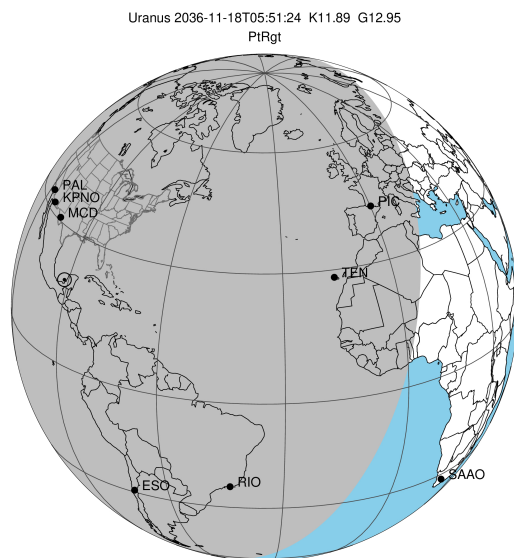


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T05:51:24.780  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191

ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s

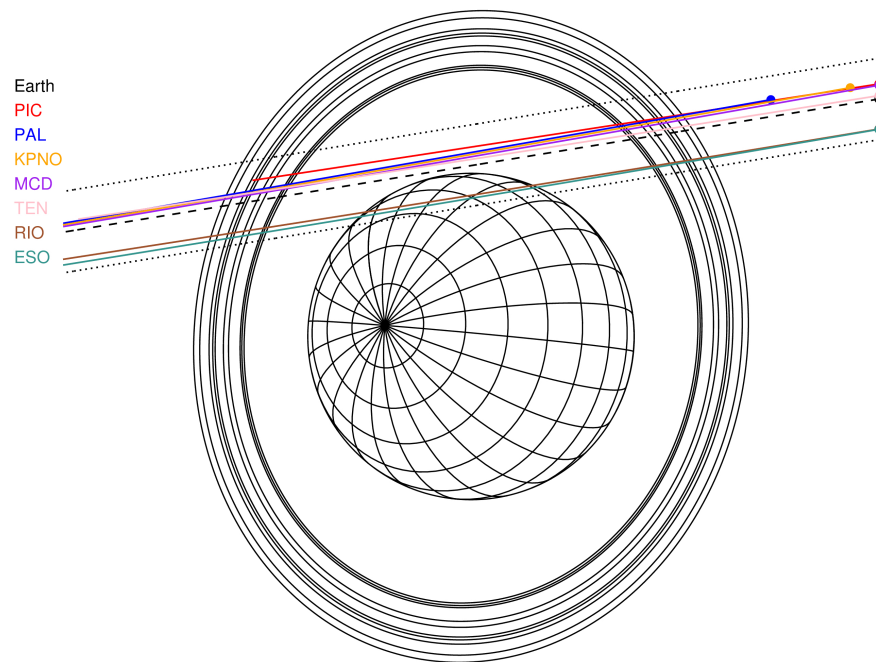
RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 129.80  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67

| #  | 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 |



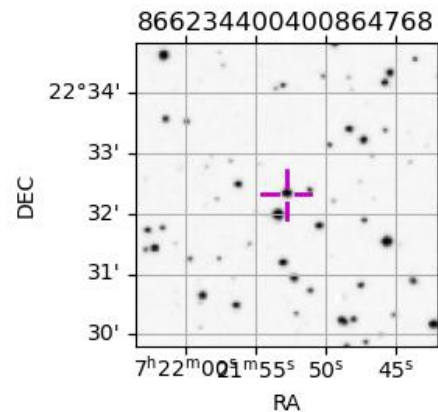
2036-11-18T05:51:24.7800 ra: 07 21 52.87612 s: +22 32 18.732 C/A 2.018° PA 189.27 deg v\_sky -11.51 km/s D 18.16 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2036-11-18T05:51:24 K11.89 G12.95 PtRgt

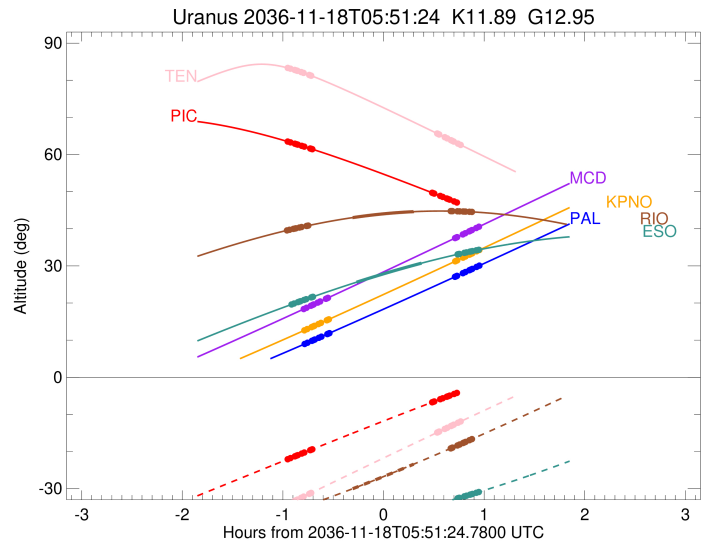
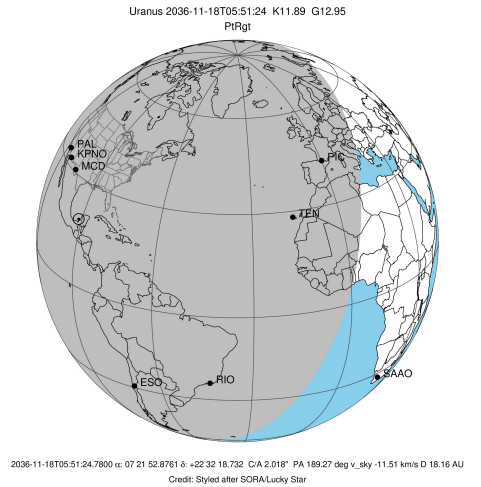


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| Obs  | Location              | lat   | Elon  | Rings I | Planet | Rings E | Observed Events Interval    | OEcode |
|------|-----------------------|-------|-------|---------|--------|---------|-----------------------------|--------|
| PIC  | Pic du Midi           | 42.9  | 0.1   | +++++   |        | +++++   | NOV 18 04:54 - NOV 18 06:29 | PnnRie |
| PAL  | Palomar Mt (200")     | 33.4  | 243.1 | +++++   |        | +++++   | NOV 18 05:04 - NOV 18 06:48 | PnnRie |
| PNO  | Purple Mtn Obs. Nanki | 32.1  | 118.8 |         |        |         |                             | PnnRnn |
| KPNO | Kitt Peak Natl Obs    | 32.0  | 248.4 | +++++   |        | +++++   | NOV 18 05:04 - NOV 18 06:48 | PnnRie |
| MCD  | McDonald Obs. 2.7m    | 30.7  | 256.0 | +++++   |        | +++++   | NOV 18 05:04 - NOV 18 06:48 | PnnRie |
| TEN  | Teide Obs./Tenerife   | 28.3  | 343.5 | +++++   |        | +++++   | NOV 18 04:54 - NOV 18 06:37 | 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 | +++++   | + +    | +++++   | NOV 18 04:54 - NOV 18 06:44 | PieRie |
| ESO  | European Southern Obs | -29.3 | 289.3 | +++++   | + +    | +++++   | NOV 18 04:57 - NOV 18 06:48 | PieRie |
| AAT  | Siding Spring (AAT)   | -31.3 | 149.1 |         |        |         |                             | PnnRnn |
| SAAO | So. Afr. Astro. Obs.  | -32.4 | 20.8  |         |        |         |                             | PnnRnn |
| MSO  | Mt. Stromlo Observato | -35.3 | 149.0 |         |        |         |                             | PnnRnn |



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T05:47:51.210  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191  
 ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s  
 RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 130.65  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.226  
 C/A sky separation (km) : 29322.8  
 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

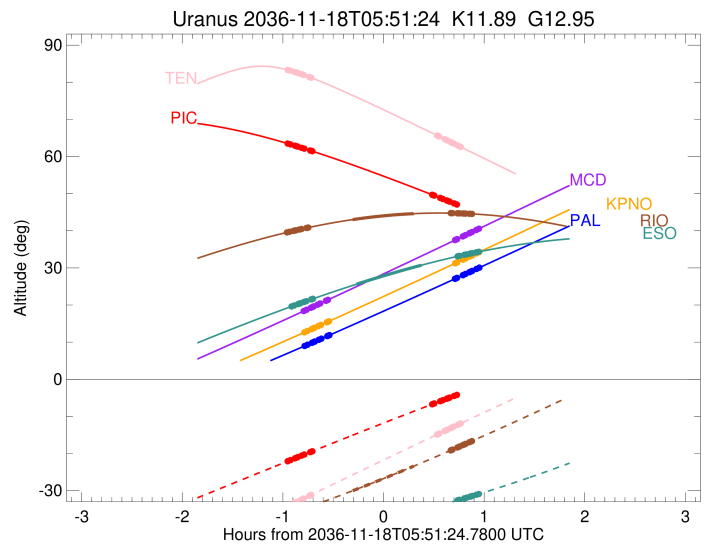
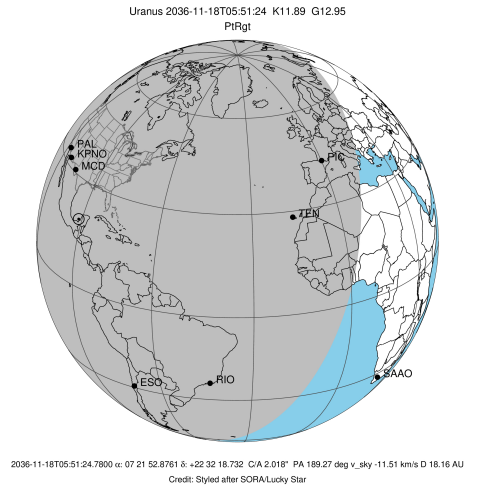


| Ring    | I/E | UTC                     | b? | alt   | alt-sun | radius   | r-dot  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I   | 2036-11-18T04:54:51.157 |    | 63.42 | -21.97  | 50792.77 | -11.17 |         |              |
| lambda  | I   | 2036-11-18T04:55:59.852 |    | 63.27 | -21.77  | 50026.71 | -11.11 |         |              |
| delta   | I   | 2036-11-18T04:58:36.839 |    | 62.91 | -21.29  | 48300.35 | -10.88 |         |              |
| gamma   | I   | 2036-11-18T04:59:38.725 |    | 62.77 | -21.10  | 47629.70 | -10.79 |         |              |
| eta     | I   | 2036-11-18T05:00:20.895 |    | 62.67 | -20.97  | 47176.12 | -10.72 |         |              |
| beta    | I   | 2036-11-18T05:02:41.864 |    | 62.34 | -20.55  | 45681.15 | -10.49 |         |              |
| alpha   | I   | 2036-11-18T05:04:16.109 |    | 62.12 | -20.26  | 44701.74 | -10.31 |         |              |
| 4       | I   | 2036-11-18T05:07:42.489 |    | 61.62 | -19.64  | 42609.88 | -9.90  |         |              |
| 5       | I   | 2036-11-18T05:08:24.204 |    | 61.52 | -19.51  | 42190.41 | -9.78  |         |              |
| 6       | I   | 2036-11-18T05:09:04.038 |    | 61.43 | -19.39  | 41816.44 | -9.72  |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2036-11-18T06:20:29.546 |  | 49.69 | -6.72  | 41874.13 | 9.69  |  |  |
| 5       | E | 2036-11-18T06:20:58.053 |  | 49.61 | -6.64  | 42168.57 | 9.74  |  |  |
| 4       | E | 2036-11-18T06:21:41.824 |  | 49.48 | -6.52  | 42593.85 | 9.86  |  |  |
| alpha   | E | 2036-11-18T06:25:09.657 |  | 48.86 | -5.92  | 44691.17 | 10.27 |  |  |
| beta    | E | 2036-11-18T06:26:42.794 |  | 48.59 | -5.66  | 45659.84 | 10.44 |  |  |
| eta     | E | 2036-11-18T06:29:06.195 |  | 48.16 | -5.25  | 47176.12 | 10.68 |  |  |
| gamma   | E | 2036-11-18T06:29:47.796 |  | 48.04 | -5.13  | 47621.56 | 10.74 |  |  |
| delta   | E | 2036-11-18T06:30:50.724 |  | 47.85 | -4.95x | 48300.35 | 10.83 |  |  |
| lambda  | E | 2036-11-18T06:33:28.457 |  | 47.38 | -4.51x | 50026.71 | 11.05 |  |  |
| epsilon | E | 2036-11-18T06:35:02.759 |  | 47.10 | -4.24x | 51074.68 | 11.11 |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T06:00:04.090  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191  
 ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s  
 RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 129.52  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.155  
 C/A sky separation (km) : 28378.6  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

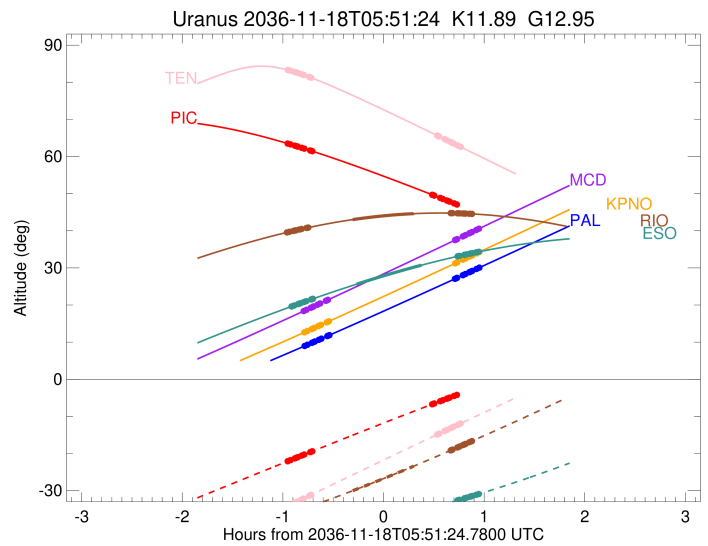
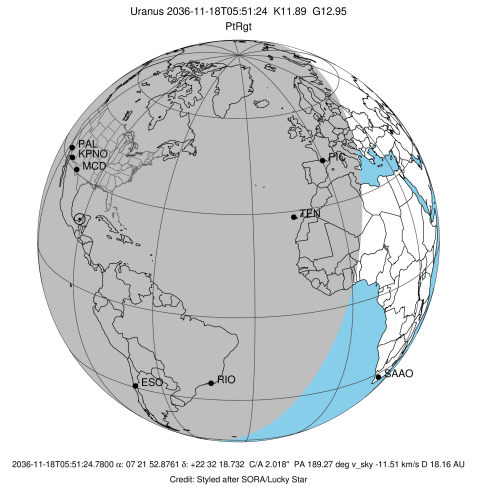


| Ring    | I/E | UTC                     | b? | alt   | alt-sun | radius   | r-dot  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I   | 2036-11-18T05:04:58.298 |    | 9.08  | -54.36  | 50793.40 | -11.03 |         |              |
| lambda  | I   | 2036-11-18T05:06:07.893 |    | 9.31  | -54.60  | 50026.71 | -10.98 |         |              |
| delta   | I   | 2036-11-18T05:08:46.545 |    | 9.83  | -55.14  | 48300.35 | -10.78 |         |              |
| gamma   | I   | 2036-11-18T05:09:48.977 |    | 10.03 | -55.35  | 47629.73 | -10.70 |         |              |
| eta     | I   | 2036-11-18T05:10:31.486 |    | 10.17 | -55.49  | 47176.12 | -10.64 |         |              |
| beta    | I   | 2036-11-18T05:12:53.344 |    | 10.64 | -55.97  | 45681.14 | -10.43 |         |              |
| alpha   | I   | 2036-11-18T05:14:27.935 |    | 10.95 | -56.29  | 44701.99 | -10.28 |         |              |
| 4       | I   | 2036-11-18T05:17:54.453 |    | 11.63 | -56.98  | 42609.62 | -9.92  |         |              |
| 5       | I   | 2036-11-18T05:18:35.936 |    | 11.77 | -57.12  | 42191.17 | -9.81  |         |              |
| 6       | I   | 2036-11-18T05:19:15.752 |    | 11.90 | -57.25  | 41816.00 | -9.76  |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2036-11-18T06:34:05.488 |  | 27.07 | -70.99 | 41875.10 | 9.89  |  |  |
| 5       | E | 2036-11-18T06:34:33.622 |  | 27.17 | -71.06 | 42170.79 | 9.94  |  |  |
| 4       | E | 2036-11-18T06:35:16.076 |  | 27.31 | -71.17 | 42591.97 | 10.05 |  |  |
| alpha   | E | 2036-11-18T06:38:40.604 |  | 28.02 | -71.68 | 44692.10 | 10.43 |  |  |
| beta    | E | 2036-11-18T06:40:12.206 |  | 28.33 | -71.90 | 45658.96 | 10.59 |  |  |
| eta     | E | 2036-11-18T06:42:33.803 |  | 28.82 | -72.23 | 47176.12 | 10.81 |  |  |
| gamma   | E | 2036-11-18T06:43:14.889 |  | 28.96 | -72.33 | 47621.46 | 10.87 |  |  |
| delta   | E | 2036-11-18T06:44:17.092 |  | 29.18 | -72.47 | 48300.35 | 10.96 |  |  |
| lambda  | E | 2036-11-18T06:46:53.132 |  | 29.72 | -72.83 | 50026.71 | 11.17 |  |  |
| epsilon | E | 2036-11-18T06:48:27.925 |  | 30.05 | -73.03 | 51090.67 | 11.22 |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T05:59:55.680  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191  
 ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s  
 RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 129.57  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.132  
 C/A sky separation (km) : 28077.0  
 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\_itrfr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

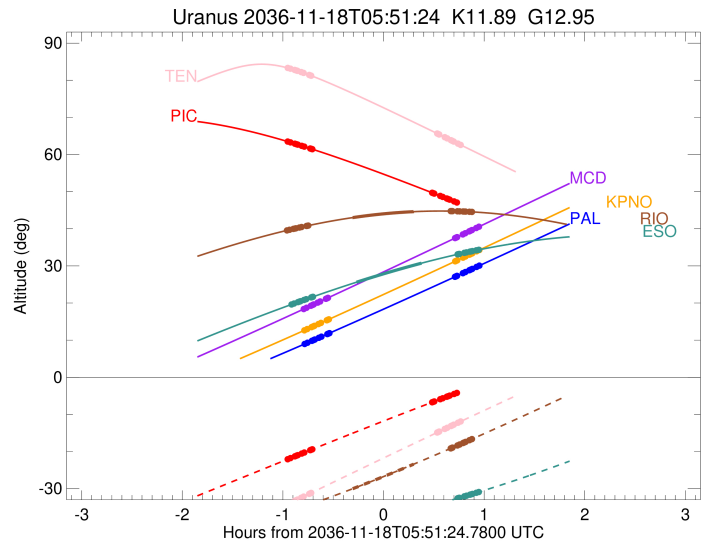
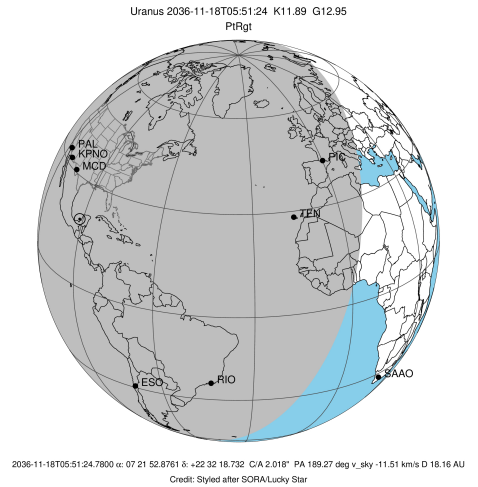


| Ring    | I/E | UTC                     | b? | alt   | alt-sun | radius   | r-dot  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I   | 2036-11-18T05:04:47.328 |    | 12.75 | -58.97  | 50794.91 | -11.12 |         |              |
| lambda  | I   | 2036-11-18T05:05:56.485 |    | 12.99 | -59.21  | 50026.71 | -11.07 |         |              |
| delta   | I   | 2036-11-18T05:08:33.767 |    | 13.52 | -59.74  | 48300.35 | -10.88 |         |              |
| gamma   | I   | 2036-11-18T05:09:35.631 |    | 13.73 | -59.95  | 47629.76 | -10.80 |         |              |
| eta     | I   | 2036-11-18T05:10:17.748 |    | 13.87 | -60.09  | 47176.12 | -10.74 |         |              |
| beta    | I   | 2036-11-18T05:12:38.231 |    | 14.34 | -60.57  | 45681.12 | -10.54 |         |              |
| alpha   | I   | 2036-11-18T05:14:11.818 |    | 14.66 | -60.88  | 44702.26 | -10.39 |         |              |
| 4       | I   | 2036-11-18T05:17:36.063 |    | 15.35 | -61.57  | 42609.38 | -10.04 |         |              |
| 5       | I   | 2036-11-18T05:18:16.939 |    | 15.49 | -61.71  | 42191.86 | -9.94  |         |              |
| 6       | I   | 2036-11-18T05:18:56.384 |    | 15.62 | -61.84  | 41815.61 | -9.89  |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2036-11-18T06:34:14.233 |  | 31.25 | -75.01 | 41875.28 | 10.01 |  |  |
| 5       | E | 2036-11-18T06:34:42.062 |  | 31.35 | -75.07 | 42171.24 | 10.06 |  |  |
| 4       | E | 2036-11-18T06:35:23.913 |  | 31.50 | -75.15 | 42591.60 | 10.17 |  |  |
| alpha   | E | 2036-11-18T06:38:46.205 |  | 32.21 | -75.55 | 44692.28 | 10.54 |  |  |
| beta    | E | 2036-11-18T06:40:16.839 |  | 32.53 | -75.72 | 45658.80 | 10.70 |  |  |
| eta     | E | 2036-11-18T06:42:37.090 |  | 33.02 | -75.98 | 47176.12 | 10.91 |  |  |
| gamma   | E | 2036-11-18T06:43:17.798 |  | 33.17 | -76.05 | 47621.44 | 10.97 |  |  |
| delta   | E | 2036-11-18T06:44:19.446 |  | 33.38 | -76.15 | 48300.35 | 11.06 |  |  |
| lambda  | E | 2036-11-18T06:46:54.159 |  | 33.93 | -76.40 | 50026.71 | 11.26 |  |  |
| epsilon | E | 2036-11-18T06:48:28.423 |  | 34.26 | -76.54 | 51093.35 | 11.31 |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T05:59:33.350  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191  
 ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s  
 RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 129.66  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.105  
 C/A sky separation (km) : 27728.8  
 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

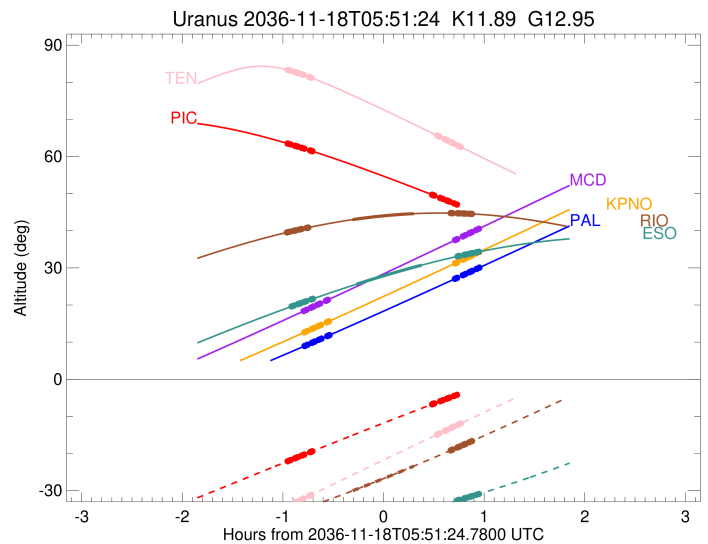
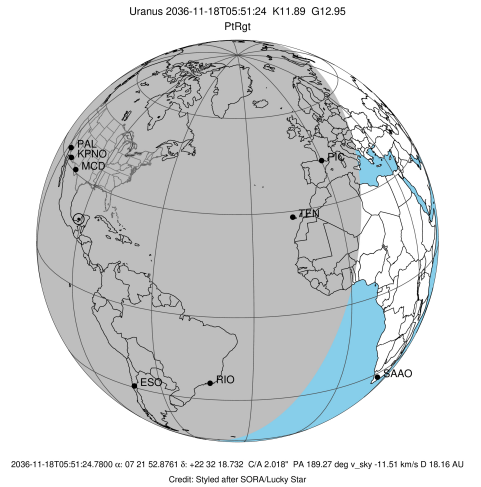


| Ring    | I/E | UTC                     | b? | alt   | alt-sun | radius   | r-dot  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I   | 2036-11-18T05:04:25.353 |    | 18.50 | -65.45  | 50796.75 | -11.23 |         |              |
| lambda  | I   | 2036-11-18T05:05:33.960 |    | 18.73 | -65.68  | 50026.71 | -11.19 |         |              |
| delta   | I   | 2036-11-18T05:08:09.551 |    | 19.27 | -66.20  | 48300.35 | -11.00 |         |              |
| gamma   | I   | 2036-11-18T05:09:10.717 |    | 19.49 | -66.40  | 47629.80 | -10.92 |         |              |
| eta     | I   | 2036-11-18T05:09:52.355 |    | 19.63 | -66.54  | 47176.12 | -10.87 |         |              |
| beta    | I   | 2036-11-18T05:12:11.164 |    | 20.11 | -67.00  | 45681.10 | -10.67 |         |              |
| alpha   | I   | 2036-11-18T05:13:43.538 |    | 20.43 | -67.30  | 44702.59 | -10.52 |         |              |
| 4       | I   | 2036-11-18T05:17:05.060 |    | 21.14 | -67.96  | 42609.08 | -10.18 |         |              |
| 5       | I   | 2036-11-18T05:17:45.219 |    | 21.28 | -68.09  | 42192.69 | -10.08 |         |              |
| 6       | I   | 2036-11-18T05:18:24.219 |    | 21.41 | -68.21  | 41815.16 | -10.04 |         |              |

No planet occultations

|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2036-11-18T06:34:09.966 |  | 37.51 | -78.75 | 41875.48 | 10.16 |  |  |
| 5       | E | 2036-11-18T06:34:37.441 |  | 37.61 | -78.76 | 42171.75 | 10.21 |  |  |
| 4       | E | 2036-11-18T06:35:18.596 |  | 37.75 | -78.78 | 42591.19 | 10.31 |  |  |
| alpha   | E | 2036-11-18T06:38:38.270 |  | 38.47 | -78.85 | 44692.48 | 10.67 |  |  |
| beta    | E | 2036-11-18T06:40:07.768 |  | 38.79 | -78.86 | 45658.62 | 10.82 |  |  |
| eta     | E | 2036-11-18T06:42:26.429 |  | 39.29 | -78.86 | 47176.12 | 11.03 |  |  |
| gamma   | E | 2036-11-18T06:43:06.688 |  | 39.43 | -78.86 | 47621.43 | 11.09 |  |  |
| delta   | E | 2036-11-18T06:44:07.677 |  | 39.65 | -78.85 | 48300.35 | 11.17 |  |  |
| lambda  | E | 2036-11-18T06:46:40.808 |  | 40.20 | -78.80 | 50026.71 | 11.37 |  |  |
| epsilon | E | 2036-11-18T06:48:14.412 |  | 40.53 | -78.76 | 51096.28 | 11.42 |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T05:48:47.710  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191  
 ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s  
 RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 130.66  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.081  
 C/A sky separation (km) : 27412.2  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

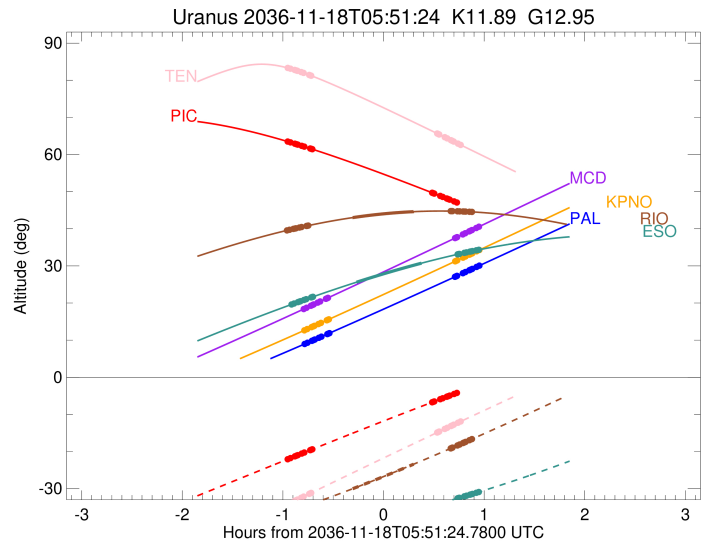
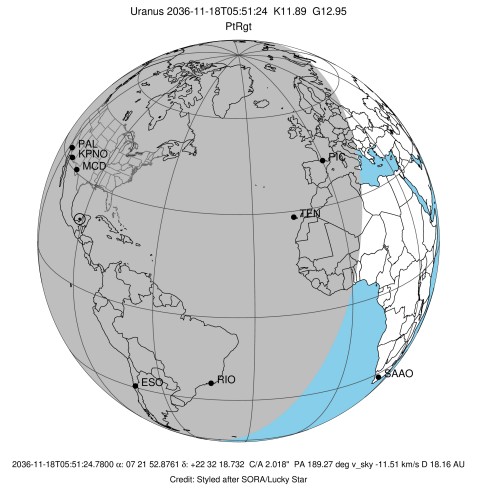


| Ring    | I/E | UTC                     | b? | alt   | alt-sun | radius   | r-dot  | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I   | 2036-11-18T04:54:51.863 |    | 83.26 | -34.10  | 50801.80 | -11.62 |         |              |
| lambda  | I   | 2036-11-18T04:55:58.618 |    | 83.12 | -33.85  | 50026.71 | -11.57 |         |              |
| delta   | I   | 2036-11-18T04:58:29.007 |    | 82.78 | -33.30  | 48300.35 | -11.38 |         |              |
| gamma   | I   | 2036-11-18T04:59:28.110 |    | 82.64 | -33.09  | 47629.90 | -11.30 |         |              |
| eta     | I   | 2036-11-18T05:00:08.354 |    | 82.55 | -32.94  | 47176.12 | -11.25 |         |              |
| beta    | I   | 2036-11-18T05:02:22.463 |    | 82.21 | -32.45  | 45681.03 | -11.05 |         |              |
| alpha   | I   | 2036-11-18T05:03:51.594 |    | 81.97 | -32.12  | 44703.39 | -10.90 |         |              |
| 4       | I   | 2036-11-18T05:07:06.224 |    | 81.44 | -31.41  | 42608.38 | -10.56 |         |              |
| 5       | I   | 2036-11-18T05:07:44.691 |    | 81.33 | -31.27  | 42194.59 | -10.46 |         |              |
| 6       | I   | 2036-11-18T05:08:22.610 |    | 81.22 | -31.14  | 41814.17 | -10.41 |         |              |

No planet occultations

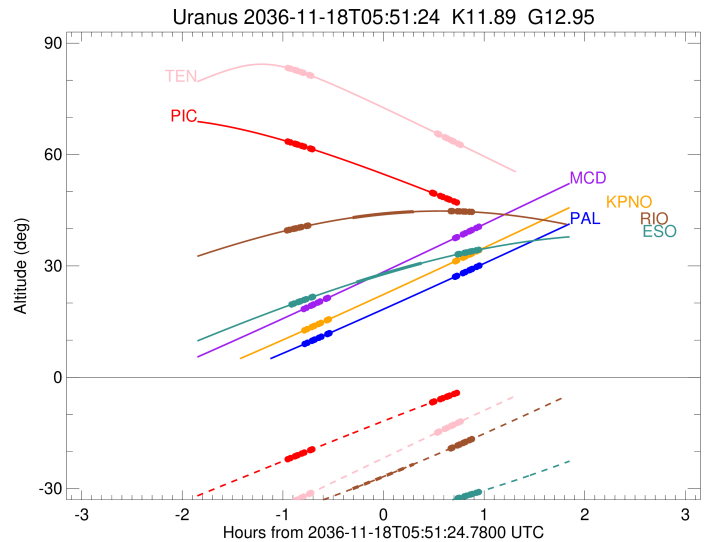
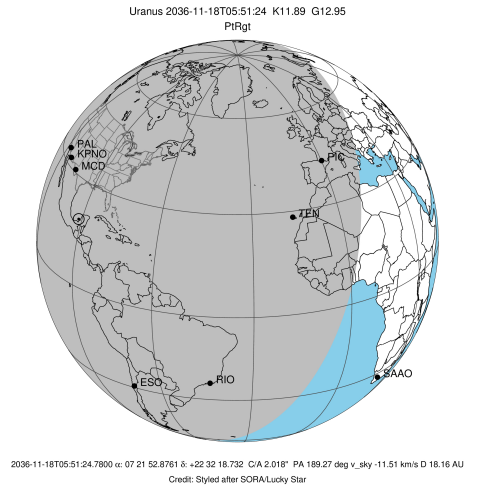
|         |   |                         |  |       |        |          |       |  |  |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6       | E | 2036-11-18T06:23:29.841 |  | 65.65 | -14.87 | 41875.40 | 10.39 |  |  |
| 5       | E | 2036-11-18T06:23:56.699 |  | 65.55 | -14.77 | 42171.52 | 10.44 |  |  |
| 4       | E | 2036-11-18T06:24:37.031 |  | 65.40 | -14.63 | 42591.39 | 10.53 |  |  |
| alpha   | E | 2036-11-18T06:27:52.711 |  | 64.69 | -13.94 | 44692.35 | 10.87 |  |  |
| beta    | E | 2036-11-18T06:29:20.581 |  | 64.37 | -13.62 | 45658.75 | 11.02 |  |  |
| eta     | E | 2036-11-18T06:31:36.814 |  | 63.87 | -13.14 | 47176.12 | 11.22 |  |  |
| gamma   | E | 2036-11-18T06:32:16.404 |  | 63.72 | -13.00 | 47621.44 | 11.28 |  |  |
| delta   | E | 2036-11-18T06:33:16.399 |  | 63.50 | -12.79 | 48300.35 | 11.36 |  |  |
| lambda  | E | 2036-11-18T06:35:47.163 |  | 62.95 | -12.25 | 50026.71 | 11.54 |  |  |
| epsilon | E | 2036-11-18T06:37:19.134 |  | 62.61 | -11.93 | 51093.14 | 11.59 |  |  |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T05:51:27.590  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191  
 ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s  
 RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 130.24  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.657  
 C/A sky separation (km) : 21830.0  
 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   | 2036-11-18T04:54:19.019 |    | 39.61 | -36.34  | 50829.84 | -12.48 |         |              |
| lambda  | I   | 2036-11-18T04:55:23.320 |    | 39.73 | -36.18  | 50026.71 | -12.47 |         |              |
| delta   | I   | 2036-11-18T04:57:42.392 |    | 39.97 | -35.83  | 48300.35 | -12.36 |         |              |
| gamma   | I   | 2036-11-18T04:58:36.704 |    | 40.07 | -35.69  | 47630.39 | -12.31 |         |              |
| eta     | I   | 2036-11-18T04:59:13.647 |    | 40.13 | -35.59  | 47176.12 | -12.28 |         |              |
| beta    | I   | 2036-11-18T05:01:15.990 |    | 40.34 | -35.28  | 45680.42 | -12.17 |         |              |
| alpha   | I   | 2036-11-18T05:02:36.204 |    | 40.47 | -35.07  | 44708.00 | -12.08 |         |              |
| 4       | I   | 2036-11-18T05:05:31.073 |    | 40.76 | -34.61  | 42603.82 | -11.89 |         |              |
| 5       | I   | 2036-11-18T05:06:03.692 |    | 40.81 | -34.52  | 42206.21 | -11.83 |         |              |
| 6       | I   | 2036-11-18T05:06:38.668 |    | 40.87 | -34.43  | 41808.68 | -11.81 |         |              |
| Uranus  | I   | 2036-11-18T05:32:58.946 |    | 43.01 | -30.03  | 25530.97 |        | -7.82   | -8.19        |
| Uranus  | E   | 2036-11-18T06:09:23.309 |    | 44.61 | -23.42  | 25333.67 |        | 22.85   | 23.81        |
| 6       | E   | 2036-11-18T06:31:34.094 |    | 44.75 | -19.15  | 41878.04 | 11.85  |         |              |
| 5       | E   | 2036-11-18T06:31:58.553 |    | 44.75 | -19.07  | 42180.73 | 11.87  |         |              |
| 4       | E   | 2036-11-18T06:32:32.498 |    | 44.74 | -18.95  | 42584.33 | 11.93  |         |              |
| alpha   | E   | 2036-11-18T06:35:27.372 |    | 44.71 | -18.38  | 44696.03 | 12.13  |         |              |
| beta    | E   | 2036-11-18T06:36:45.875 |    | 44.69 | -18.12  | 45655.76 | 12.22  |         |              |
| eta     | E   | 2036-11-18T06:38:49.564 |    | 44.66 | -17.72  | 47176.12 | 12.33  |         |              |
| gamma   | E   | 2036-11-18T06:39:25.604 |    | 44.65 | -17.60  | 47621.17 | 12.37  |         |              |
| delta   | E   | 2036-11-18T06:40:20.425 |    | 44.63 | -17.41  | 48300.35 | 12.41  |         |              |
| lambda  | E   | 2036-11-18T06:42:38.872 |    | 44.58 | -16.96  | 50026.71 | 12.52  |         |              |
| epsilon | E   | 2036-11-18T06:44:08.020 |    | 44.55 | -16.66  | 51146.19 | 12.54  |         |              |

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-11-18T05:54:58.750  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 866234400400864768  
 2Mass ID (if available) : 07215287+2232191  
 ICRS Star Coord at Epoch: 07h 21m 52.87612s +22:32:18.73233s  
 RUWE (>1.4 is poor) : 1.10  
 K magnitude : 11.890  
 G magnitude : 12.949  
 RP magnitude : 12.562  
 BP magnitude : 13.187  
 DUPflag : 0  
 Distance (au) : 18.159  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -11.51  
 Sun-Target sep (deg) : 127.12  
 Sun-Moon sep (deg) : 129.84  
 B (ring opening deg) : 57.84  
 PA of pole (deg) : 82.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.620  
 C/A sky separation (km) : 21341.1  
 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\_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   | 2036-11-18T04:57:02.653 |    | 19.69 | -41.05  | 50831.06 | -12.41 |         |              |
| lambda  | I   | 2036-11-18T04:58:07.414 |    | 19.87 | -41.01  | 50026.71 | -12.40 |         |              |
| delta   | I   | 2036-11-18T05:00:27.207 |    | 20.25 | -40.93  | 48300.35 | -12.30 |         |              |
| gamma   | I   | 2036-11-18T05:01:21.776 |    | 20.40 | -40.89  | 47630.40 | -12.26 |         |              |
| eta     | I   | 2036-11-18T05:01:58.887 |    | 20.50 | -40.87  | 47176.12 | -12.23 |         |              |
| beta    | I   | 2036-11-18T05:04:01.736 |    | 20.83 | -40.78  | 45680.39 | -12.12 |         |              |
| alpha   | I   | 2036-11-18T05:05:22.214 |    | 21.04 | -40.72  | 44708.22 | -12.04 |         |              |
| 4       | I   | 2036-11-18T05:08:17.603 |    | 21.51 | -40.59  | 42603.58 | -11.86 |         |              |
| 5       | I   | 2036-11-18T05:08:50.217 |    | 21.59 | -40.56  | 42206.79 | -11.80 |         |              |
| 6       | I   | 2036-11-18T05:09:25.327 |    | 21.69 | -40.54  | 41808.43 | -11.79 |         |              |
| Uranus  | I   | 2036-11-18T05:35:17.621 |    | 25.61 | -38.91  | 25524.58 |        | -8.68   | -9.08        |
| Uranus  | E   | 2036-11-18T06:14:05.240 |    | 30.74 | -35.21  | 25316.07 |        | 23.79   | 24.78        |
| 6       | E   | 2036-11-18T06:35:40.858 |    | 33.12 | -32.59  | 41878.26 | 11.89  |         |              |
| 5       | E   | 2036-11-18T06:36:05.345 |    | 33.17 | -32.54  | 42181.87 | 11.91  |         |              |
| 4       | E   | 2036-11-18T06:36:38.977 |    | 33.22 | -32.47  | 42583.50 | 11.98  |         |              |
| alpha   | E   | 2036-11-18T06:39:33.394 |    | 33.51 | -32.09  | 44696.49 | 12.16  |         |              |
| beta    | E   | 2036-11-18T06:40:51.628 |    | 33.64 | -31.91  | 45655.42 | 12.25  |         |              |
| eta     | E   | 2036-11-18T06:42:55.064 |    | 33.84 | -31.64  | 47176.12 | 12.36  |         |              |
| gamma   | E   | 2036-11-18T06:43:31.028 |    | 33.90 | -31.56  | 47621.15 | 12.39  |         |              |
| delta   | E   | 2036-11-18T06:44:25.745 |    | 33.98 | -31.44  | 48300.35 | 12.44  |         |              |
| lambda  | E   | 2036-11-18T06:46:43.960 |    | 34.20 | -31.12  | 50026.71 | 12.54  |         |              |
| epsilon | E   | 2036-11-18T06:48:13.500 |    | 34.34 | -30.92  | 51152.76 | 12.56  |         |              |