PLANETARY OCCULTATIONS

BY DAVID W. DUNHAM, DAVID HERALD, AND STEVE PRESTON

As major, dwarf, and minor planets, and their moons, move across the sky, they occasionally pass directly between an observer and a distant star, producing an *occultation*. Astronomers have learned much about solar system bodies by carefully monitoring the changing apparent brightness of stars during the immersion and emersion phases of occultations. If the occulting body does not have an atmosphere, the occultation is virtually instantaneous; if there is an atmosphere, it causes the star's disappearance and reappearance to occur gradually. If a planet has rings or other debris in its environs, the extent and degree of transparency of this material can be precisely mapped. The rings of Uranus, the ring arcs of Neptune, and the atmosphere of Pluto were all discovered by occultation observations. If an occultation is observed at several distributed sites, the size and shape of the occulting body can be determined more accurately than by other Earth-based techniques.

Amateur astronomers can make important contributions to occultation observing campaigns. This is particularly true for minor planet occultations, for which the paths across Earth are often very narrow and somewhat uncertain in location (due mainly to uncertainties in the ephemeris of the minor planet). By recording the times of the star's disappearance and reappearance as seen from several sites (i.e. by noting the edges of the minor planet's shadow as it sweeps across Earth), the object's profile can be directly determined. Sometimes timings can be made by visual observers with modest telescopes.

When observing an occultation, it is important that an observer know his or her location to within a fraction of a kilometre. Geographic longitude and latitude as well as the altitude of an observing site can be determined with a GPS receiver, from a high-quality topographic map, or from some map websites. To be useful, the times of immersion and emersion must be determined as accurately as possible—certainly to better than 0.5 s, and better than 0.2 s for the shorter events (those less than about 10 s in duration). Photoelectric and CCD equipment with high-speed digital recording systems is well suited for this work. Attaching a low-light-level video camera to a telescope is a less expensive method for accurate timing; a good primer for video observation is at **https://occultations.org/documents/OccultationObservingPrimer.pdf** . Visual observers using smartphones as audio recorders, and another smartphone using an accurate time signal app, can also make useful contributions. Even simple measurements of the duration of an occultation made with a smartphone stopwatch function, may be of value. CCD observers should be aware that most of these systems are incapable of timing accuracies better than about 2 s. But many CCD observers use the trick of turning off the telescope clock drive shortly before the predicted time and let the images trail. The occultation will appear as a break in the trail that can be measured to about a tenth of a second if the moment the exposure is started (just after turning off the clock drive) is accurately timed; see **https://www.asteroidoccultation.com/observations/DriftScan/Index.htm**.

Occultation observations are coordinated in North America by the International Occultation Timing Association (IOTA) (**www.occultations.org**). IOTA member or not, IOTA wants to inform you, and others in your area, able to locate stars to 11th magnitude of prediction updates. IOTA's free Occult Watcher software (see below) is best for finding events near your location. Otherwise, you can email the longitude and latitude (or location from the nearest town) of convenient observing sites, telescope size(s), and an indication of whether you are mobile to dunham@starpower.net. Individuals interested in joining IOTA should refer to OCCULTATIONS BY THE MOON, p. 162 in this Handbook, for membership information.

More information is in the *Solar System Photometry Handbook* (Willmann-Bell, Inc., 1983), *Sky & Telescope*, and papers in IOTA's *Journal of Occultation Astronomy (JOA), Icarus, Minor Planet Bulletin,* and other journals.

Observations of occultations by major and minor planets, *including* negative observations, should be sent to reports@asteroidoccultation.com for analysis, archiving, and publication by IOTA. When reporting timings, describe your geographic longitude, latitude, and altitude (to the nearest arcsecond and 30 m, respectively), telescope size, timing method, the start and end time of observation, an estimate of the observer's reaction time (if applicable) and the accuracy of the timing, and whether the reaction time correction has been applied. IOTA's main Web site at www.occultations.org, especially the Observing tab, has comprehensive up-to-date information on observing and reporting occultations. The Publications tab includes links to IOTA's free *Journal of Occultation Astronomy (JOA).* In this section, stars are identified by numbers from either the Smithsonian Astrophysical Observatory (SAO) catalog, the Hipparcos (HIP) catalog, the Tycho (TYC) catalogue; or the fourth U. S. Naval Observatory CCD Astrographic (UCAC4) catalogue.

Planetary Occultations

Occultations by the major planets are difficult to observe due to the brightness of the occulting body; events involving stars bright enough to observe next to a dazzling planet are rare. In 2025, the brightest star occulted by a major planet in North America is 7/4-mag. SAO 97869 = HIP 41765 by Venus on August 30th around 11:30 UT, visible best from central N. America. But Venus is much brighter than the star, so high magnification with a large telescope will be needed to see it; only the dark-side reappearance might be seen. Venus will be 12″ across and 84% sunlit, so the greatest distance of Venus' dark edge will be only 2.0″ from its terminator. Better will be an occultation of 8.9-mag. SAO 93455 = HIP 16271 by Uranus on Apr. 8, around 2.5h UT, visible best again from central N. America. With Uranus at mag. 5.8, effective observations of the event by Uranus' atmosphere could be made with large telescopes and methane-band filters that darken the methane-rich planet. The occultation will last up to 28 minutes, while brief occultations by the ε ring will occur about 12 min. before the D and 12 min. after the R. Predictions of these contacts will be posted on IOTA's page for 2025 occultations by the major planets and their moons at **https://occultations.org/publications/rasc/2025/nam25Planetoccs.htm**. Also with a methane-band filter, an occultation of 7.5-msg. SAO 79613 = HIP 37442 by Jupiter lasting almost 3h might be recorded from Hawaii the morning of Oct. 13; only the D might be observed from the Pacific Time Zone around 13:24 UT. R. French and D. Souami published a paper on occultations by the outer planets, and by Titan and Triton, through 2050 that is available at **https://arxiv.org/abs/2307.13530**.

Easier to observe are occultations by moons of the planets, but they are not common. There are several occultations by the small Martian moons, with the brightest being an occultation of 9.1-mag. SAO 80372 near M44 by Deimos on May 6 around 4:58 UT. More valuable is an occultation by Uranus' 1169-km moon Umbriel on Aug. 2 at 4:47 UT across central Mexico, s. Texas and Florida, but the path may be as far north as Oklahoma or Kentucky. Occultations by the irregular outer moons of Jupiter are predicted by astronomers working for the Lucky Star project, but usually only a few weeks in advance, based on special astrometric updates; IOTA's Occult program found no observable events by the larger of these moons in North America during 2025. More on occultations by planets can be found at **https://occultations.org/publications/rasc/2025/nam25Planetoccs.htm**.

Maps of Asteroidal Occultations

This year, like for 2024, we are presenting below a map of the brightest occultations by main-belt asteroids. Most of the stars are brighter than 9th magnitude. After it is a table, similar to our tables published the last three years. The predictions were generated by Edwin Goffin, Scott Donnell, Steve Preston, and David Herald. Preston assisted Dunham in the selection for the map and table. The maps were produced with IOTA's free *Occult* software; see **http://www.lunar-occultations.com/iota/occult4.htm**. The orbital elements are from the NASA JPL Horizons Web site at **https://ssd.jpl.nasa.gov/horizons.cgi** and the stellar data are from the Early third release (EDR3) of the European Space Agency's Gaia mission, as implemented with UCAC4, Tycho, and Hipparcos catalog identifiers with *Occult*.

FIGURE 1-2025 OCCULTATIONS OF BRIGHT STARS BY MAIN-BELT ASTEROIDS

[Insert here, the map, nam25MBmap.tif]

TABLE 1-2025 OCCULTATIONS OF RIGHT STARS BY MAIN-BELT ASTEROIDS

[insert here, a table generated from nam25MBmap.xlsx]

The successive columns in the table list: (1) the date and central time of the event (the time at other locations along the path can be a few minutes different); (2) the number and name of the occulting asteroid; (3) the catalogue and number of the occulted star; (4) the star's apparent visual magnitude; (5) the star's J2000 right ascension and (6) declination; (7) the expected magnitude change from the combined brightness; (8) the predicted maximum duration of the occultation in seconds; and, (9) the path location specified by the lands crossed by the ends of the path shown on the map. The two-letter abbreviations for the US States and Canadian Provinces are given, with the order indicating the direction of motion of the shadow. "Baja" is Baja California, either Norte or Sur, while "Mex" denotes the rest of Mexico. CU is Cuba. The motion is very slow for the events on Feb. 10 and 18, so the UT is given at 2 or 3 places along their paths. Three stars have Bayer Greek letter designations, while two are specified by their numbers in Robertson's Zodiacal Catalog (ZC). Due to uncertainties mainly in the ephemerides of the minor planets from which these predictions are derived (most star positions are now accurately determined from the European Space Agency's Gaia mission), the region of visibility of an occultation is uncertain, but now by only a few tenths of a path-width for most of these events. Errors remain, so those near but outside the paths should try to observe. It's also useful, especially for the brighter stars that produce high signal-to-noise recordings, to observe even if you are located up to about 10 path-widths from the predicted path, to check for the possibility of an occultation by a previously-unknown satellite of the asteroid.

We can only portray the brightest events here. Our searches have found many other occultations, including 23,000 visible from North America of stars brighter than mag. 11.1, details available via Occult Watcher (OW), described more below. With improvements resulting from ESA's Gaia mission, we can now predict occultations by many thousands of small asteroids that we could not predict well enough previously. The maps and tables of the brighter events shown above are available at **https://occultations.org/publications/rasc/2025/nam25MBoccs.htm.** More about all of these events, including zoomable Google maps, will be at **http://www.poyntsource.com/New/Future.htm**.

For 2025, Steve Preston's asteroidal occultation website: **www.asteroidoccultation.com** has been changed. It gives access to many more events, but will no longer be updated biweekly as before 2024. The best updates, including interactive path maps and finder charts, will be available only from Occult Watcher (OW) and OW Cloud (see below). The best way to use those is given at **https://occultations.org/observing/software/ow/.** Much other useful information, including interactive maps to zoom in on the path, circumstances for dozens of stations in and near the path, and lists of stars that can be used to pre-point telescopes to the target stars are at **http://www.poyntsource.com/New/Future.htm**, including many of the events on **www.asteroidoccultation.com**. Occult Watcher is highly recommended as it will list all of the asteroidal occultations, filtered to a magnitude limit that you specify, visible from your site or region during the next two months; it is a free download from **http://www.hristopavlov.net/OccultWatcher/publish.htm**. Since OW, and its companion OW Cloud, works from an interactive Web site, IOTA uses it to coordinate minor planet occultation observation plans. It is a valuable tool that all serious observers of these events should use.

Now that the prediction accuracy is improved for most asteroids, thanks to the Gaia mission, we give maps and tables in the next subsections for selected fainter but more scientifically valuable occultations observable by many amateurs.

Occultations by Near-Earth Asteroids

Occultations by Near-Earth Asteroids (NEAs) is an exciting endeavor that contributes to planetary defense by refining the orbits of these small but possibly dangerous objects. IOTA's first success with NEA events was with (3200) Phaethon in 2019, but more spectacularly with (99942) Apophis in 2021. Much information about the occultations, their value, how they helped retire the threat of Apophis, and updated information about other important NEAs, is given in papers (see especially

IOTA's presentation at the top of the page) given at the 2023 Asteroids, Comets, and Meteors Conference that you can obtain at **https://occultations.org/publications/rasc/2023/ACM2023.htm**. There are several opportunities in 2025 shown on the map and table below, similar to those described for bright main-belt occultations in the previous subsection. Since NEA occultations are so short, their expected durations are given to 0.01s. Since the paths for NEA events are all very narrow, one must travel to them with mobile equipment to observe them, rather like grazing occultations of stars by the Moon. And like lunar grazes, it is necessary to adjust the location for elevation above sea level, done now with IOTA's free Occult program.

FIGURE 2-2025 OCCULTATIONS BY NEAR-EARTH ASTEROIDS
[insert here, nam25NEAmap.tif]

TABLE 2-2025 OCCULTATIONS BY NEAR-EARTH ASTEROIDS
[insert here, a table generated from nam25NEAmap.xlsx]

The map shows the paths of occultations of stars to magnitude 12.5 by our selected NEA's. When an NEA occultation is first observed, it generally must be done by a large team of observers to cover the relatively large uncertainty zone. But after one occultation is observed, that data can refine the orbit to allow more accurate predictions of future events that can then be covered by only a few observers. More about the 2025 NEA occultations, including campaign plans, will be available at **https://occultations.org/publications/rasc/2025/nam25NEAoccs.htm.**

Some of the mapped NEA occultations have uncertain paths due to a poor Gaia astrometric solution for the star. I have identified those problem events with "?" added usually near the ends of the paths on the NEA occultations map (Fig. 2). For these events, only those near the path should try it, only from convenient home locations; no mobile efforts should be made for them. The dates of these events are given in the information about the asteroids given below.

We are focusing our efforts on spacecraft mission targets, and on a list of 20 NEAs 1 km or larger whose current orbit uncertainties are large enough that an impact with Earth is possible (but with low probability) during the period from 100 to 1000 years from now. This list of the most hazardous NEAs can be found at **https://occultations.org/publications/rasc/2023/2312PHAsNext1000years.pdf.** During 2025, occultations by two of these objects will occur in North America: (4183) Cuno and (220839) 2004 VA. Information about other occulting NEAs is below:

(1866) Sisyphus: This 7km NEA has two small moons; S. Messner recorded an occultation by Sisyphus in Nov. 2022
(2102) Tantalus: This 1.4km potentially hazardous asteroid is in an orbit inclined 64° to the ecliptic, and will be out of radar range until its next close approach in 2038. 8th-mag. SAO 164452 was occulted by Tantalus on 2024 May 7; it was successfully observed in NM. See the IOTA NEA Web page for a link to an article about it. The prediction was spot on, again showing that the real errors for some NEA orbits with radar data are often much less than the formal errors.
(3200) Phaethon: The paths should be quite accurate, with the orbit well-determined from the 2019, 2020, and 2021 occultations. But more observations are desired, to check for variations in Phaethon's non-gravitational forces caused by mass shedding (Geminid meteoroids) from its extreme thermal environment. An October 2022 occultation had an unexplained 2-km shift, possibly due to a significant mass shedding event at its May 2022 perihelion, so we are anxious to know the current state of Phaethon's orbit from more occultation data. Phaethon is JAXA's DESTINY+ mission target.
(29886) Randytung: This is a possible flyby target of the European Space Agency's Hera mission.
(98943) 2001 CC21: This is a 2026 flyby target of Japan's Hayabusa-2 extended mission.

The Asteroid Collaborative Research via Occultation Systematic Survey **(ACROSS)** project home page is at **https://lagrange.oca.eu/fr/home-across**, and predictions are at **https://lagrange.oca.eu/fr/prediction** . The effort is funded by the European Space Agency (ESA) and is focused on Didymos and other Hera mission NEA possibilities.

Occultations by Special Main-Belt Asteroids
The map, and the corresponding table, similar to those of the previous subsections, shows the paths for the best occultations of a selected group of Main-Belt asteroids that will be occulted in 2025 in North America. More about these events will be available at **https://occultations.org/publications/rasc/2025/nam25MBspecialoccs.htm.** The Web site lists 71 asteroids that we consider special. They are mainly in five groups: Targets of spacecraft missions (planned and past flybys); asteroids proven or suspected of having moons from past occultations; the better asteroids that may have moons based on Gaia observations (the Gaiamoons program, described in a 2024 Earth and Planetary Astrophysics paper at **https://doi.org/10.48550/arXiv.2406.07195**); asteroids that likely have satellites from light-curve observations; and several others with unusual occultation shapes or other unique characteristics.

FIGURE 3-2025 OCCULTATIONS BY SPECIAL MAIN-BELT ASTEROIDS
[Insert here, the image file nam25MBspecialMap.tif]

TABLE 3-2025 OCCULTATIONS BY SPECIAL MAIN-BELT ASTEROIDS
[insert here, a table generated from nam25MBspecialMap.xlsx]

With this larger selection than in the past, and the better predictions now possible for smaller objects from Gaia data, over

15,000 occultations by our 71 objects were found worldwide of stars to mag. 16 during 2025, with over 1100 visible from North America. To down-select to the 15 occultations portrayed, we had to limit the selection to magnitude 10.5 for most objects, but retained some occultations down to mag. 12.1 for a few of the more important objects. Data and instructions for computing predictions for the many more occultations of fainter stars by these objects visible from your home or region are on the Web page. Two of the occultations have stars with Gaia astrometric problems that are marked with "?" on the map. The Dec. 2nd event by Kant is a Gaiamoons event so even if the path is off, observers near it might record an occultation of the bright star by the object's possible moon, if not by Kant itself. The asteroids in our map selection are described below.

(234) Barbara: This may be a contact binary; past occultation observations reveal two lobes.
(253) Mathilde: NEAR imaged half of the 58-km asteroid in 1997; occultations could probe the other half.
(319) Leona-x: We want to improve knowledge of the size and shape of this object, to better analyze observations of the 2023 Dec. 12th occultation of Betelgeuse by Leona.
(379) Huena: An 8-km moon, S2003-379-1, 3000 km (33 diams) away was discovered with adaptive optics at Keck in 2003. An orbit for the moon has been used to compute its path separately, but it has poor accuracy.
(412) Elisabetha: May have a 4km moon 3 diameters away, based on a 2016 Mar. 17 event in Slovakia.
(516) Amherstia: Gaiamoons 66-km asteroid with a possibly 4-km moon about 90 km away.
(906) Repsolda: This may have a ~10km moon ~240km away, according to a 2023 Jan. 25 event in Calif.; see **https://www.dr-ricknolthenius.com/events/20230124Repsolda/index.html**.
(4337) Arecibo: Binarity discovered during 2021 occultations and confirmed by Gaia to have a 1.3d period.
(7083) Kant: Gaiamoons 2.2-km asteroid with a possibly 100m moon about 22 km away.
(10253) Westerwald: This is the first flyby target of the UAE Main-Belt asteroids mission, only 2.2 km across.
(10424) Gaillard: With a 2024 Jan. 14 occultation, J-F Gout in MS found components 4 and 3 km across and 7 km apart.

The minor planet numbers of the 71 asteroids considered in our searches are: 90, 121, **165,** 216, 234, 252, **253,** 264, **269, 276,** 317, 319, 379, **412,** *449, 476,* 513, *516***, 532,** *550*, **578, 595**, *605*, **623**, *699*, **705**, *810, 879*, **906,** *950*, 957, 1016, *1024*, 1089, **1180**, *1509, 1800, 3457, 3800*, **4337,** 4552, *5044*, 5232, **5457,** 7083, 7165, 8632, 8947, 10235, **10253**, **10424**, *10518, 12281*, 12936, **13294**, *15269, 16901, 18434,* **20426,** *22150*, 23871, *25707*, 31450, **33074, 52246,** 59980, *85714*, 87464, **88055, 100624,** and **172376.** Those with bold font and underlined are planned or past spacecraft targets; those with bold font but not underlined are suspected or confirmed to be binary from previous occultation observations; and those in italics are Gaiamoon objects. (319) Leona is of special interest since we need to improve knowledge of the size and shape of this object, to better analyze observations of the 2023 Dec. 12th occultation of Betelgeuse by Leona. The Lucy spacecraft will fly by (52246) DonaldJohanson on 2025 April 20, so observations of any occultations before then are of great interest to NASA. The European Section of IOTA has their own priority list of "neglected asteroids", especially 46 slow rotators that may have slowed down due to interaction with a satellite; see **https://www.iota-es.de/neglected_asteroids.html** .

Occultations by Trojan Asteroids

The Trojan asteroids formed, or were captured into, stable orbits about Jupiter's L4 and L5 triangular libration points. It is estimated that there are about a million of them larger than 1 km, about the same number as main-belt asteroids. But because they are about twice as far from the Earth, we know less about the Trojans than the main-belt objects. To learn more about the Trojans, NASA is sending its Lucy spacecraft to fly by five of them, from 2027 to 2033, to study them in detail. Three of them have known moons. But during 2025 in North America, there are no occultations of stars bright enough to learn anymore about their sizes, shapes, and precise orbits of the Lucy targets, over what has already been determined from past occultation campaigns. However, observations of occultations by several other Trojan asteroids presented here would add valuable knowledge that will add context for the Lucy spacecraft observations. In addition, the European Lucky Star project is interested in several other large Trojan objects, and is similarly encouraging observations of them. A map and table of the 14 best possibilities for 2025 in North America for star brighter than magnitude 14.7 are presented below, similar to those for other asteroids given in previous sections. and more information about Trojan occultations will be posted at **https://occultations.org/publications/rasc/2025/nam25Trojanoccs.htm**,

FIGURE 4-2025 OCCULTATIONS BY TROJAN ASTEROIDS
[Insert here, the image file nam25TrojansFinal.tif]

TABLE 4-2025 OCCULTATIONS BY TROJAN ASTEROIDS
[insert here, a table generated from nam25 Trojans.xlsx to create this]

The minor planet numbers of the 43 Trojan asteroids that we considered in our calculations are 588, **617,** 624, 659, 884, 911, 1143, 1172, 1173, 1208, 1404, 1437, 1583, 1647, 1749, 1867, 1873, 2207, 2241, 2357, 2363, 2797, 2920, 3063, 3240, 3317, 3451, **3548,** 3709, 3793, 4063, 4543, 4709, 4836, 5027, 5283, **11351, 15094,** 15440, 16560, **21900,** 58931, 100624; their names and more will be posted at **https://occultations.org/publications/rasc/2025/nam25Trojanoccs.htm**, which has notes about some of our mapped events. Those with bold font are Lucy mission targets. (624) Hektor is the largest Trojan and an interesting contact binary object (the two lobes have different spectra, indicating different compositions), also having a significant moon. A good article about SwRI's past occultation campaigns is on pages 34-40 of the 2023 September issue of *Sky and Telescope*. Predictions by many Trojan asteroids can also be found at the Lucky Star occultations prediction Web site at: **https://lesia.obspm.fr/lucky-star/predictions.php.** Notes about a few of the Trojan events shown on our map are below.

(911) Agamemnon: This is the second or third largest Trojan asteroid. A 2012 occultation showed a size of about 160 km, but more well-observed events are sought to better determine its size and shape. The 2012 event also revealed a satellite, ~10 km across with a separation of 278 km. **[This red font text has been removed; keeping it only for my later use]**

(1173) Anchises: Lucky Star has a better orbit to improve this path.

(2241) Alcathous: Lucky Star has a better orbit to improve this path, from a 2022 Aug 11 UK occultation.

Occultations by Distant Objects

Of special interest are occultations by distant trans-Neptunian objects (TNO's) and Centaurs, many of which have moons and some have rings. These distant objects move slowly, so occultations by them are rare, so stars as faint as mag. 15.6 had to be considered, requiring larger telescopes to observe. The uncertainties of the paths of these objects is often many path-widths, requiring special astrometric observations with large telescopes to predict their location well enough for observing campaigns, but most of the ones that we have considered for 2025 have some previous occultation observations that have allowed calculation of better paths. You should consult Occult Watcher (individual events can be found by specifying the date and the asteroid's number at **https://cloud.occultwatcher.net/events**) and/or the Lucky Star prediction site at **lesia.obspm.fr/lucky-star/predictions.php** a few weeks in advance to get the latest updated path predictions. Other sources for predictions by distant objects are the top 3 links at the RECON site at **https://www.boulder.swri.edu/~buie/recon/.** More about these events will be available at **https://occultations.org/publications/rasc/2025/nam25distantoccs.htm.**

The map and table below for the 2025 distant objects are similar to those for other objects described earlier.

FIGURE 5-2025 OCCULTATIONS BY DISTANT OBJECTS
[Insert here, the image file nam25Distant.tif]

TABLE 5-2025 OCCULTATIONS BY DISTANT OBJECTS
[Use the attached file nam25Distant.xlsx to create this]

Included in our searches for 2025 events are the following objects with minor planet numbers 944. 2060. 5145. 10199. 19521. 28978. 38628. 50000. 54598. 60558. 90377. 95626. 136108. 136199. 307261. and 468861. In addition, we are including here three comets whose orbits have been updated with observations of occultations by them: 28P/Neujmin 1. 29P/Schwassmann-Wachmann 1, and 430P/Scotti. We also include here occultations by the medium-sized irregular-shaped moons of Jupiter, indicated by (J-#) in our table where # is the Roman number of the moon. Moons of the other outer planets were also searched, with only one event by Umbriel, the 2nd moon of Uranus, found. The path for the March 11th occultation by the 230-km TNO (95626) 2002 GZ32 is south of our mapped area, over southern Cuba, but its path uncertainty is enough for it to occult the star as far north as central Florida. Similarly, the n. limit for the Aug. 2nd Umbriel occultation could be farther north; we expect an update for that path based on observations of a 2020 Sept. occultation by Umbriel. **(468861) 2013 LU28**, with 3 paths on our map, is a TNO in a highly eccentric orbit, period 2434 years (aphelion 353 AU) and a retrograde "Damocloid" object of high interest to planetary astronomers; extensive astrometry has reduced the formal 1-σ error to ~3 path-widths. An observation of an occultation of one of the early events would be valuable to update the orbit, to allow a large campaign for one of the later events to characterize well this strange object. A good example of a past TNO campaign is at **https://occultations.org/publications/rasc/2022/2002TC302Results.pdf.**