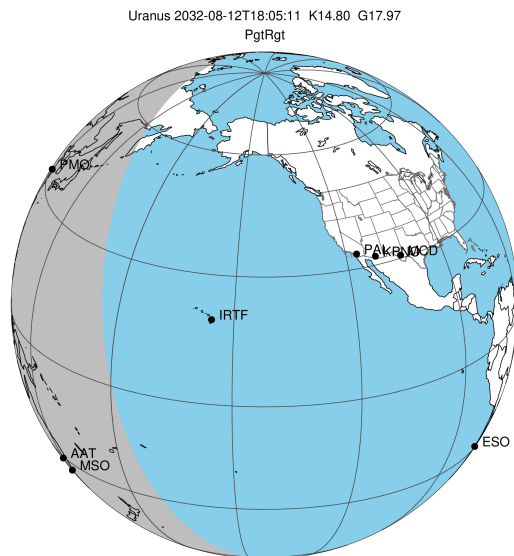


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-08-12T18:05:11.400  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3424867120093676672  
 2Mass ID (if available) : 05594767+2336545

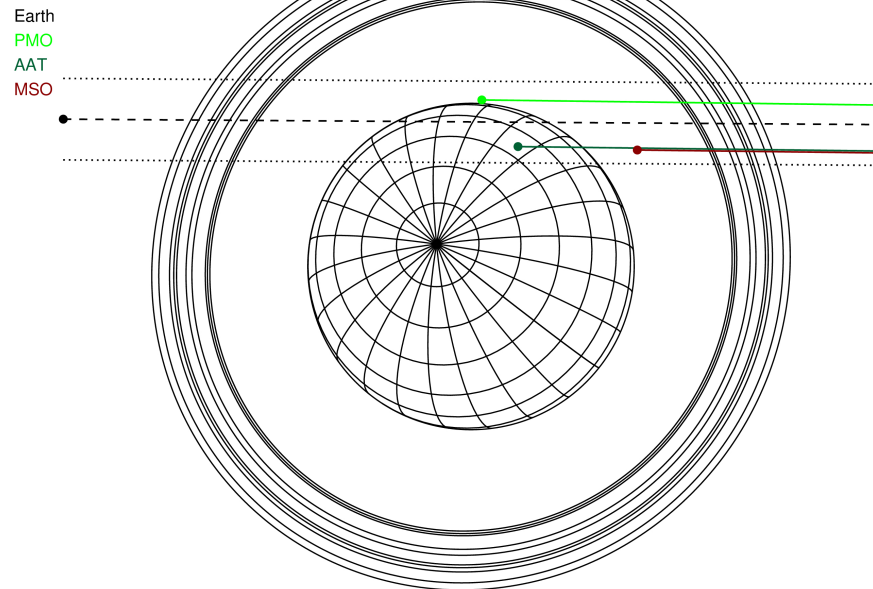
Uranus 2032-08-12T18:05:11 K14.80 G17.97 PgtRgt

ICRS Star Coord at Epoch: 05h 59m 47.68072s +23:36:54.50558s

RUWE (>1.4 is poor) : 0.00  
 K magnitude : 14.799  
 G magnitude : 17.971  
 RP magnitude : 16.762  
 BP magnitude : 18.504  
 DUPflag : 0  
 Distance (au) : 19.676  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 25.44  
 Sun-Target sep (deg) : 50.17  
 Sun-Moon sep (deg) : 121.93  
 B (ring opening deg) : 75.41  
 PA of pole (deg) : 56.95



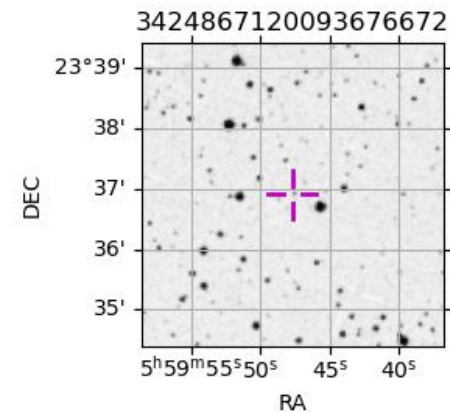
2032-08-12T18:05:11.4000 ex: 05 59 47.6807 s: +23 36 54.506 C/A 1.592° PA 179.61 deg v\_sky +25.44 km/s D 19.68 AU  
 Credit: Styled after SORA/Lucky Star



| #  | 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   |         |        |         |                             | PnnRnn |
| PAL  | Palomar Mt (200")     | 33.4  | 243.1 |         |        |         |                             | PnnRnn |
| PMO  | Purple Mtn Obs. Nanki | 32.1  | 118.8 |         |        | +++++++ | AUG 12 18:23 - AUG 12 18:30 | PnnRne |
| 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 |         |        |         |                             | PnnRnn |
| 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 |         |        |         |                             | PnnRnn |
| ESO  | European Southern Obs | -29.3 | 289.3 |         |        |         |                             | PnnRnn |
| AAT  | Siding Spring (AAT)   | -31.3 | 149.1 |         | +      | +++++++ | AUG 12 18:13 - AUG 12 18:32 | PneRne |
| SAAO | So. Afr. Astro. Obs.  | -32.4 | 20.8  |         |        |         |                             | PnnRnn |
| MSO  | Mt. Stromlo Observato | -35.3 | 149.0 |         |        | +++++++ | AUG 12 18:26 - AUG 12 18:33 | PnnRne |

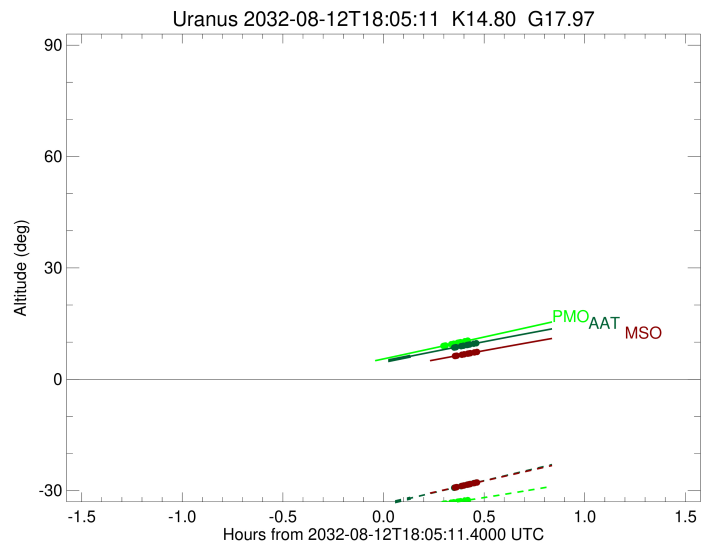
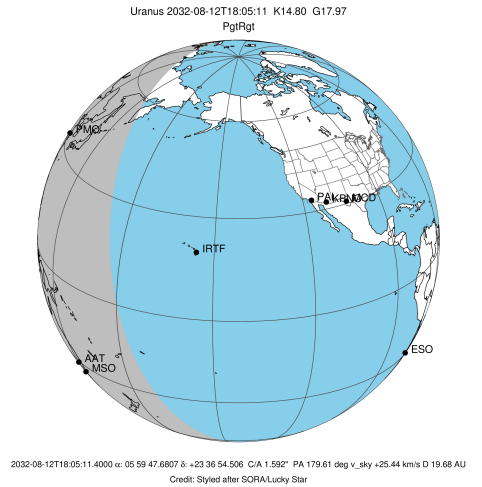


3424867120093676672

23°39'  
 38'  
 37'  
 36'  
 35'  
 5h59m55s50s 45s 40s  
 RA

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-08-12T18:01:48.260
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       : 3424867120093676672
2Mass ID (if available) : 05594767+2336545
ICRS Star Coord at Epoch: 05h 59m 47.68072s +23:36:54.50558s
RUWE (>1.4 is poor) : 0.00
K magnitude          : 14.799
G magnitude          : 17.971
RP magnitude         : 16.762
BP magnitude         : 18.504
DUPflag             : 0
Distance (au)        : 19.676
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 25.44
Sun-Target sep (deg) : 50.17
Sun-Moon sep (deg)   : 121.59
B (ring opening deg) : 75.41
PA of pole (deg)     : 56.95
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.829
C/A sky separation (km) : 26104.8
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

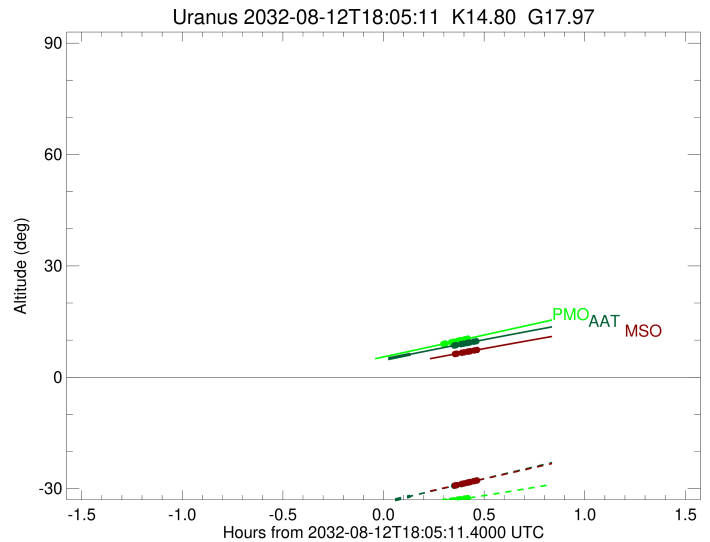
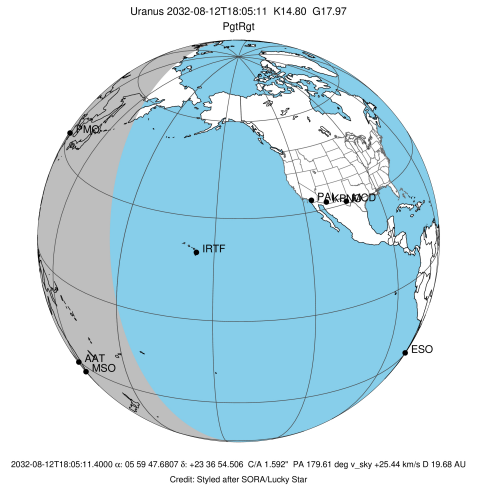


| Ring    | I/E | UTC                     | b?     | alt    | alt-sun  | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|--------|--------|----------|--------|-------|---------|--------------|
| epsilon | I   | 2032-08-12T17:34:33.712 | -0.35x | -39.22 | 50876.24 | -22.29 |       |         |              |
| lambda  | I   | 2032-08-12T17:35:11.801 | -0.23x | -39.16 | 50026.71 | -22.23 |       |         |              |
| delta   | I   | 2032-08-12T17:36:29.998 | 0.01x  | -39.03 | 48300.35 | -21.92 |       |         |              |
| gamma   | I   | 2032-08-12T17:37:00.606 | 0.11x  | -38.98 | 47631.55 | -21.78 |       |         |              |
| eta     | I   | 2032-08-12T17:37:21.558 | 0.17x  | -38.95 | 47176.12 | -21.69 |       |         |              |
| beta    | I   | 2032-08-12T17:38:31.088 | 0.39x  | -38.83 | 45679.63 | -21.36 |       |         |              |
| alpha   | I   | 2032-08-12T17:39:14.999 | 0.53x  | -38.76 | 44748.85 | -21.13 |       |         |              |
| 4       | I   | 2032-08-12T17:41:01.479 | 0.86x  | -38.58 | 42530.50 | -20.52 |       |         |              |
| 5       | I   | 2032-08-12T17:41:14.103 | 0.90x  | -38.56 | 42271.45 | -20.47 |       |         |              |
| 6       | I   | 2032-08-12T17:41:33.297 | 0.96x  | -38.53 | 41869.74 | -20.30 |       |         |              |

No planet occultations

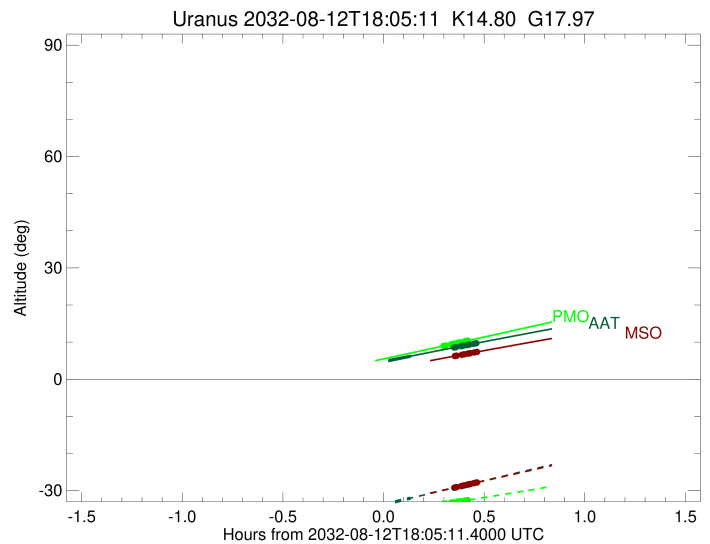
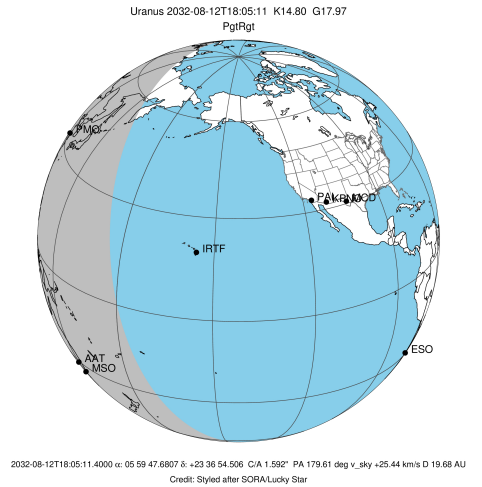
|         |   |                         |       |        |          |       |  |  |  |
|---------|---|-------------------------|-------|--------|----------|-------|--|--|--|
| 6       | E | 2032-08-12T18:23:01.262 | 8.97  | -33.57 | 41803.70 | 20.24 |  |  |  |
| 5       | E | 2032-08-12T18:23:25.427 | 9.05  | -33.51 | 42296.36 | 20.40 |  |  |  |
| 4       | E | 2032-08-12T18:23:40.564 | 9.10  | -33.48 | 42600.07 | 20.46 |  |  |  |
| alpha   | E | 2032-08-12T18:25:22.752 | 9.43  | -33.25 | 44723.60 | 21.06 |  |  |  |
| beta    | E | 2032-08-12T18:26:07.062 | 9.58  | -33.14 | 45662.33 | 21.28 |  |  |  |
| eta     | E | 2032-08-12T18:27:17.672 | 9.81  | -32.98 | 47176.12 | 21.61 |  |  |  |
| gamma   | E | 2032-08-12T18:27:38.389 | 9.88  | -32.93 | 47624.71 | 21.70 |  |  |  |
| delta   | E | 2032-08-12T18:28:09.431 | 9.98  | -32.86 | 48300.35 | 21.83 |  |  |  |
| lambda  | E | 2032-08-12T18:29:27.943 | 10.24 | -32.68 | 50026.71 | 22.14 |  |  |  |
| epsilon | E | 2032-08-12T18:30:12.006 | 10.39 | -32.58 | 51005.87 | 22.20 |  |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-08-12T18:01:54.800  
 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 : 3424867120093676672  
 2Mass ID (if available) : 05594767+2336545  
 ICRS Star Coord at Epoch: 05h 59m 47.68072s +23:36:54.50558s  
 RUWE (>1.4 is poor) : 0.00  
 K magnitude : 14.799  
 G magnitude : 17.971  
 RP magnitude : 16.762  
 BP magnitude : 18.504  
 DUPflag : 0  
 Distance (au) : 19.676  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 25.44  
 Sun-Target sep (deg) : 50.17  
 Sun-Moon sep (deg) : 121.60  
 B (ring opening deg) : 75.41  
 PA of pole (deg) : 56.95  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.322  
 C/A sky separation (km) : 18869.0  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



| Ring    | I/E | UTC                     | b?     | alt    | alt-sun  | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|--------|--------|----------|--------|-------|---------|--------------|
| epsilon | I   | 2032-08-12T17:31:55.790 | -1.49x | -40.84 | 50927.69 | -24.00 |       |         |              |
| lambda  | I   | 2032-08-12T17:32:33.278 | -1.37x | -40.70 | 50026.71 | -24.00 |       |         |              |
| delta   | I   | 2032-08-12T17:33:45.443 | -1.14x | -40.45 | 48300.35 | -23.85 |       |         |              |
| gamma   | I   | 2032-08-12T17:34:13.534 | -1.05x | -40.35 | 47631.37 | -23.78 |       |         |              |
| eta     | I   | 2032-08-12T17:34:32.695 | -0.99x | -40.28 | 47176.12 | -23.74 |       |         |              |
| beta    | I   | 2032-08-12T17:35:36.034 | -0.79x | -40.06 | 45677.88 | -23.58 |       |         |              |
| alpha   | I   | 2032-08-12T17:36:15.726 | -0.67x | -39.92 | 44745.44 | -23.48 |       |         |              |
| 4       | I   | 2032-08-12T17:37:50.733 | -0.36x | -39.58 | 42527.33 | -23.19 |       |         |              |
| 5       | I   | 2032-08-12T17:38:02.559 | -0.33x | -39.54 | 42256.08 | -23.18 |       |         |              |
| 6       | I   | 2032-08-12T17:38:18.567 | -0.28x | -39.48 | 41874.71 | -23.09 |       |         |              |
| Uranus  | I   | 2032-08-12T17:51:03.558 | 2.13x  | -36.76 | 25053.72 | 13.98  | 14.61 |         |              |
| Uranus  | E   | 2032-08-12T18:13:15.570 | 6.22   | -32.02 | 25541.80 | -2.52  | -2.64 |         |              |
| 6       | E   | 2032-08-12T18:26:13.555 | 8.54   | -29.24 | 41799.03 | 23.01  |       |         |              |
| 5       | E   | 2032-08-12T18:26:34.453 | 8.60   | -29.17 | 42284.53 | 23.09  |       |         |              |
| 4       | E   | 2032-08-12T18:26:48.730 | 8.64   | -29.11 | 42606.54 | 23.11  |       |         |              |
| alpha   | E   | 2032-08-12T18:28:19.421 | 8.91   | -28.79 | 44717.19 | 23.39  |       |         |              |
| beta    | E   | 2032-08-12T18:28:59.553 | 9.03   | -28.65 | 45658.63 | 23.49  |       |         |              |
| eta     | E   | 2032-08-12T18:30:03.975 | 9.22   | -28.42 | 47176.12 | 23.64  |       |         |              |
| gamma   | E   | 2032-08-12T18:30:22.898 | 9.27   | -28.35 | 47623.86 | 23.68  |       |         |              |
| delta   | E   | 2032-08-12T18:30:51.425 | 9.36   | -28.25 | 48300.35 | 23.75  |       |         |              |
| lambda  | E   | 2032-08-12T18:32:03.902 | 9.57   | -27.99 | 50026.71 | 23.89  |       |         |              |
| epsilon | E   | 2032-08-12T18:32:47.420 | 9.70   | -27.83 | 51068.19 | 23.90  |       |         |              |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-08-12T18:02:03.530  
 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 : 3424867120093676672  
 2Mass ID (if available) : 05594767+2336545  
 ICRS Star Coord at Epoch: 05h 59m 47.68072s +23:36:54.50558s  
 RUWE (>1.4 is poor) : 0.00  
 K magnitude : 14.799  
 G magnitude : 17.971  
 RP magnitude : 16.762  
 BP magnitude : 18.504  
 DUPflag : 0  
 Distance (au) : 19.676  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 25.44  
 Sun-Target sep (deg) : 50.17  
 Sun-Moon sep (deg) : 121.59  
 B (ring opening deg) : 75.41  
 PA of pole (deg) : 56.95  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.301  
 C/A sky separation (km) : 18560.9  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



| Ring    | I/E | UTC                     | b?     | alt    | alt-sun  | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|--------|--------|----------|--------|-------|---------|--------------|
| epsilon | I   | 2032-08-12T17:31:59.644 | -3.34x | -40.22 | 50930.02 | -24.07 |       |         |              |
| lambda  | I   | 2032-08-12T17:32:37.122 | -3.23x | -40.10 | 50026.71 | -24.07 |       |         |              |
| delta   | I   | 2032-08-12T17:33:49.069 | -3.01x | -39.85 | 48300.35 | -23.92 |       |         |              |
| gamma   | I   | 2032-08-12T17:34:17.072 | -2.92x | -39.76 | 47631.36 | -23.86 |       |         |              |
| eta     | I   | 2032-08-12T17:34:36.169 | -2.87x | -39.70 | 47176.12 | -23.82 |       |         |              |
| beta    | I   | 2032-08-12T17:35:39.295 | -2.67x | -39.49 | 45677.79 | -23.67 |       |         |              |
| alpha   | I   | 2032-08-12T17:36:18.844 | -2.55x | -39.35 | 44745.27 | -23.57 |       |         |              |
| 4       | I   | 2032-08-12T17:37:53.469 | -2.27x | -39.03 | 42527.24 | -23.29 |       |         |              |
| 5       | I   | 2032-08-12T17:38:05.275 | -2.23x | -39.00 | 42255.42 | -23.28 |       |         |              |
| 6       | I   | 2032-08-12T17:38:21.178 | -2.18x | -38.94 | 41874.89 | -23.19 |       |         |              |
| Uranus  | I   | 2032-08-12T17:50:59.072 | 0.09x  | -36.39 | 25048.47 |        |       | 14.05   | 14.69        |
| Uranus  | E   | 2032-08-12T18:13:37.031 | 4.07x  | -31.78 | 25538.28 |        |       | -2.76   | -2.89        |
| 6       | E   | 2032-08-12T18:26:27.607 | 6.25   | -29.16 | 41798.88 | 23.11  |       |         |              |
| 5       | E   | 2032-08-12T18:26:48.393 | 6.31   | -29.09 | 42284.03 | 23.20  |       |         |              |
| 4       | E   | 2032-08-12T18:27:02.642 | 6.35   | -29.04 | 42606.77 | 23.21  |       |         |              |
| alpha   | E   | 2032-08-12T18:28:32.940 | 6.61   | -28.73 | 44716.94 | 23.48  |       |         |              |
| beta    | E   | 2032-08-12T18:29:12.925 | 6.72   | -28.60 | 45658.48 | 23.58  |       |         |              |
| eta     | E   | 2032-08-12T18:30:17.122 | 6.90   | -28.38 | 47176.12 | 23.72  |       |         |              |
| gamma   | E   | 2032-08-12T18:30:35.979 | 6.95   | -28.31 | 47623.82 | 23.76  |       |         |              |
| delta   | E   | 2032-08-12T18:31:04.412 | 7.03   | -28.22 | 48300.35 | 23.82  |       |         |              |
| lambda  | E   | 2032-08-12T18:32:16.659 | 7.23   | -27.97 | 50026.71 | 23.96  |       |         |              |
| epsilon | E   | 2032-08-12T18:33:00.152 | 7.35   | -27.82 | 51070.70 | 23.97  |       |         |              |