

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-01T10:50:56.130
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 674563719514980992
 2Mass ID (if available) : 07502877+2134177

ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s

RUWE (>1.4 is poor) : 0.94
 K magnitude : 12.061
 G magnitude : 14.459
 RP magnitude : 13.585
 BP magnitude : 14.873
 DUPflag : 0
 Distance (au) : 17.695
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.06
 Sun-Target sep (deg) : 163.65
 Sun-Moon sep (deg) : 70.99
 B (ring opening deg) : 51.32
 PA of pole (deg) : 87.51

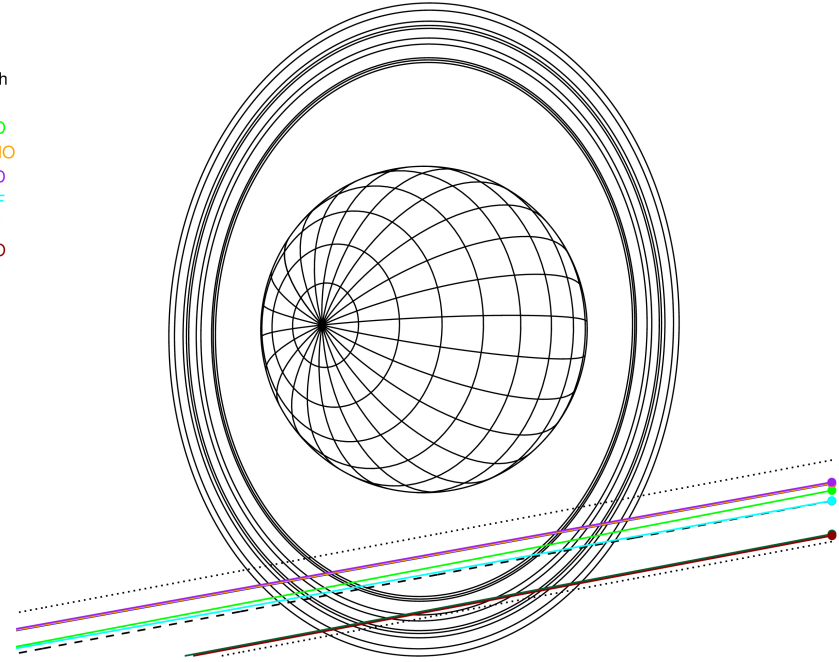
| # | a(km) | ring |
|----|---------|---------|
| 1 | 41837.2 | 6 |
| 2 | 42235.0 | 5 |
| 3 | 42571.2 | 4 |
| 4 | 44718.5 | alpha |
| 5 | 45661.1 | beta |
| 6 | 47176.1 | eta |
| 7 | 47626.3 | gamma |
| 8 | 48300.3 | delta |
| 9 | 50026.7 | lambda |
| 10 | 51149.4 | epsilon |



2039-02-01T10:50:56.1300 α: 07 50 28.7094 s: +21 34 16.855 C/A 2.963° PA 10.60 deg v_sky -22.06 km/s D 17.69 AU
 Credit: Styled after SORA/Lucky Star

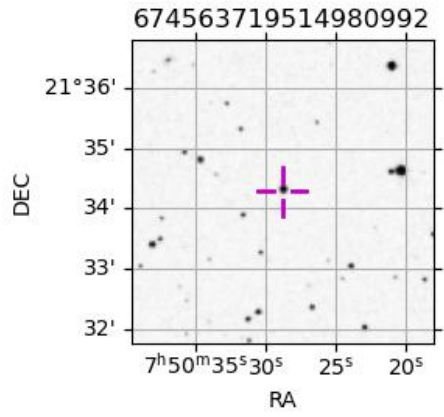
Uranus 2039-02-01T10:50:56 K12.06 G14.46 XRgt

Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 AAT
 MSO

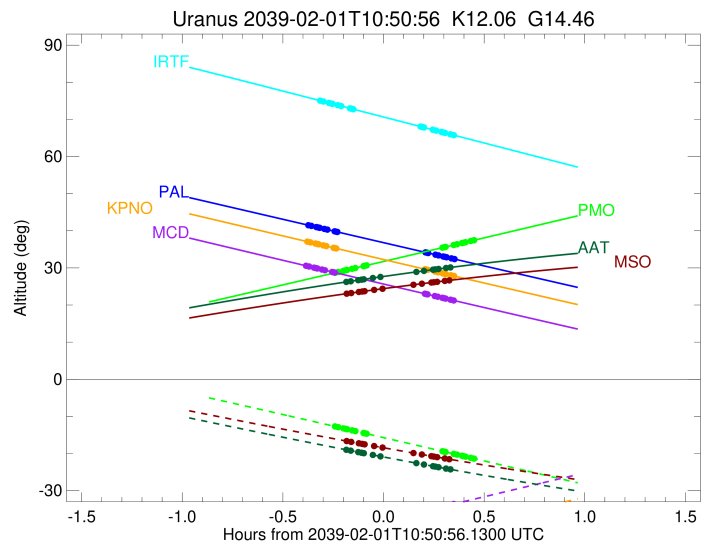
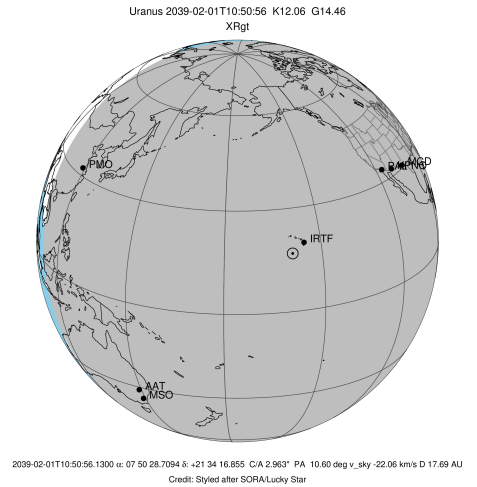


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| 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 | +++++ | | +++++ | FEB 01 10:28 - FEB 01 11:12 | PnnRie |
| PMO | Purple Mtn Obs. Nanki | 32.1 | 118.8 | +++++ | | +++++ | FEB 01 10:36 - FEB 01 11:18 | PnnRie |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | +++++ | | +++++ | FEB 01 10:28 - FEB 01 11:12 | PnnRie |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | +++++ | | +++++ | FEB 01 10:27 - FEB 01 11:12 | PnnRie |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | | | | | PnnRnn |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | +++++ | | +++++ | FEB 01 10:31 - FEB 01 11:12 | PnnRie |
| 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 | +++++ | | +++++ | FEB 01 10:39 - FEB 01 11:11 | PnnRie |
| SAAO | So. Afr. Astro. Obs. | -32.4 | 20.8 | | | | | PnnRnn |
| MSO | Mt. Stromlo Observato | -35.3 | 149.0 | +++++ | | +++++ | FEB 01 10:39 - FEB 01 11:10 | PnnRie |



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-01T10:48:03.840
 Event type : XRgt
 : No Uranus occs
 : 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 : 674563719514980992
 2Mass ID (if available) : 07502877+2134177
 ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s
 RUWE (>1.4 is poor) : 0.94
 K magnitude : 12.061
 G magnitude : 14.459
 RP magnitude : 13.585
 BP magnitude : 14.873
 DUPflag : 0
 Distance (au) : 17.695
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.06
 Sun-Target sep (deg) : 163.65
 Sun-Moon sep (deg) : 71.70
 B (ring opening deg) : 51.32
 PA of pole (deg) : 87.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.734
 C/A sky separation (km) : 35090.5
 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

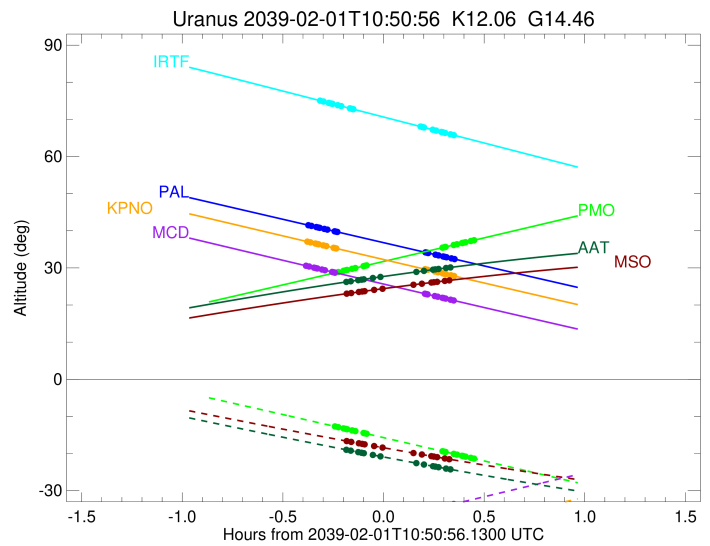
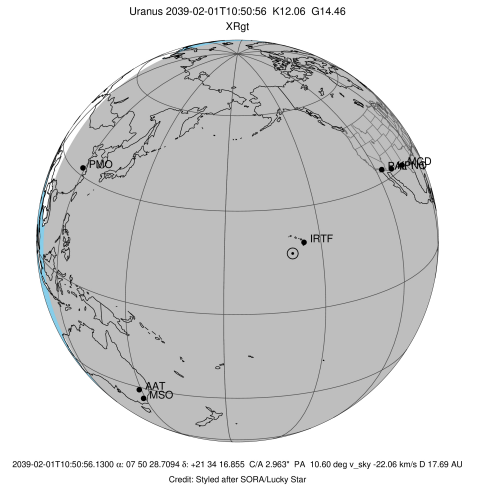


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-02-01T10:28:20.724 | | 41.54 | -53.21 | 51391.94 | -20.58 | | |
| lambda | I | 2039-02-01T10:29:28.301 | | 41.30 | -52.98 | 50026.71 | -19.94 | | |
| delta | I | 2039-02-01T10:30:56.510 | | 41.00 | -52.69 | 48300.35 | -19.19 | | |
| gamma | I | 2039-02-01T10:31:31.651 | | 40.87 | -52.57 | 47631.52 | -18.87 | | |
| eta | I | 2039-02-01T10:31:55.930 | | 40.79 | -52.49 | 47176.12 | -18.64 | | |
| beta | I | 2039-02-01T10:33:18.718 | | 40.50 | -52.21 | 45668.94 | -17.82 | | |
| alpha | I | 2039-02-01T10:34:11.663 | | 40.31 | -52.03 | 44732.89 | -17.24 | | |
| 4 | I | 2039-02-01T10:36:22.515 | | 39.86 | -51.59 | 42590.29 | -15.63 | | |
| 5 | I | 2039-02-01T10:36:40.742 | | 39.79 | -51.53 | 42304.63 | -15.43 | | |
| 6 | I | 2039-02-01T10:37:09.449 | | 39.69 | -51.43 | 41849.96 | -15.05 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-02-01T11:03:28.466 | | 34.18 | -46.06 | 41879.32 | 15.02 | | |
| 5 | E | 2039-02-01T11:03:57.805 | | 34.08 | -45.95 | 42299.51 | 15.40 | | |
| 4 | E | 2039-02-01T11:04:13.052 | | 34.02 | -45.90 | 42540.66 | 15.60 | | |
| alpha | E | 2039-02-01T11:06:27.357 | | 33.56 | -45.44 | 44751.87 | 17.21 | | |
| beta | E | 2039-02-01T11:07:20.411 | | 33.37 | -45.26 | 45680.85 | 17.78 | | |
| eta | E | 2039-02-01T11:08:42.560 | | 33.08 | -44.98 | 47176.12 | 18.60 | | |
| gamma | E | 2039-02-01T11:09:06.611 | | 33.00 | -44.89 | 47626.06 | 18.82 | | |
| delta | E | 2039-02-01T11:09:42.135 | | 32.88 | -44.77 | 48300.35 | 19.14 | | |
| lambda | E | 2039-02-01T11:11:10.590 | | 32.57 | -44.46 | 50026.71 | 19.88 | | |
| epsilon | E | 2039-02-01T11:12:21.658 | | 32.32 | -44.22 | 51459.07 | 20.52 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-01T10:54:45.080
 Event type : XRgt
 : No Uranus occs
 : 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 : 674563719514980992
 2Mass ID (if available) : 07502877+2134177
 ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s
 RUWE (>1.4 is poor) : 0.94
 K magnitude : 12.061
 G magnitude : 14.459
 RP magnitude : 13.585
 BP magnitude : 14.873
 DUPflag : 0
 Distance (au) : 17.695
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.06
 Sun-Target sep (deg) : 163.65
 Sun-Moon sep (deg) : 71.21
 B (ring opening deg) : 51.32
 PA of pole (deg) : 87.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.868
 C/A sky separation (km) : 36812.1
 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



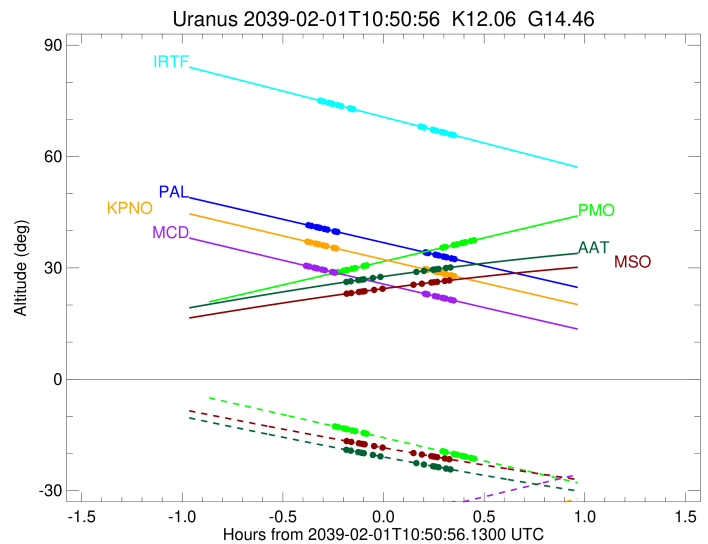
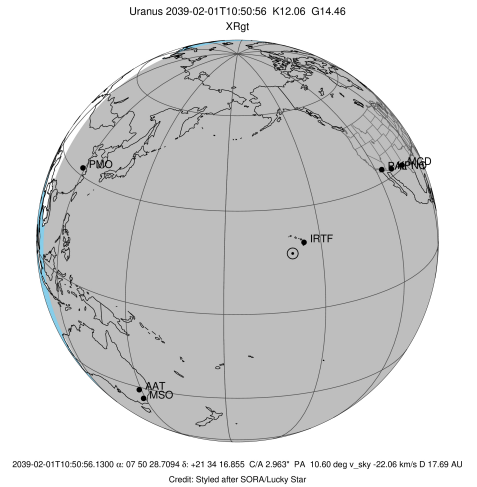
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-02-01T10:36:15.659 | | 28.64 | -12.66 | 51404.68 | -19.56 | | |
| lambda | I | 2039-02-01T10:37:27.685 | | 28.89 | -12.91 | 50026.71 | -18.82 | | |
| delta | I | 2039-02-01T10:39:01.517 | | 29.22 | -13.24 | 48300.35 | -17.96 | | |
| gamma | I | 2039-02-01T10:39:39.154 | | 29.35 | -13.37 | 47631.48 | -17.58 | | |
| eta | I | 2039-02-01T10:40:05.250 | | 29.44 | -13.46 | 47176.12 | -17.31 | | |
| beta | I | 2039-02-01T10:41:34.876 | | 29.76 | -13.77 | 45669.95 | -16.34 | | |
| alpha | I | 2039-02-01T10:42:32.905 | | 29.96 | -13.97 | 44734.68 | -15.65 | | |
| 4 | I | 2039-02-01T10:44:59.857 | | 30.48 | -14.48 | 42587.30 | -13.67 | | |
| 5 | I | 2039-02-01T10:45:20.403 | | 30.55 | -14.55 | 42307.36 | -13.41 | | |
| 6 | I | 2039-02-01T10:45:53.501 | | 30.67 | -14.66 | 41853.03 | -12.93 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-02-01T11:08:32.747 | | 35.46 | -19.40 | 41878.56 | 12.95 | | |
| 5 | E | 2039-02-01T11:09:06.492 | | 35.58 | -19.52 | 42303.58 | 13.43 | | |
| 4 | E | 2039-02-01T11:09:23.953 | | 35.64 | -19.58 | 42543.75 | 13.69 | | |
| alpha | E | 2039-02-01T11:11:53.799 | | 36.17 | -20.10 | 44752.24 | 15.68 | | |
| beta | E | 2039-02-01T11:12:51.724 | | 36.38 | -20.30 | 45681.08 | 16.37 | | |
| eta | E | 2039-02-01T11:14:20.300 | | 36.69 | -20.61 | 47176.12 | 17.35 | | |
| gamma | E | 2039-02-01T11:14:46.051 | | 36.78 | -20.70 | 47626.42 | 17.62 | | |
| delta | E | 2039-02-01T11:15:23.889 | | 36.91 | -20.84 | 48300.35 | 18.00 | | |
| lambda | E | 2039-02-01T11:16:57.492 | | 37.24 | -21.16 | 50026.71 | 18.87 | | |
| epsilon | E | 2039-02-01T11:18:12.867 | | 37.51 | -21.43 | 51473.64 | 19.61 | | |

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2039-02-01T10:47:50.430
Event type           : XRgt
: No Uranus occs
: 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       : 674563719514980992
2Mass ID (if available) : 07502877+2134177
ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 12.061
G magnitude           : 14.459
RP magnitude          : 13.585
BP magnitude          : 14.873
DUPflag              : 0
Distance (au)         : 17.695
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.06
Sun-Target sep (deg) : 163.65
Sun-Moon sep (deg)   : 71.65
B (ring opening deg) : 51.32
PA of pole (deg)     : 87.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.728
C/A sky separation (km) : 35012.0
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

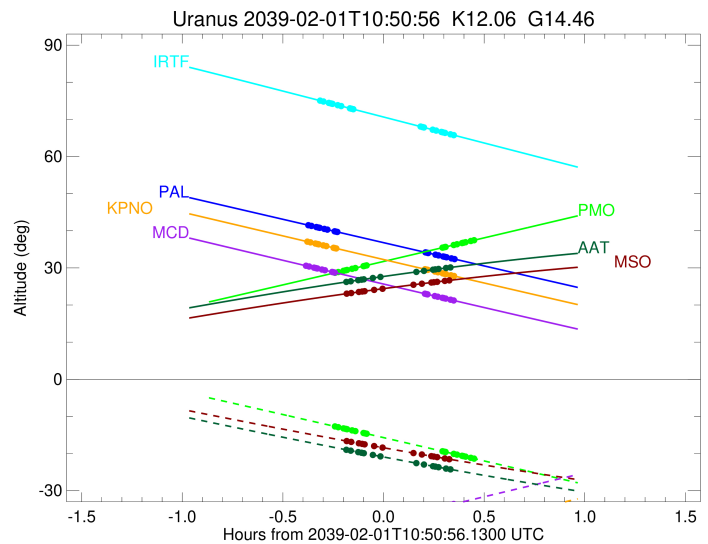
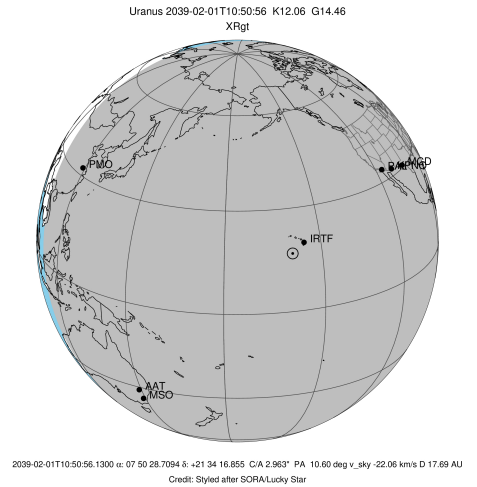


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-02-01T10:28:02.823 | | 37.11 | -49.29 | 51391.28 | -20.60 | | |
| lambda | I | 2039-02-01T10:29:10.304 | | 36.87 | -49.06 | 50026.71 | -19.96 | | |
| delta | I | 2039-02-01T10:30:38.404 | | 36.56 | -48.75 | 48300.35 | -19.22 | | |
| gamma | I | 2039-02-01T10:31:13.493 | | 36.44 | -48.63 | 47631.52 | -18.90 | | |
| eta | I | 2039-02-01T10:31:37.732 | | 36.35 | -48.54 | 47176.12 | -18.67 | | |
| beta | I | 2039-02-01T10:33:00.364 | | 36.06 | -48.25 | 45668.89 | -17.86 | | |
| alpha | I | 2039-02-01T10:33:53.185 | | 35.87 | -48.07 | 44732.81 | -17.29 | | |
| 4 | I | 2039-02-01T10:36:03.614 | | 35.41 | -47.62 | 42590.42 | -15.69 | | |
| 5 | I | 2039-02-01T10:36:21.784 | | 35.35 | -47.55 | 42304.49 | -15.49 | | |
| 6 | I | 2039-02-01T10:36:50.375 | | 35.25 | -47.45 | 41849.82 | -15.11 | | |

No planet occultations

| | | | | | | |
|---------|---|-------------------------|-------|--------|----------|-------|
| 6 | E | 2039-02-01T11:03:20.365 | 29.64 | -41.87 | 41879.34 | 15.09 |
| 5 | E | 2039-02-01T11:03:49.587 | 29.54 | -41.76 | 42299.34 | 15.46 |
| 4 | E | 2039-02-01T11:04:04.776 | 29.48 | -41.71 | 42540.54 | 15.66 |
| alpha | E | 2039-02-01T11:06:18.682 | 29.01 | -41.24 | 44751.85 | 17.25 |
| beta | E | 2039-02-01T11:07:11.618 | 28.83 | -41.05 | 45680.84 | 17.82 |
| eta | E | 2039-02-01T11:08:33.623 | 28.54 | -40.76 | 47176.12 | 18.62 |
| gamma | E | 2039-02-01T11:08:57.638 | 28.45 | -40.68 | 47626.05 | 18.85 |
| delta | E | 2039-02-01T11:09:33.116 | 28.33 | -40.55 | 48300.35 | 19.16 |
| lambda | E | 2039-02-01T11:11:01.479 | 28.02 | -40.24 | 50026.71 | 19.90 |
| epsilon | E | 2039-02-01T11:12:12.465 | 27.77 | -39.99 | 51458.49 | 20.53 |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-01T10:47:36.150
 Event type : XRgt
 : No Uranus occs
 : 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 : 674563719514980992
 2Mass ID (if available) : 07502877+2134177
 ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s
 RUWE (>1.4 is poor) : 0.94
 K magnitude : 12.061
 G magnitude : 14.459
 RP magnitude : 13.585
 BP magnitude : 14.873
 DUPflag : 0
 Distance (au) : 17.695
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.06
 Sun-Target sep (deg) : 163.65
 Sun-Moon sep (deg) : 71.58
 B (ring opening deg) : 51.32
 PA of pole (deg) : 87.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.714
 C/A sky separation (km) : 34832.3
 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



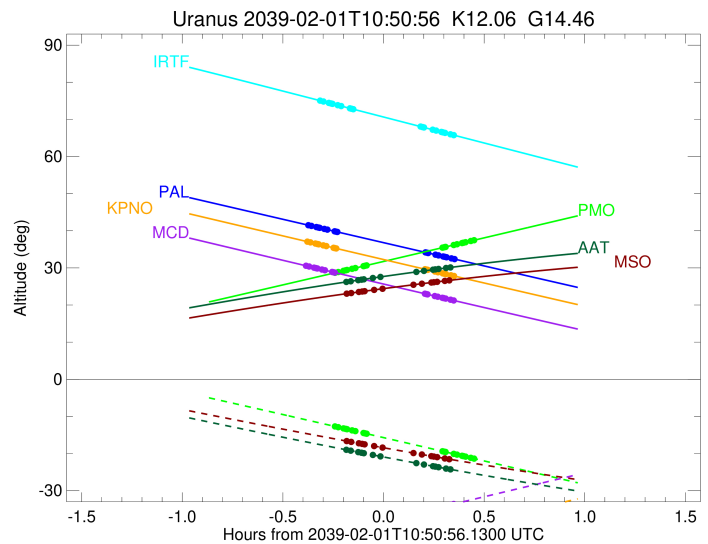
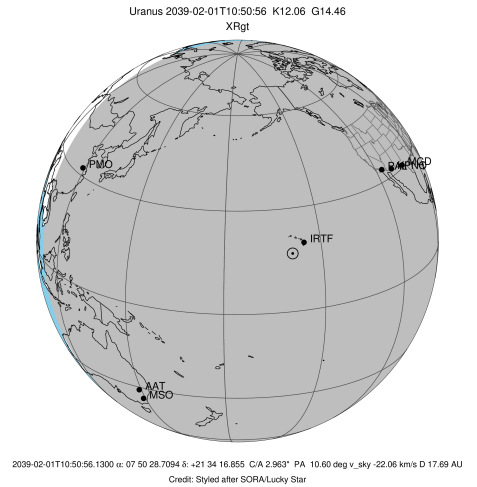
| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-02-01T10:27:39.420 | | 30.61 | -43.13 | 51389.71 | -20.65 | | |
| lambda | I | 2039-02-01T10:28:46.632 | | 30.37 | -42.89 | 50026.71 | -20.02 | | |
| delta | I | 2039-02-01T10:30:14.425 | | 30.06 | -42.57 | 48300.35 | -19.29 | | |
| gamma | I | 2039-02-01T10:30:49.371 | | 29.93 | -42.45 | 47631.53 | -18.98 | | |
| eta | I | 2039-02-01T10:31:13.504 | | 29.85 | -42.36 | 47176.12 | -18.76 | | |
| beta | I | 2039-02-01T10:32:35.726 | | 29.56 | -42.07 | 45668.77 | -17.96 | | |
| alpha | I | 2039-02-01T10:33:28.231 | | 29.37 | -41.88 | 44732.60 | -17.40 | | |
| 4 | I | 2039-02-01T10:35:37.624 | | 28.91 | -41.41 | 42590.73 | -15.84 | | |
| 5 | I | 2039-02-01T10:35:55.655 | | 28.85 | -41.35 | 42304.18 | -15.64 | | |
| 6 | I | 2039-02-01T10:36:23.971 | | 28.74 | -41.25 | 41849.50 | -15.27 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-02-01T11:03:17.431 | | 23.04 | -35.46 | 41879.38 | 15.24 | | |
| 5 | E | 2039-02-01T11:03:46.367 | | 22.94 | -35.35 | 42298.97 | 15.61 | | |
| 4 | E | 2039-02-01T11:04:01.415 | | 22.88 | -35.30 | 42540.29 | 15.80 | | |
| alpha | E | 2039-02-01T11:06:14.317 | | 22.42 | -34.82 | 44751.81 | 17.36 | | |
| beta | E | 2039-02-01T11:07:06.944 | | 22.23 | -34.63 | 45680.82 | 17.91 | | |
| eta | E | 2039-02-01T11:08:28.552 | | 21.94 | -34.34 | 47176.12 | 18.70 | | |
| gamma | E | 2039-02-01T11:08:52.465 | | 21.86 | -34.25 | 47626.02 | 18.93 | | |
| delta | E | 2039-02-01T11:09:27.808 | | 21.74 | -34.13 | 48300.35 | 19.23 | | |
| lambda | E | 2039-02-01T11:10:55.881 | | 21.43 | -33.81 | 50026.71 | 19.96 | | |
| epsilon | E | 2039-02-01T11:12:06.619 | | 21.18 | -33.56 | 51457.22 | 20.58 | | |

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2039-02-01T10:49:33.100
Event type             : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code          : IRTF
Location                : Mauna Kea/IRTF
Latitude (deg)         : 19.82622
E. Longitude (deg)    : 204.52800
Altitude (km)         : 4.168
Gaia source ID         : 674563719514980992
2Mass ID (if available) : 07502877+2134177
ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s
RUWE (>1.4 is poor)  : 0.94
K magnitude            : 12.061
G magnitude            : 14.459
RP magnitude           : 13.585
BP magnitude           : 14.873
DUPflag                : 0
Distance (au)          : 17.695
f0 (km)                : 0.000
g0 (km)                : 0.000
skyplane vel. (km/s)  : -22.06
Sun-Target sep (deg)  : 163.65
Sun-Moon sep (deg)    : 71.89
B (ring opening deg)  : 51.32
PA of pole (deg)      : 87.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.945
C/A sky separation (km) : 37798.7
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

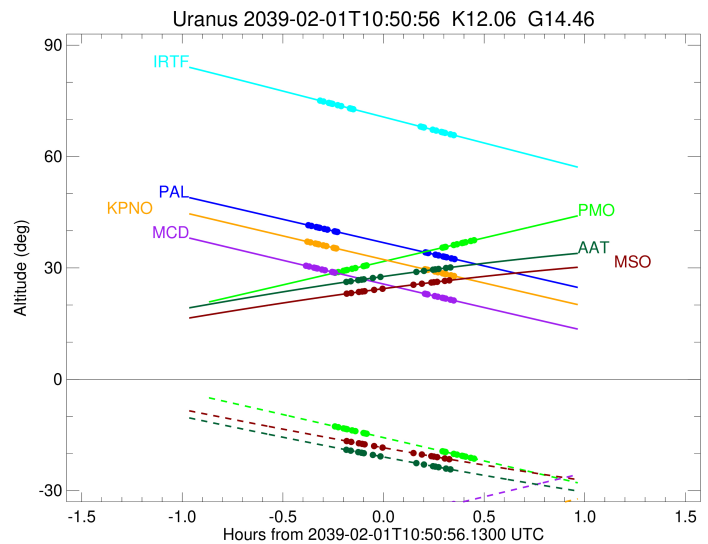
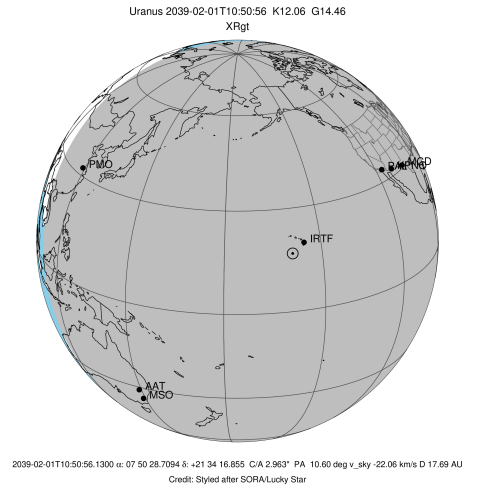


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-02-01T10:31:49.134 | | 75.11 | -87.24 | 51415.72 | -19.21 | | |
| lambda | I | 2039-02-01T10:33:03.193 | | 74.82 | -87.32 | 50026.71 | -18.41 | | |
| delta | I | 2039-02-01T10:34:39.409 | | 74.45 | -87.37 | 48300.35 | -17.45 | | |
| gamma | I | 2039-02-01T10:35:18.193 | | 74.29 | -87.37 | 47631.43 | -17.04 | | |
| eta | I | 2039-02-01T10:35:45.153 | | 74.19 | -87.37 | 47176.12 | -16.74 | | |
| beta | I | 2039-02-01T10:37:18.238 | | 73.83 | -87.33 | 45670.76 | -15.64 | | |
| alpha | I | 2039-02-01T10:38:19.079 | | 73.59 | -87.28 | 44736.09 | -14.86 | | |
| 4 | I | 2039-02-01T10:40:56.221 | | 72.98 | -87.05 | 42584.87 | -12.59 | | |
| 5 | I | 2039-02-01T10:41:18.298 | | 72.90 | -87.01 | 42309.26 | -12.28 | | |
| 6 | I | 2039-02-01T10:41:54.555 | | 72.76 | -86.94 | 41855.41 | -11.71 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| 6 | E | 2039-02-01T11:02:00.850 | | 68.07 | -83.14 | 41878.07 | 11.70 | | |
| 5 | E | 2039-02-01T11:02:37.923 | | 67.92 | -83.01 | 42305.28 | 12.27 | | |
| 4 | E | 2039-02-01T11:02:57.017 | | 67.85 | -82.94 | 42545.25 | 12.58 | | |
| alpha | E | 2039-02-01T11:05:37.365 | | 67.22 | -82.35 | 44752.34 | 14.85 | | |
| beta | E | 2039-02-01T11:06:38.287 | | 66.99 | -82.12 | 45681.15 | 15.63 | | |
| eta | E | 2039-02-01T11:08:10.626 | | 66.63 | -81.78 | 47176.12 | 16.72 | | |
| gamma | E | 2039-02-01T11:08:37.331 | | 66.52 | -81.68 | 47626.55 | 17.02 | | |
| delta | E | 2039-02-01T11:09:16.449 | | 66.37 | -81.53 | 48300.35 | 17.43 | | |
| lambda | E | 2039-02-01T11:10:52.790 | | 66.00 | -81.17 | 50026.71 | 18.39 | | |
| epsilon | E | 2039-02-01T11:12:10.237 | | 65.70 | -80.87 | 51478.35 | 19.19 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-01T10:52:31.880
 Event type : XRgt
 : No Uranus occs
 : 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 : 674563719514980992
 2Mass ID (if available) : 07502877+2134177
 ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s
 RUWE (>1.4 is poor) : 0.94
 K magnitude : 12.061
 G magnitude : 14.459
 RP magnitude : 13.585
 BP magnitude : 14.873
 DUPflag : 0
 Distance (au) : 17.695
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.06
 Sun-Target sep (deg) : 163.65
 Sun-Moon sep (deg) : 71.27
 B (ring opening deg) : 51.32
 PA of pole (deg) : 87.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.377
 C/A sky separation (km) : 43334.9
 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

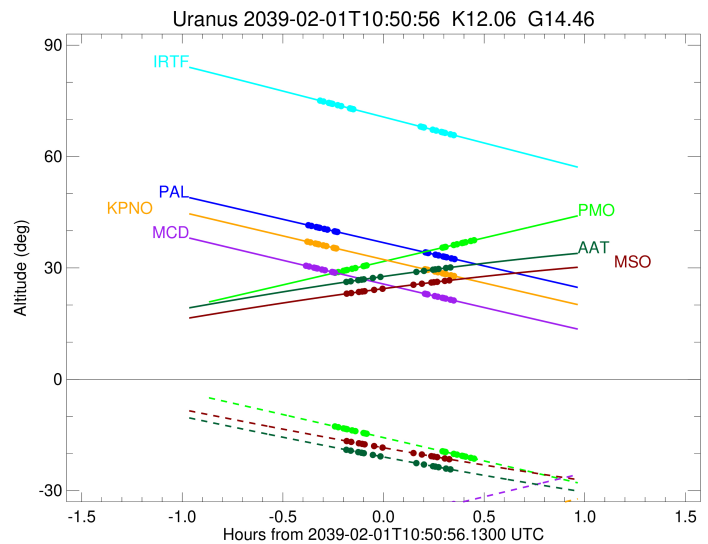
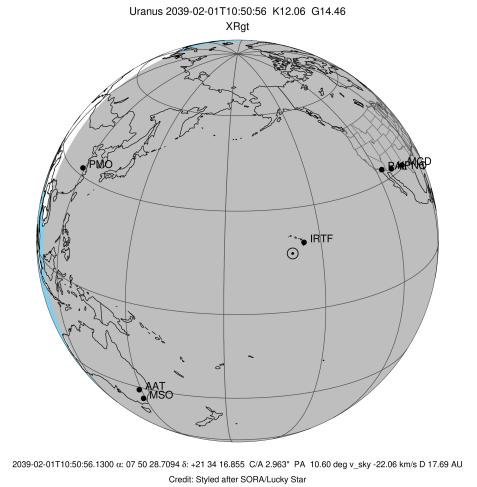


| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|---------|-----|-------------------------|----|-------|---------|----------|--------|---------|--------------|
| epsilon | I | 2039-02-01T10:39:30.681 | | 26.17 | -18.94 | 51465.42 | -15.03 | | |
| lambda | I | 2039-02-01T10:41:11.147 | | 26.40 | -19.24 | 50026.71 | -13.72 | | |
| delta | I | 2039-02-01T10:43:25.391 | | 26.70 | -19.63 | 48300.35 | -11.97 | | |
| gamma | I | 2039-02-01T10:44:23.249 | | 26.83 | -19.80 | 47631.01 | -11.16 | | |
| eta | I | 2039-02-01T10:45:05.142 | | 26.92 | -19.92 | 47176.12 | -10.55 | | |
| beta | I | 2039-02-01T10:47:46.206 | | 27.28 | -20.38 | 45675.37 | -8.07 | | |
| alpha | I | 2039-02-01T10:49:59.586 | | 27.57 | -20.77 | 44744.69 | -5.83 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| alpha | E | 2039-02-01T11:00:46.814 | | 28.93 | -22.60 | 44751.16 | 5.84 | | |
| beta | E | 2039-02-01T11:03:00.218 | | 29.20 | -22.97 | 45680.80 | 8.08 | | |
| eta | E | 2039-02-01T11:05:40.291 | | 29.52 | -23.41 | 47176.12 | 10.56 | | |
| gamma | E | 2039-02-01T11:06:21.864 | | 29.60 | -23.53 | 47627.81 | 11.17 | | |
| delta | E | 2039-02-01T11:07:19.959 | | 29.71 | -23.69 | 48300.35 | 11.98 | | |
| lambda | E | 2039-02-01T11:09:34.074 | | 29.97 | -24.06 | 50026.71 | 13.73 | | |
| epsilon | E | 2039-02-01T11:11:17.870 | | 30.17 | -24.34 | 51516.87 | 15.04 | | |

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-01T10:52:23.700
 Event type : XRgt
 : No Uranus occs
 : 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 : 674563719514980992
 2Mass ID (if available) : 07502877+2134177
 ICRS Star Coord at Epoch: 07h 50m 28.70943s +21:34:16.85506s
 RUWE (>1.4 is poor) : 0.94
 K magnitude : 12.061
 G magnitude : 14.459
 RP magnitude : 13.585
 BP magnitude : 14.873
 DUPflag : 0
 Distance (au) : 17.695
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.06
 Sun-Target sep (deg) : 163.65
 Sun-Moon sep (deg) : 71.24
 B (ring opening deg) : 51.32
 PA of pole (deg) : 87.51
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.396
 C/A sky separation (km) : 43577.7
 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 | 2039-02-01T10:39:36.904 | | 23.01 | -16.59 | 51467.74 | -14.80 | | |
| lambda | I | 2039-02-01T10:41:19.289 | | 23.23 | -16.88 | 50026.71 | -13.45 | | |
| delta | I | 2039-02-01T10:43:36.656 | | 23.52 | -17.25 | 48300.35 | -11.65 | | |
| gamma | I | 2039-02-01T10:44:36.261 | | 23.64 | -17.42 | 47630.98 | -10.80 | | |
| eta | I | 2039-02-01T10:45:19.623 | | 23.73 | -17.54 | 47176.12 | -10.17 | | |
| beta | I | 2039-02-01T10:48:08.984 | | 24.08 | -18.00 | 45675.65 | -7.53 | | |
| alpha | I | 2039-02-01T10:50:36.524 | | 24.37 | -18.40 | 44745.30 | -5.03 | | |

No planet occultations

| | | | | | | | | | |
|---------|---|-------------------------|--|-------|--------|----------|-------|--|--|
| alpha | E | 2039-02-01T10:59:55.647 | | 25.46 | -19.88 | 44750.88 | 5.03 | | |
| beta | E | 2039-02-01T11:02:23.217 | | 25.74 | -20.27 | 45680.72 | 7.54 | | |
| eta | E | 2039-02-01T11:05:11.590 | | 26.06 | -20.71 | 47176.12 | 10.18 | | |
| gamma | E | 2039-02-01T11:05:54.634 | | 26.13 | -20.82 | 47627.88 | 10.81 | | |
| delta | E | 2039-02-01T11:06:54.478 | | 26.24 | -20.98 | 48300.35 | 11.66 | | |
| lambda | E | 2039-02-01T11:09:11.722 | | 26.49 | -21.33 | 50026.71 | 13.47 | | |
| epsilon | E | 2039-02-01T11:10:57.445 | | 26.68 | -21.60 | 51518.42 | 14.81 | | |