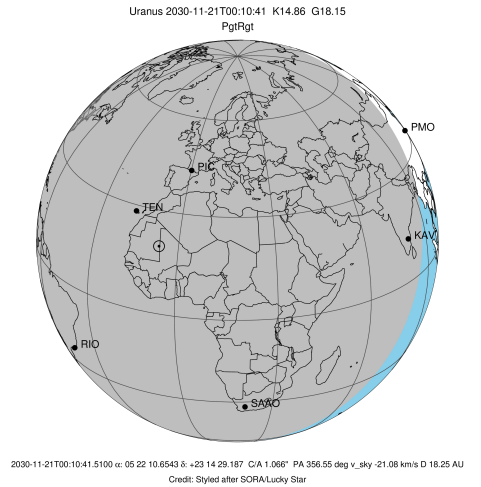
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2030-11-20T23:35:03.153 | | 50.51 | -70.67 | 50782.38 | -20.64 | | |
| lambda | I | 2030-11-20T23:35:39.750 | | 50.65 | -70.80 | 50026.71 | -20.64 | | |
| delta | I | 2030-11-20T23:37:03.514 | | 50.96 | -71.09 | 48300.35 | -20.58 | | |
| gamma | I | 2030-11-20T23:37:36.452 | | 51.08 | -71.20 | 47622.81 | -20.56 | | |
| eta | I | 2030-11-20T23:37:58.188 | | 51.16 | -71.27 | 47176.12 | -20.54 | | |
| beta | I | 2030-11-20T23:39:11.600 | | 51.43 | -71.52 | 45670.05 | -20.49 | | |
| alpha | I | 2030-11-20T23:39:59.664 | | 51.61 | -71.69 | 44685.75 | -20.44 | | |
| 4 | I | 2030-11-20T23:41:45.509 | | 51.99 | -72.04 | 42527.33 | -20.34 | | |
| 5 | I | 2030-11-20T23:42:03.427 | | 52.06 | -72.10 | 42165.79 | -20.33 | | |
| 6 | I | 2030-11-20T23:42:20.105 | | 52.12 | -72.16 | 41826.96 | -20.31 | | |
| Uranus | I | 2030-11-20T23:56:21.232 | | 55.22 | -74.92 | 25163.29 | | -7.12 | -7.46 |
| Uranus | E | 2030-11-21T00:30:09.908 | | 62.69 | -80.39 | 25551.72 | | -0.95 | -1.00 |
| 6 | E | 2030-11-21T00:44:00.491 | | 65.74 | -81.56 | 41870.07 | 20.38 | | |
| 5 | E | 2030-11-21T00:44:22.340 | | 65.82 | -81.58 | 42314.82 | 20.40 | | |
| 4 | E | 2030-11-21T00:44:36.310 | | 65.88 | -81.59 | 42600.16 | 20.41 | | |
| alpha | E | 2030-11-21T00:46:21.375 | | 66.26 | -81.65 | 44750.51 | 20.52 | | |
| beta | E | 2030-11-21T00:47:05.819 | | 66.42 | -81.68 | 45663.64 | 20.56 | | |
| eta | E | 2030-11-21T00:48:19.265 | | 66.69 | -81.71 | 47176.12 | 20.62 | | |
| gamma | E | 2030-11-21T00:48:41.123 | | 66.77 | -81.72 | 47627.06 | 20.64 | | |
| delta | E | 2030-11-21T00:49:13.725 | | 66.89 | -81.73 | 48300.35 | 20.66 | | |
| lambda | E | 2030-11-21T00:50:37.151 | | 67.20 | -81.74 | 50026.71 | 20.72 | | |
| epsilon | E | 2030-11-21T00:51:42.298 | | 67.44 | -81.75 | 51378.06 | 20.73 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-21T00:06:31.880
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3416339617145524096
 2Mass ID (if available) : 05221066+2314290
 ICRS Star Coord at Epoch: 05h 22m 10.65431s +23:14:29.18719s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.860
 G magnitude : 18.153
 RP magnitude : 17.153
 BP magnitude : 19.191
 DUPflag : 0
 Distance (au) : 18.246
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.08
 Sun-Target sep (deg) : 156.97
 Sun-Moon sep (deg) : 99.67
 B (ring opening deg) : 81.38
 PA of pole (deg) : 21.29
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.094
 C/A sky separation (km) : 14479.9
 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



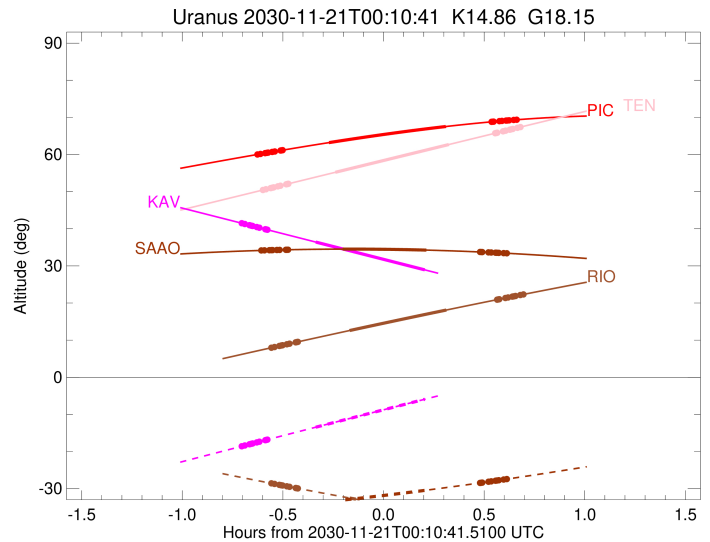
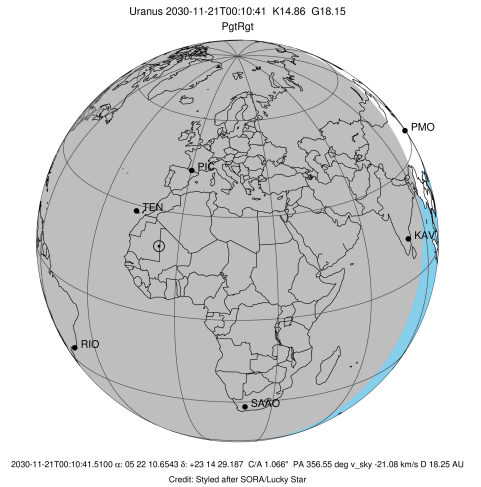
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2030-11-20T23:28:44.782 | | 41.43 | -18.52 | 50775.71 | -20.48 | | |
| lambda | I | 2030-11-20T23:29:21.344 | | 41.29 | -18.37 | 50026.71 | -20.47 | | |
| delta | I | 2030-11-20T23:30:45.821 | | 40.96 | -18.04 | 48300.35 | -20.40 | | |
| gamma | I | 2030-11-20T23:31:19.068 | | 40.83 | -17.92 | 47622.64 | -20.37 | | |
| eta | I | 2030-11-20T23:31:41.001 | | 40.75 | -17.83 | 47176.12 | -20.35 | | |
| beta | I | 2030-11-20T23:32:55.108 | | 40.47 | -17.54 | 45670.83 | -20.28 | | |
| alpha | I | 2030-11-20T23:33:43.706 | | 40.28 | -17.35 | 44686.17 | -20.22 | | |
| 4 | I | 2030-11-20T23:35:30.835 | | 39.87 | -16.94 | 42526.86 | -20.09 | | |
| 5 | I | 2030-11-20T23:35:48.881 | | 39.80 | -16.87 | 42167.76 | -20.07 | | |
| 6 | I | 2030-11-20T23:36:05.756 | | 39.74 | -16.80 | 41828.92 | -20.05 | | |
| Uranus | I | 2030-11-20T23:50:29.183 | | 36.42 | -13.45 | 25123.36 | | -7.48 | -7.83 |
| Uranus | E | 2030-11-21T00:22:59.722 | | 28.94 | -5.93 | 25543.19 | | -1.40 | -1.47 |
| 6 | E | 2030-11-21T00:37:16.161 | | 25.65 | -2.64x | 41870.71 | 19.97 | | |
| 5 | E | 2030-11-21T00:37:38.415 | | 25.57 | -2.56x | 42314.60 | 19.99 | | |
| 4 | E | 2030-11-21T00:37:52.644 | | 25.51 | -2.50x | 42599.34 | 20.00 | | |
| alpha | E | 2030-11-21T00:39:39.835 | | 25.10 | -2.09x | 44750.26 | 20.13 | | |
| beta | E | 2030-11-21T00:40:25.171 | | 24.93 | -1.92x | 45664.05 | 20.18 | | |
| eta | E | 2030-11-21T00:41:39.978 | | 24.64 | -1.63x | 47176.12 | 20.25 | | |
| gamma | E | 2030-11-21T00:42:02.234 | | 24.56 | -1.55x | 47626.96 | 20.27 | | |
| delta | E | 2030-11-21T00:42:35.437 | | 24.43 | -1.42x | 48300.35 | 20.30 | | |
| lambda | E | 2030-11-21T00:44:00.355 | | 24.10 | -1.10x | 50026.71 | 20.36 | | |
| epsilon | E | 2030-11-21T00:45:06.363 | | 23.85 | -0.84x | 51372.40 | 20.37 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-21T00:14:46.880
 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 : 3416339617145524096
 2Mass ID (if available) : 05221066+2314290
 ICRS Star Coord at Epoch: 05h 22m 10.65431s +23:14:29.18719s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.860
 G magnitude : 18.153
 RP magnitude : 17.153
 BP magnitude : 19.191
 DUPflag : 0
 Distance (au) : 18.246
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.08
 Sun-Target sep (deg) : 156.97
 Sun-Moon sep (deg) : 99.15
 B (ring opening deg) : 81.38
 PA of pole (deg) : 21.29
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.308
 C/A sky separation (km) : 17306.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_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 | 2030-11-20T23:37:35.334 | | 8.02 | -28.63 | 50768.93 | -19.93 | | |
| lambda | I | 2030-11-20T23:38:12.577 | | 8.15 | -28.74 | 50026.71 | -19.91 | | |
| delta | I | 2030-11-20T23:39:39.500 | | 8.44 | -28.99 | 48300.35 | -19.81 | | |
| gamma | I | 2030-11-20T23:40:13.756 | | 8.55 | -29.09 | 47622.45 | -19.77 | | |
| eta | I | 2030-11-20T23:40:36.350 | | 8.63 | -29.15 | 47176.12 | -19.74 | | |
| beta | I | 2030-11-20T23:41:52.755 | | 8.88 | -29.37 | 45671.75 | -19.64 | | |
| alpha | I | 2030-11-20T23:42:42.976 | | 9.05 | -29.52 | 44686.77 | -19.56 | | |
| 4 | I | 2030-11-20T23:44:33.913 | | 9.42 | -29.84 | 42526.40 | -19.38 | | |
| 5 | I | 2030-11-20T23:44:52.491 | | 9.48 | -29.89 | 42170.47 | -19.36 | | |
| 6 | I | 2030-11-20T23:45:09.983 | | 9.54 | -29.94 | 41831.44 | -19.32 | | |
| Uranus | I | 2030-11-21T00:00:34.387 | | 12.59 | -32.52 | 25064.58 | | -7.99 | -8.36 |
| Uranus | E | 2030-11-21T00:29:26.402 | | 18.12 | -36.99 | 25499.99 | | -2.72 | -2.85 |
| 6 | E | 2030-11-21T00:44:35.595 | | 20.91 | -39.09 | 41872.88 | 19.42 | | |
| 5 | E | 2030-11-21T00:44:58.261 | | 20.98 | -39.14 | 42313.41 | 19.45 | | |
| 4 | E | 2030-11-21T00:45:12.782 | | 21.02 | -39.18 | 42596.17 | 19.48 | | |
| alpha | E | 2030-11-21T00:47:02.741 | | 21.35 | -39.42 | 44749.17 | 19.67 | | |
| beta | E | 2030-11-21T00:47:49.241 | | 21.49 | -39.52 | 45665.65 | 19.75 | | |
| eta | E | 2030-11-21T00:49:05.529 | | 21.72 | -39.68 | 47176.12 | 19.85 | | |
| gamma | E | 2030-11-21T00:49:28.200 | | 21.79 | -39.73 | 47626.54 | 19.88 | | |
| delta | E | 2030-11-21T00:50:02.050 | | 21.89 | -39.81 | 48300.35 | 19.93 | | |
| lambda | E | 2030-11-21T00:51:28.454 | | 22.15 | -39.99 | 50026.71 | 20.03 | | |
| epsilon | E | 2030-11-21T00:52:34.243 | | 22.35 | -40.13 | 51346.99 | 20.05 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2030-11-21T00:10:43.730
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 3416339617145524096
 2Mass ID (if available) : 05221066+2314290
 ICRS Star Coord at Epoch: 05h 22m 10.65431s +23:14:29.18719s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.860
 G magnitude : 18.153
 RP magnitude : 17.153
 BP magnitude : 19.191
 DUPflag : 0
 Distance (au) : 18.246
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.08
 Sun-Target sep (deg) : 156.97
 Sun-Moon sep (deg) : 99.58
 B (ring opening deg) : 81.38
 PA of pole (deg) : 21.29
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.470
 C/A sky separation (km) : 19447.6
 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



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 | 2030-11-20T23:34:35.520 | | 34.18 | -35.15 | 50762.12 | -19.80 | | |
| lambda | I | 2030-11-20T23:35:12.671 | | 34.19 | -35.10 | 50026.71 | -19.77 | | |
| delta | I | 2030-11-20T23:36:40.283 | | 34.23 | -34.99 | 48300.35 | -19.64 | | |
| gamma | I | 2030-11-20T23:37:14.863 | | 34.24 | -34.94 | 47622.25 | -19.58 | | |
| eta | I | 2030-11-20T23:37:37.668 | | 34.25 | -34.91 | 47176.12 | -19.54 | | |
| beta | I | 2030-11-20T23:38:54.859 | | 34.28 | -34.81 | 45672.73 | -19.41 | | |
| alpha | I | 2030-11-20T23:39:45.719 | | 34.30 | -34.74 | 44687.54 | -19.31 | | |
| 4 | I | 2030-11-20T23:41:38.339 | | 34.34 | -34.59 | 42526.08 | -19.06 | | |
| 5 | I | 2030-11-20T23:41:57.079 | | 34.35 | -34.56 | 42173.62 | -19.03 | | |
| 6 | I | 2030-11-20T23:42:14.866 | | 34.35 | -34.54 | 41834.15 | -18.99 | | |
| Uranus | I | 2030-11-20T23:58:30.365 | | 34.52 | -33.08 | 25020.20 | | -8.35 | -8.75 |
| Uranus | E | 2030-11-21T00:23:28.684 | | 34.26 | -30.42 | 25452.91 | | -3.65 | -3.82 |
| 6 | E | 2030-11-21T00:39:30.331 | | 33.75 | -28.46 | 41874.01 | 19.00 | | |
| 5 | E | 2030-11-21T00:39:53.366 | | 33.73 | -28.41 | 42312.45 | 19.04 | | |
| 4 | E | 2030-11-21T00:40:08.157 | | 33.72 | -28.38 | 42594.26 | 19.07 | | |
| alpha | E | 2030-11-21T00:42:00.334 | | 33.65 | -28.14 | 44748.46 | 19.32 | | |
| beta | E | 2030-11-21T00:42:47.740 | | 33.61 | -28.04 | 45666.52 | 19.42 | | |
| eta | E | 2030-11-21T00:44:05.225 | | 33.56 | -27.87 | 47176.12 | 19.55 | | |
| gamma | E | 2030-11-21T00:44:28.230 | | 33.54 | -27.82 | 47626.32 | 19.59 | | |
| delta | E | 2030-11-21T00:45:02.589 | | 33.51 | -27.75 | 48300.35 | 19.64 | | |
| lambda | E | 2030-11-21T00:46:30.170 | | 33.45 | -27.55 | 50026.71 | 19.78 | | |
| epsilon | E | 2030-11-21T00:47:36.082 | | 33.40 | -27.41 | 51333.24 | 19.81 | | |