

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-15T21:17:57.130
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427500209924204160
 2Mass ID (if available) : 05514268+2338282

ICRS Star Coord at Epoch: 05h 51m 42.68939s +23:38:28.38685s

RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.658
 G magnitude : 16.969
 RP magnitude : 16.249
 BP magnitude : 17.546
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.06
 Sun-Target sep (deg) : 152.51
 Sun-Moon sep (deg) : 31.76
 B (ring opening deg) : 76.90
 PA of pole (deg) : 51.67

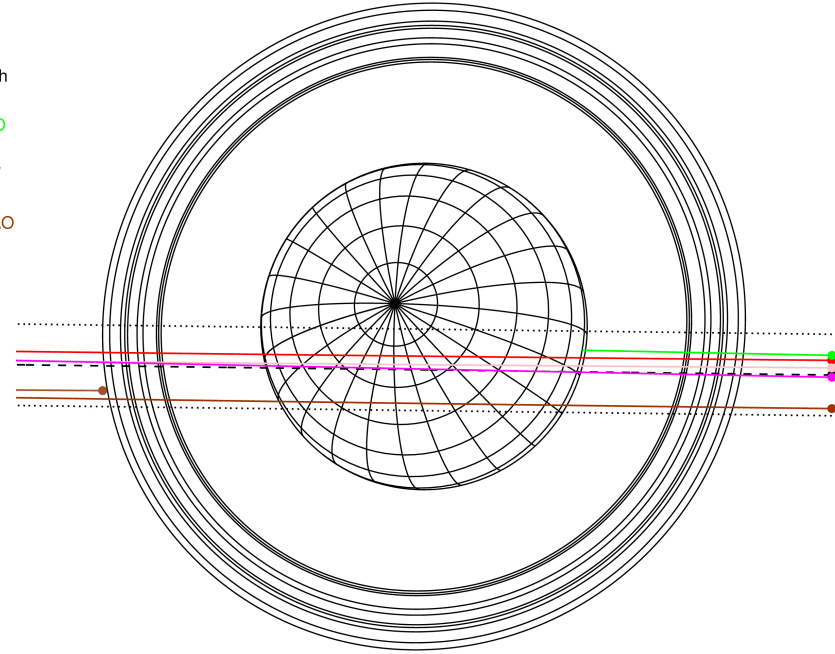
| # | a(km) | ring |
|----|---------|---------|
| 1 | 41837.2 | 6 |
| 2 | 42235.0 | 5 |
| 3 | 42571.2 | 4 |
| 4 | 44718.5 | alpha |
| 5 | 45661.1 | beta |
| 6 | 47176.1 | eta |
| 7 | 47626.3 | gamma |
| 8 | 48300.3 | delta |
| 9 | 50026.7 | lambda |
| 10 | 51149.4 | epsilon |



2033-01-15T21:17:57.1300 ra: 05 51 42.6894 d: +23 38 28.387 C/A 0.510° PA 359.28 deg v_sky -20.06 km/s D 18.14 AU
 Credit: Styled after SORA/Lucky Star

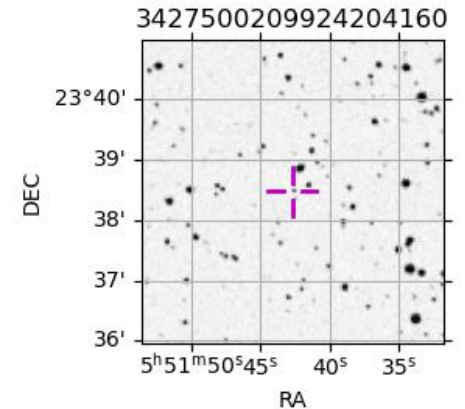
Uranus 2033-01-15T21:17:57 K14.66 G16.97 PgtRgt

Earth
 PIC
 PMO
 TEN
 KAV
 RIO
 SAAO

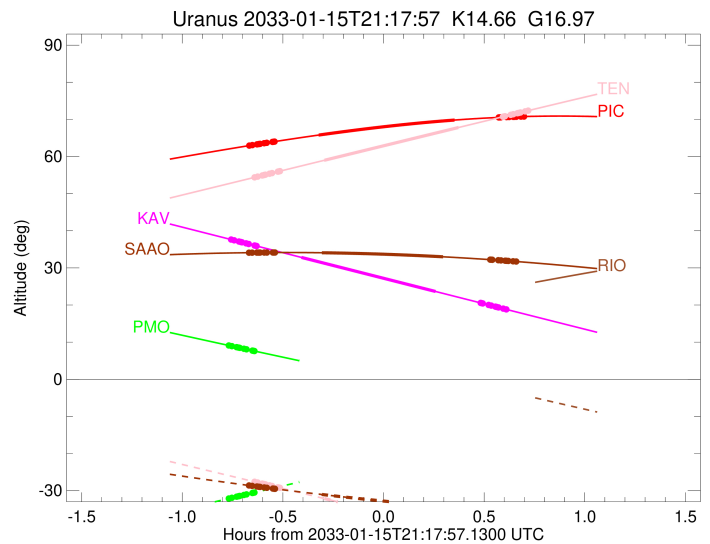
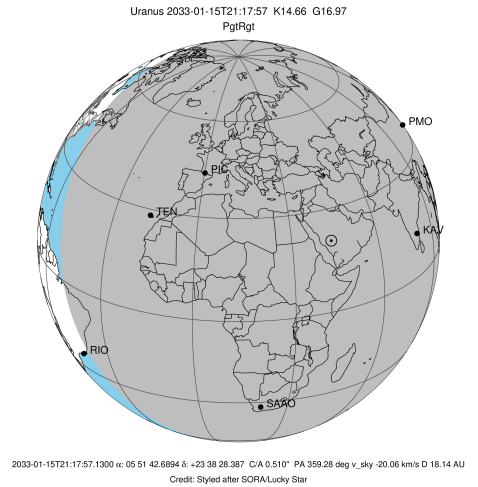


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| Obs | Location | lat | Elon | Rings I | Planet | Rings E | Observed Events Interval | OEcode |
|------|-----------------------|-------|-------|---------|--------|---------|-----------------------------|--------|
| PIC | Pic du Midi | 42.9 | 0.1 | +++++ | + + | +++++ | JAN 15 20:38 - JAN 15 22:00 | PieRie |
| PAL | Palomar Mt (200") | 33.4 | 243.1 | | | | | PnnRnn |
| PMO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | +++++ | + | | JAN 15 20:32 - JAN 15 20:52 | PinRin |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | | | | | PnnRnn |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | | | | | PnnRnn |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | +++++ | + + | +++++ | JAN 15 20:39 - JAN 15 22:01 | PieRie |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | | | | PnnRnn |
| KAV | Kavalur Observatory | 12.6 | 78.8 | +++++ | + + | +++++ | JAN 15 20:32 - JAN 15 21:54 | PieRie |
| 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 | | | | | PnnRnn |
| SAAO | So. Afr. Astro. Obs. | -32.4 | 20.8 | +++++ | + + | +++++ | JAN 15 20:38 - JAN 15 21:57 | PieRie |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |

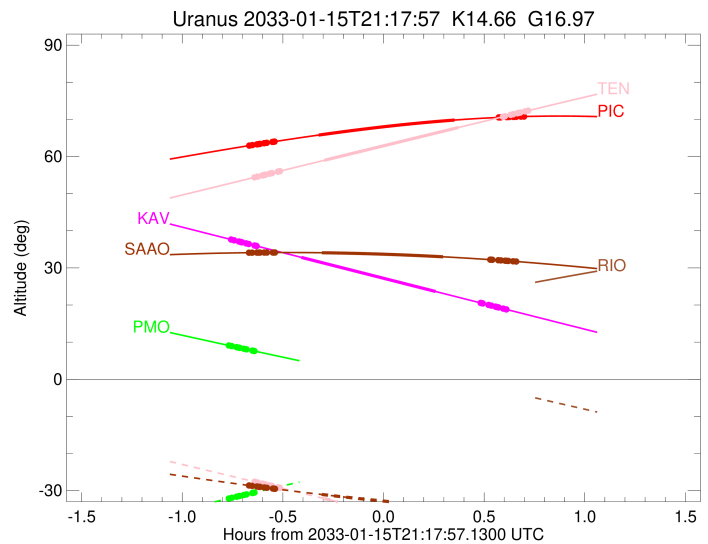
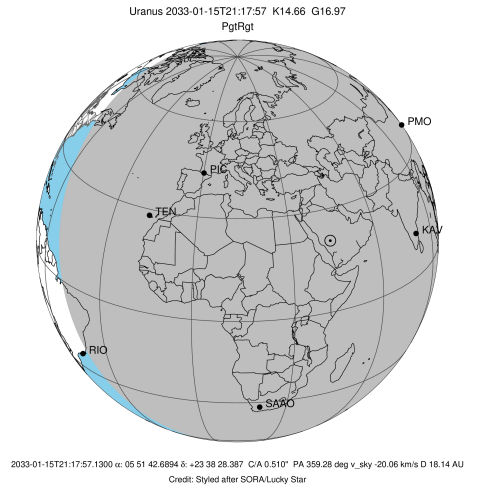


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-15T21:18:48.050
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3427500209924204160
 2Mass ID (if available) : 05514268+2338282
 ICRS Star Coord at Epoch: 05h 51m 42.68939s +23:38:28.38685s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.658
 G magnitude : 16.969
 RP magnitude : 16.249
 BP magnitude : 17.546
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.06
 Sun-Target sep (deg) : 152.51
 Sun-Moon sep (deg) : 32.39
 B (ring opening deg) : 76.90
 PA of pole (deg) : 51.67
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.354
 C/A sky separation (km) : 4653.2
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2033-01-15T20:38:11.567 | | 62.98 | -41.16 | 50846.22 | -20.61 | | |
| lambda | I | 2033-01-15T20:38:51.309 | | 63.08 | -41.28 | 50026.71 | -20.62 | | |
| delta | I | 2033-01-15T20:40:15.046 | | 63.28 | -41.53 | 48300.35 | -20.61 | | |
| gamma | I | 2033-01-15T20:40:47.616 | | 63.36 | -41.63 | 47629.02 | -20.61 | | |
| eta | I | 2033-01-15T20:41:09.592 | | 63.41 | -41.69 | 47176.12 | -20.61 | | |
| beta | I | 2033-01-15T20:42:23.010 | | 63.59 | -41.92 | 45663.29 | -20.60 | | |
| alpha | I | 2033-01-15T20:43:09.333 | | 63.70 | -42.05 | 44710.47 | -20.60 | | |
| 4 | I | 2033-01-15T20:44:51.246 | | 63.94 | -42.36 | 42606.57 | -20.58 | | |
| 5 | I | 2033-01-15T20:45:12.926 | | 63.99 | -42.43 | 42172.52 | -20.58 | | |
| 6 | I | 2033-01-15T20:45:29.591 | | 64.03 | -42.48 | 41828.27 | -20.59 | | |
| Uranus | I | 2033-01-15T20:58:37.322 | | 65.78 | -44.83 | 25115.35 | | -11.65 | -12.18 |
| Uranus | E | 2033-01-15T21:39:08.222 | | 69.83 | -51.89 | 25308.49 | | 8.68 | 9.08 |
| 6 | E | 2033-01-15T21:52:18.808 | | 70.53 | -54.09 | 41855.07 | 20.60 | | |
| 5 | E | 2033-01-15T21:52:39.691 | | 70.55 | -54.14 | 42284.91 | 20.60 | | |
| 4 | E | 2033-01-15T21:52:52.121 | | 70.55 | -54.18 | 42530.60 | 20.59 | | |
| alpha | E | 2033-01-15T21:54:38.141 | | 70.62 | -54.47 | 44719.55 | 20.61 | | |
| beta | E | 2033-01-15T21:55:23.555 | | 70.65 | -54.59 | 45654.99 | 20.61 | | |
| eta | E | 2033-01-15T21:56:37.334 | | 70.69 | -54.79 | 47176.12 | 20.62 | | |
| gamma | E | 2033-01-15T21:56:58.987 | | 70.70 | -54.85 | 47622.68 | 20.62 | | |
| delta | E | 2033-01-15T21:57:31.842 | | 70.71 | -54.94 | 48300.35 | 20.63 | | |
| lambda | E | 2033-01-15T21:58:55.520 | | 70.75 | -55.16 | 50026.71 | 20.63 | | |
| epsilon | E | 2033-01-15T22:00:01.829 | | 70.78 | -55.34 | 51395.13 | 20.63 | | |

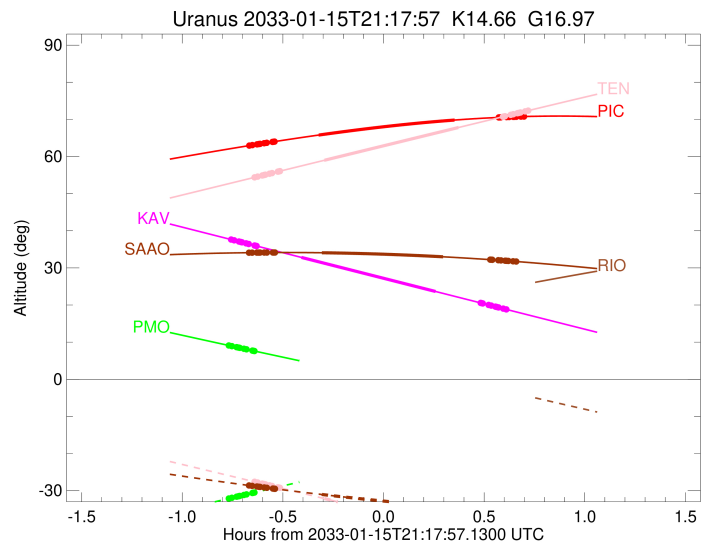
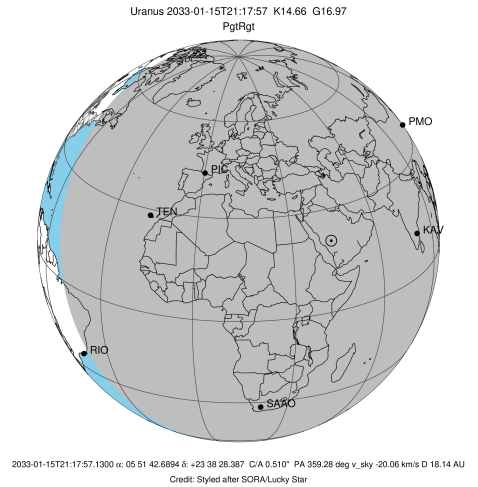
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-15T21:13:35.480
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3427500209924204160
 2Mass ID (if available) : 05514268+2338282
 ICRS Star Coord at Epoch: 05h 51m 42.68939s +23:38:28.38685s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.658
 G magnitude : 16.969
 RP magnitude : 16.249
 BP magnitude : 17.546
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.06
 Sun-Target sep (deg) : 152.51
 Sun-Moon sep (deg) : 31.21
 B (ring opening deg) : 76.90
 PA of pole (deg) : 51.67
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.245
 C/A sky separation (km) : 3218.0
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|--------|---------|----------|--------|---------|--------------|
| epsilon | I | 2033-01-15T20:32:05.333 | | 9.05 | -32.07 | 50851.30 | -20.33 | | |
| lambda | I | 2033-01-15T20:32:45.891 | | 8.92 | -31.93 | 50026.71 | -20.33 | | |
| delta | I | 2033-01-15T20:34:10.822 | | 8.64 | -31.63 | 48300.35 | -20.32 | | |
| gamma | I | 2033-01-15T20:34:43.851 | | 8.53 | -31.51 | 47629.12 | -20.32 | | |
| eta | I | 2033-01-15T20:35:06.145 | | 8.46 | -31.43 | 47176.12 | -20.32 | | |
| beta | I | 2033-01-15T20:36:20.586 | | 8.22 | -31.17 | 45663.73 | -20.31 | | |
| alpha | I | 2033-01-15T20:37:07.546 | | 8.06 | -31.01 | 44711.23 | -20.31 | | |
| 4 | I | 2033-01-15T20:38:50.905 | | 7.73 | -30.64 | 42607.26 | -20.30 | | |
| 5 | I | 2033-01-15T20:39:12.854 | | 7.65 | -30.57 | 42173.79 | -20.30 | | |
| 6 | I | 2033-01-15T20:39:29.875 | | 7.60 | -30.51 | 41827.23 | -20.30 | | |
| Uranus | I | 2033-01-15T20:52:47.697 | | 5.01 | -27.71 | 25137.39 | | -11.34 | -11.87 |
| Uranus | E | 2033-01-15T21:34:32.465 | | -2.87x | -19.01 | 25271.72 | | 9.31 | 9.74 |
| 6 | E | 2033-01-15T21:47:57.007 | | -5.31x | -16.25 | 41853.38 | 20.17 | | |
| 5 | E | 2033-01-15T21:48:18.533 | | -5.37x | -16.18 | 42287.57 | 20.17 | | |
| 4 | E | 2033-01-15T21:48:31.162 | | -5.41x | -16.13 | 42531.49 | 20.17 | | |
| alpha | E | 2033-01-15T21:50:19.469 | | -5.73x | -15.76 | 44720.95 | 20.17 | | |
| beta | E | 2033-01-15T21:51:05.848 | | -5.87x | -15.61 | 45655.77 | 20.17 | | |
| eta | E | 2033-01-15T21:52:21.211 | | -6.10x | -15.35 | 47176.12 | 20.18 | | |
| gamma | E | 2033-01-15T21:52:43.353 | | -6.16x | -15.27 | 47622.84 | 20.18 | | |
| delta | E | 2033-01-15T21:53:16.933 | | -6.26x | -15.16 | 48300.35 | 20.18 | | |
| lambda | E | 2033-01-15T21:54:42.495 | | -6.52x | -14.87 | 50026.71 | 20.18 | | |
| epsilon | E | 2033-01-15T21:55:50.896 | | -6.72x | -14.63 | 51406.89 | 20.17 | | |

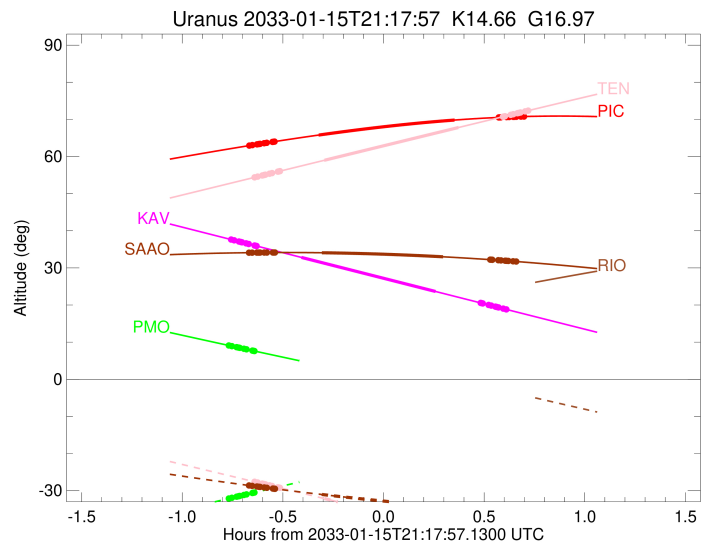
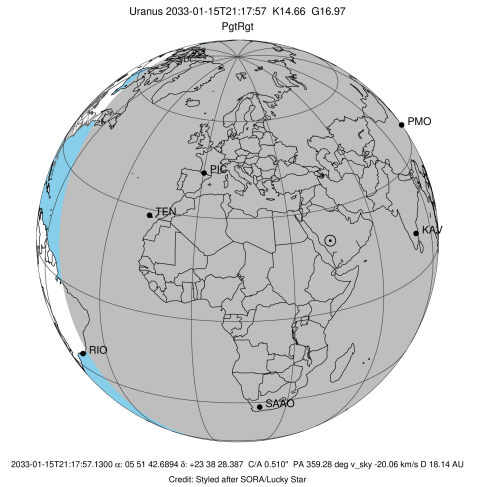
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-01-15T21:20:12.460
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      : 3427500209924204160
2Mass ID (if available) : 05514268+2338282
ICRS Star Coord at Epoch: 05h 51m 42.68939s +23:38:28.38685s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 14.658
G magnitude         : 16.969
RP magnitude        : 16.249
BP magnitude        : 17.546
DUPflag            : 0
Distance (au)       : 18.137
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -20.06
Sun-Target sep (deg) : 152.51
Sun-Moon sep (deg)  : 32.56
B (ring opening deg) : 76.90
PA of pole (deg)    : 51.67
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.455
C/A sky separation (km) : 5984.4
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 | 2033-01-15T20:39:46.315 | | 54.45 | -27.67 | 50839.83 | -20.55 | | |
| lambda | I | 2033-01-15T20:40:25.857 | | 54.60 | -27.81 | 50026.71 | -20.56 | | |
| delta | I | 2033-01-15T20:41:49.841 | | 54.90 | -28.11 | 48300.35 | -20.55 | | |
| gamma | I | 2033-01-15T20:42:22.517 | | 55.03 | -28.23 | 47628.91 | -20.55 | | |
| eta | I | 2033-01-15T20:42:44.556 | | 55.11 | -28.31 | 47176.12 | -20.54 | | |
| beta | I | 2033-01-15T20:43:58.239 | | 55.38 | -28.58 | 45662.74 | -20.53 | | |
| alpha | I | 2033-01-15T20:44:44.743 | | 55.55 | -28.75 | 44709.56 | -20.52 | | |
| 4 | I | 2033-01-15T20:46:27.022 | | 55.93 | -29.12 | 42605.72 | -20.50 | | |
| 5 | I | 2033-01-15T20:46:48.824 | | 56.01 | -29.19 | 42171.06 | -20.50 | | |
| 6 | I | 2033-01-15T20:47:05.411 | | 56.07 | -29.25 | 41829.52 | -20.51 | | |
| Uranus | I | 2033-01-15T21:00:18.109 | | 58.99 | -32.13 | 25093.34 | | -11.95 | -12.49 |
| Uranus | E | 2033-01-15T21:40:18.390 | | 67.82 | -40.89 | 25339.25 | | 8.11 | 8.49 |
| 6 | E | 2033-01-15T21:53:33.486 | | 70.72 | -43.81 | 41856.40 | 20.55 | | |
| 5 | E | 2033-01-15T21:53:54.251 | | 70.80 | -43.88 | 42282.72 | 20.55 | | |
| 4 | E | 2033-01-15T21:54:06.763 | | 70.84 | -43.93 | 42529.93 | 20.55 | | |
| alpha | E | 2033-01-15T21:55:52.963 | | 71.23 | -44.32 | 44718.45 | 20.58 | | |
| beta | E | 2033-01-15T21:56:38.465 | | 71.40 | -44.49 | 45654.38 | 20.58 | | |
| eta | E | 2033-01-15T21:57:52.371 | | 71.66 | -44.76 | 47176.12 | 20.60 | | |
| gamma | E | 2033-01-15T21:58:14.044 | | 71.74 | -44.84 | 47622.56 | 20.60 | | |
| delta | E | 2033-01-15T21:58:46.939 | | 71.86 | -44.96 | 48300.35 | 20.61 | | |
| lambda | E | 2033-01-15T22:00:10.691 | | 72.17 | -45.27 | 50026.71 | 20.62 | | |
| epsilon | E | 2033-01-15T22:01:16.588 | | 72.40 | -45.51 | 51385.72 | 20.61 | | |

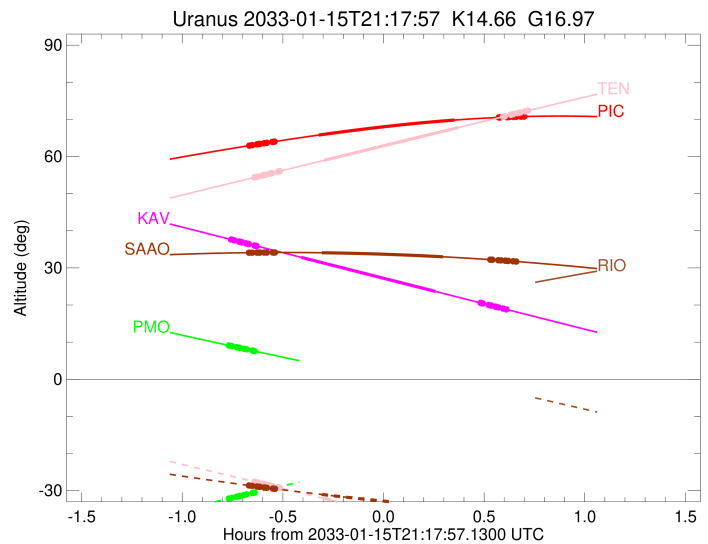
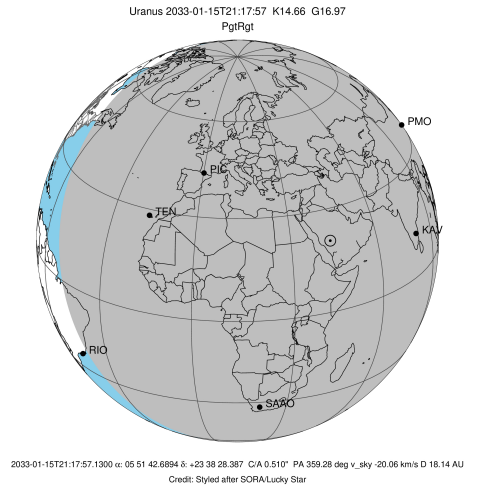
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-15T21:13:19.800
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3427500209924204160
 2Mass ID (if available) : 05514268+2338282
 ICRS Star Coord at Epoch: 05h 51m 42.68939s +23:38:28.38685s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.658
 G magnitude : 16.969
 RP magnitude : 16.249
 BP magnitude : 17.546
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.06
 Sun-Target sep (deg) : 152.51
 Sun-Moon sep (deg) : 31.30
 B (ring opening deg) : 76.90
 PA of pole (deg) : 51.67
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.506
 C/A sky separation (km) : 6662.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2033-01-15T20:32:47.425 | | 37.58 | -64.99 | 50833.23 | -20.47 | | |
| lambda | I | 2033-01-15T20:33:26.797 | | 37.43 | -64.84 | 50026.71 | -20.48 | | |
| delta | I | 2033-01-15T20:34:51.121 | | 37.10 | -64.52 | 48300.35 | -20.46 | | |
| gamma | I | 2033-01-15T20:35:23.942 | | 36.98 | -64.40 | 47628.78 | -20.46 | | |
| eta | I | 2033-01-15T20:35:46.072 | | 36.89 | -64.32 | 47176.12 | -20.45 | | |
| beta | I | 2033-01-15T20:37:00.118 | | 36.61 | -64.04 | 45662.20 | -20.43 | | |
| alpha | I | 2033-01-15T20:37:46.868 | | 36.43 | -63.86 | 44708.66 | -20.42 | | |
| 4 | I | 2033-01-15T20:39:29.670 | | 36.04 | -63.48 | 42604.88 | -20.39 | | |
| 5 | I | 2033-01-15T20:39:51.621 | | 35.95 | -63.39 | 42169.71 | -20.39 | | |
| 6 | I | 2033-01-15T20:40:08.165 | | 35.89 | -63.33 | 41830.72 | -20.39 | | |
| Uranus | I | 2033-01-15T20:53:27.277 | | 32.83 | -60.30 | 25077.65 | | -12.15 | -12.71 |
| Uranus | E | 2033-01-15T21:33:28.464 | | 23.65 | -51.07 | 25347.71 | | 7.95 | 8.33 |
| 6 | E | 2033-01-15T21:46:55.718 | | 20.57 | -47.94 | 41856.59 | 20.26 | | |
| 5 | E | 2033-01-15T21:47:16.758 | | 20.49 | -47.86 | 42282.41 | 20.26 | | |
| 4 | E | 2033-01-15T21:47:29.458 | | 20.44 | -47.81 | 42529.85 | 20.26 | | |
| alpha | E | 2033-01-15T21:49:17.181 | | 20.03 | -47.39 | 44718.32 | 20.28 | | |
| beta | E | 2033-01-15T21:50:03.340 | | 19.85 | -47.22 | 45654.32 | 20.29 | | |
| eta | E | 2033-01-15T21:51:18.311 | | 19.57 | -46.92 | 47176.12 | 20.31 | | |
| gamma | E | 2033-01-15T21:51:40.294 | | 19.48 | -46.84 | 47622.55 | 20.31 | | |
| delta | E | 2033-01-15T21:52:13.663 | | 19.36 | -46.71 | 48300.35 | 20.31 | | |
| lambda | E | 2033-01-15T21:53:38.622 | | 19.03 | -46.38 | 50026.71 | 20.33 | | |
| epsilon | E | 2033-01-15T21:54:45.443 | | 18.78 | -46.12 | 51385.12 | 20.32 | | |


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-01-15T21:17:25.470
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      : 3427500209924204160
2Mass ID (if available) : 05514268+2338282
ICRS Star Coord at Epoch: 05h 51m 42.68939s +23:38:28.38685s
RUWE (>1.4 is poor) : 0.99
K magnitude         : 14.658
G magnitude         : 16.969
RP magnitude        : 16.249
BP magnitude        : 17.546
DUPflag            : 0
Distance (au)       : 18.137
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -20.06
Sun-Target sep (deg) : 152.51
Sun-Moon sep (deg)  : 31.85
B (ring opening deg) : 76.90
PA of pole (deg)    : 51.67
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.917
C/A sky separation (km) : 12058.1
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 | 2033-01-15T20:38:08.776 | | 34.10 | -28.64 | 50809.10 | -20.16 | | |
| lambda | I | 2033-01-15T20:38:47.556 | | 34.11 | -28.72 | 50026.71 | -20.17 | | |
| delta | I | 2033-01-15T20:40:13.266 | | 34.12 | -28.89 | 48300.35 | -20.12 | | |
| gamma | I | 2033-01-15T20:40:46.689 | | 34.12 | -28.96 | 47628.26 | -20.10 | | |
| eta | I | 2033-01-15T20:41:09.193 | | 34.13 | -29.00 | 47176.12 | -20.08 | | |
| beta | I | 2033-01-15T20:42:24.765 | | 34.13 | -29.15 | 45659.89 | -20.03 | | |
| alpha | I | 2033-01-15T20:43:12.569 | | 34.14 | -29.24 | 44704.93 | -20.00 | | |
| 4 | I | 2033-01-15T20:44:57.687 | | 34.14 | -29.44 | 42600.85 | -19.91 | | |
| 5 | I | 2033-01-15T20:45:20.251 | | 34.15 | -29.49 | 42164.40 | -19.90 | | |
| 6 | I | 2033-01-15T20:45:36.620 | | 34.15 | -29.52 | 41836.07 | -19.90 | | |
| Uranus | I | 2033-01-15T20:59:33.470 | | 34.08 | -31.04 | 25015.95 | | -12.95 | -13.54 |
| Uranus | E | 2033-01-15T21:35:42.750 | | 32.99 | -34.24 | 25463.16 | | 5.33 | 5.58 |
| 6 | E | 2033-01-15T21:49:46.639 | | 32.22 | -35.17 | 41861.70 | 19.87 | | |
| 5 | E | 2033-01-15T21:50:07.382 | | 32.20 | -35.19 | 42272.96 | 19.88 | | |
| 4 | E | 2033-01-15T21:50:20.601 | | 32.19 | -35.20 | 42527.70 | 19.89 | | |
| alpha | E | 2033-01-15T21:52:10.074 | | 32.07 | -35.31 | 44713.87 | 19.97 | | |
| beta | E | 2033-01-15T21:52:57.000 | | 32.02 | -35.35 | 45651.94 | 20.01 | | |
| eta | E | 2033-01-15T21:54:13.084 | | 31.94 | -35.42 | 47176.12 | 20.06 | | |
| gamma | E | 2033-01-15T21:54:35.311 | | 31.92 | -35.44 | 47622.12 | 20.07 | | |
| delta | E | 2033-01-15T21:55:09.085 | | 31.88 | -35.47 | 48300.35 | 20.09 | | |
| lambda | E | 2033-01-15T21:56:34.910 | | 31.78 | -35.55 | 50026.71 | 20.14 | | |
| epsilon | E | 2033-01-15T21:57:40.348 | | 31.71 | -35.61 | 51345.50 | 20.13 | | |