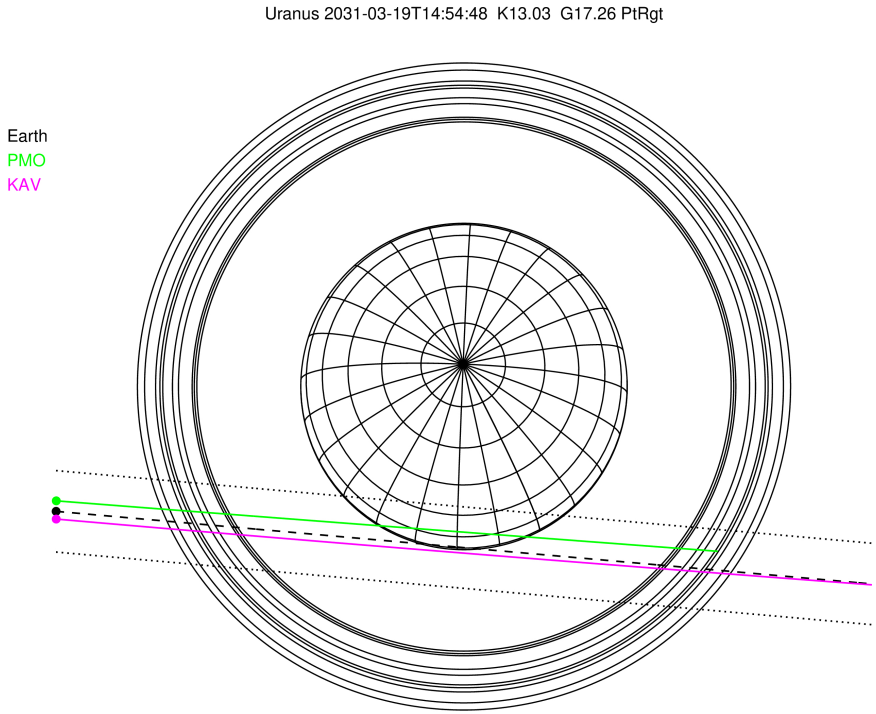
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 00:06:25 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2031-03-19T14:54:48.330
Event type : PtRgt
: Uranus occs: topocentric, not geoecetric
: Ring occs: geocentric, topocentric
Gaia source ID : 3415395278392515968
2Mass ID (if available) : 05102737+2303046

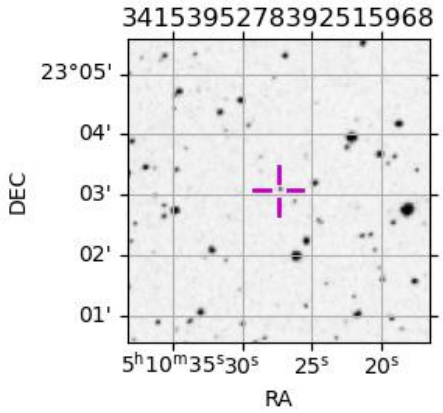
ICRS Star Coord at Epoch: 05h 10m 27.36874s +23:03:04.35983s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.034
G magnitude : 17.258
RP magnitude : 15.969
BP magnitude : 19.148
DUPflag : 0
Distance (au) : 19.281
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : 11.37
Sun-Target sep (deg) : 80.24
Sun-Moon sep (deg) : 125.93
B (ring opening deg) : 82.12
PA of pole (deg) : 2.13

| # | 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 |

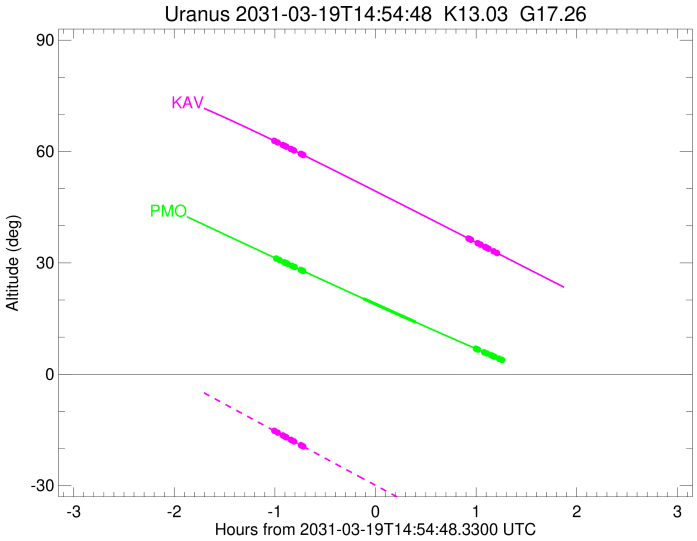

Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| 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 | ++++++++++ | + + | ++++++ | MAR 19 13:55 - MAR 19 16:03 | PieRie |
| 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 | ++++++++++ | | ++++++++++ | MAR 19 13:54 - MAR 19 16:07 | PnnRie |
| 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 | | | | | PnnRnn |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | | | | | PnnRnn |



Uranus_2031-03-19T14_54_48.3300_PMO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:19:56 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2031-03-19T15:03:27.490
Event type : PtRgt
: Uranus occs: topocentric, not geoecetric
: 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 : 3415395278392515968
2Mass ID (if available) : 05102737+2303046
ICRS Star Coord at Epoch: 05h 10m 27.36874s +23:03:04.35983s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.034
G magnitude : 17.258
RP magnitude : 15.969
BP magnitude : 19.148
DUPflag : 0
Distance (au) : 19.281
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : 11.37
Sun-Target sep (deg) : 80.24
Sun-Moon sep (deg) : 125.71
B (ring opening deg) : 82.12
PA of pole (deg) : 2.13
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.627
C/A sky separation (km) : 22750.1
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.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

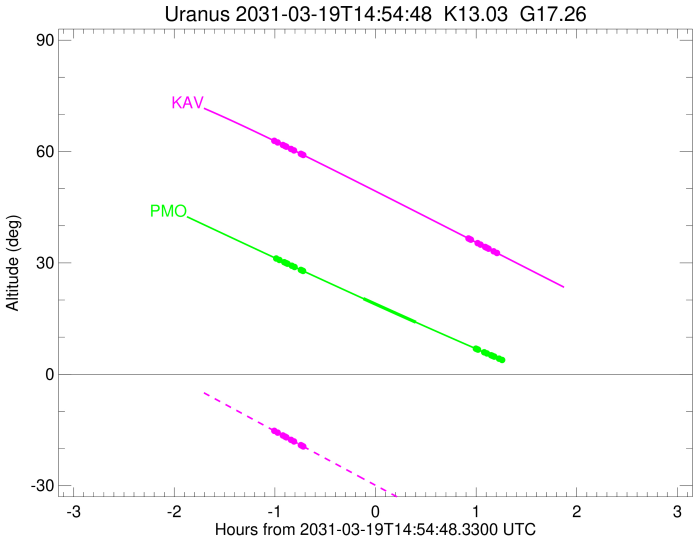




b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---|---|---|---|---|---|---|---|---|---|
| epsilon | I | 2031-03-19T13:55:42.196 | | 31.17 | -44.97 | 51114.20 | -10.02 | | |
| lambda | I | 2031-03-19T13:57:31.467 | | 30.79 | -45.28 | 50026.71 | -9.93 | | |
| delta | I | 2031-03-19T14:00:26.195 | | 30.17 | -45.76 | 48300.35 | -9.83 | | |
| gamma | I | 2031-03-19T14:01:35.097 | | 29.93 | -45.95 | 47624.15 | -9.79 | | |
| eta | I | 2031-03-19T14:02:20.906 | | 29.77 | -46.08 | 47176.12 | -9.77 | | |
| beta | I | 2031-03-19T14:04:55.433 | | 29.23 | -46.50 | 45674.12 | -9.67 | | |
| alpha | I | 2031-03-19T14:06:37.069 | | 28.88 | -46.77 | 44694.95 | -9.60 | | |
| 4 | I | 2031-03-19T14:10:22.496 | | 28.09 | -47.37 | 42550.73 | -9.42 | | |
| 5 | I | 2031-03-19T14:10:52.149 | | 27.99 | -47.45 | 42270.20 | -9.39 | | |
| 6 | I | 2031-03-19T14:11:33.707 | | 27.85 | -47.56 | 41879.33 | -9.36 | | |
| Uranus | I | 2031-03-19T14:47:40.450 | | 20.36 | -52.74 | 25138.55 | | -6.70 | -7.02 |
| Uranus | E | 2031-03-19T15:18:50.896 | | 14.02 | -56.12 | 25038.71 | | -7.48 | -7.83 |
| 6 | E | 2031-03-19T15:54:36.378 | | 6.91 | -58.28 | 41815.16 | 9.54 | | |
| 5 | E | 2031-03-19T15:55:11.430 | | 6.79 | -58.30 | 42154.88 | 9.57 | | |
| 4 | E | 2031-03-19T15:55:52.482 | | 6.66 | -58.32 | 42542.93 | 9.60 | | |
| alpha | E | 2031-03-19T15:59:35.219 | | 5.93 | -58.41 | 44708.05 | 9.80 | | |
| beta | E | 2031-03-19T16:01:10.162 | | 5.62 | -58.45 | 45641.41 | 9.88 | | |
| eta | E | 2031-03-19T16:03:44.719 | | 5.12 | -58.49 | 47176.12 | 9.99 | | |
| gamma | E | 2031-03-19T16:04:30.249 | | 4.98x | -58.50 | 47631.52 | 10.02 | | |
| delta | E | 2031-03-19T16:05:36.868 | | 4.76x | -58.52 | 48300.35 | 10.06 | | |
| lambda | E | 2031-03-19T16:08:27.547 | | 4.21x | -58.54 | 50026.71 | 10.17 | | |
| epsilon | E | 2031-03-19T16:10:51.091 | | 3.75x | -58.56 | 51491.88 | 10.27 | | |

Uranus_2031-03-19T14_54_48.3300_KAV.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:30:43 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2031-03-19T15:01:16.150
Event type : PtRgt
: Uranus occs: topocentric, not geoecetric
: 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 : 3415395278392515968
2Mass ID (if available) : 05102737+2303046
ICRS Star Coord at Epoch: 05h 10m 27.36874s +23:03:04.35983s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.034
G magnitude : 17.258
RP magnitude : 15.969
BP magnitude : 19.148
DUPflag : 0
Distance (au) : 19.281
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : 11.37
Sun-Target sep (deg) : 80.24
Sun-Moon sep (deg) : 126.16
B (ring opening deg) : 82.12
PA of pole (deg) : 2.13
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.860
C/A sky separation (km) : 26015.7
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.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


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 | 2031-03-19T13:54:29.864 | | 62.88 | -15.25 | 51141.38 | -9.41 | | |
| lambda | I | 2031-03-19T13:56:29.349 | | 62.44 | -15.73 | 50026.71 | -9.29 | | |
| delta | I | 2031-03-19T13:59:36.400 | | 61.76 | -16.49 | 48300.35 | -9.16 | | |
| gamma | I | 2031-03-19T14:00:50.358 | | 61.48 | -16.79 | 47624.52 | -9.11 | | |
| eta | I | 2031-03-19T14:01:39.675 | | 61.30 | -16.99 | 47176.12 | -9.07 | | |
| beta | I | 2031-03-19T14:04:26.548 | | 60.69 | -17.67 | 45672.85 | -8.94 | | |
| alpha | I | 2031-03-19T14:06:16.765 | | 60.28 | -18.12 | 44693.02 | -8.84 | | |
| 4 | I | 2031-03-19T14:10:22.769 | | 59.37 | -19.12 | 42547.21 | -8.59 | | |
| 5 | I | 2031-03-19T14:10:55.668 | | 59.25 | -19.25 | 42263.55 | -8.55 | | |
| 6 | I | 2031-03-19T14:11:40.551 | | 59.08 | -19.43 | 41878.61 | -8.52 | | |

No planet occultations

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 6 | E | 2031-03-19T15:50:11.884 | | 36.59 | -43.26 | 41818.94 | 8.64 | | |
| 5 | E | 2031-03-19T15:50:50.090 | | 36.45 | -43.41 | 42155.59 | 8.68 | | |
| 4 | E | 2031-03-19T15:51:34.910 | | 36.28 | -43.59 | 42539.58 | 8.73 | | |
| alpha | E | 2031-03-19T15:55:38.802 | | 35.34 | -44.56 | 44705.13 | 8.99 | | |
| beta | E | 2031-03-19T15:57:22.501 | | 34.94 | -44.98 | 45641.82 | 9.09 | | |
| eta | E | 2031-03-19T16:00:09.940 | | 34.30 | -45.64 | 47176.12 | 9.24 | | |
| gamma | E | 2031-03-19T16:00:59.133 | | 34.11 | -45.84 | 47631.57 | 9.28 | | |
| delta | E | 2031-03-19T16:02:10.984 | | 33.83 | -46.12 | 48300.35 | 9.34 | | |
| lambda | E | 2031-03-19T16:05:14.513 | | 33.13 | -46.85 | 50026.71 | 9.47 | | |
| epsilon | E | 2031-03-19T16:07:49.928 | | 32.53 | -47.47 | 51507.54 | 9.60 | | |