*1: I thank my many co-authors, especially Fumi Yoshida from Japan; she provided much of the new material. Fumi, please stand for the audience. My slides are way too busy, I will only say a few of the more important things about each quickly. Don't try to see everything on them, or even take pictures of them, since my presentation is at the top of a Web site we've prepared that also has links to many more occultation resources. The link is given prominently on my last slide; just take a picture of it to get everything. In this talk, I just try to show you enough to want to visit the Web site. Many of these slides were in another talk I gave at the Planetary Defense Conference in April, but there are some changes and new material. NEXT.

*2: I first talk about Phaethon. At PDC 2021, I gave details of the large effort for the bright 2019 July occultation in the southwestern USA. Isao Sato found that event, and from it, IOTA's work on NEA occultations began; Isao is here, please stand. The following occultations allowed accurate determination of Phaethon's orbit, and of its A2 non-gravitational parameter. NEXT.

*3: This shows the modern equipment and organization of the Japanese Occultation Information Network (JOIN) and their plan to found an East Asia section of IOTA; a first meeting of that will be held by Zoom on August 26/27. NEXT.

*4: This 2021 Phaethon occultation is the best-observed NEA occultation so far. NEXT.

*5: This 2022 Phaethon occultation was also well-observed, but after the previous events were so accurately predicted, we were surprised to have an over 2-km south shift of the shadow from the expected path. No other Phaethon events have been observed since to confirm this result.

*6: Perhaps the shift was caused by something that happened due to the strong thermal shock at Phaethon's May 2022 perihelion passage. NEXT.

*7: We hope to set up several stations to record at least one of the 3 Phaethon occultations shown. There is a similarly good 4th Phaethon event on September 25 from Arizona to Arkansas that's in

our 2023 NEA occultations document linked to from our ACM Web page. That NEA events document also has predictions for the rest of 2023 that includes some of the objects pointed out as potentially hazardous during the next 1000 years described a couple of days ago, with abstract 2312.

*8: Two years ago, I discussed the first observed occultation by Apophis. Most of the observations were made with small systems pre-pointed to the event alt./az. using stars and left unattended, set up by a few IOTA observers – they caught 2 of the 3 positives. The systems are aimed manually by star hopping; we are looking into practical plate-solving methods with video that could make this easier so more might try it.

*9: Because the star's position was a few Apophis angular diameters in error, from a high Gaia Renormalized Unit Weight Error (RUWE), the next occultation was missed. Fortunately, about 2 weeks later, Roger Venable deployed 5 large telescopes that he pre-pointed at carefully-chosen locations along a highway in Florida to reach out far enough to catch the 2nd occultation, involving a star with good Gaia data, so Apophis' accurate orbit was finally secured, as will be described better by Damya Souami in the next talk. Last April, I described how occultations by Didymos and Dimorphos dominated our work late last year. Venable deployed his 5 systems to catch the first occultation by Didymos, of a 10.7-mag. star, on 2022 October 15 in Oklahoma; that event was also recorded by Dunford and Trank in Illinois. Three days later, a 2nd occultation was observed from Spain, followed 14 hours later by one of the best-observed Didymos occultations, of an 11th-magnitude star, in Japan. The day after that, Venable recorded the first Dimorphos occultation from Florida. In January this year, the Didymos system occulted a 9th-magnitude star over France and Italy; the recordings by several gave the most-accurate fixes of both objects. More about our Didymos efforts is shown in the PDC 2023 documents that you can see on our ACM Web page; I had a Didymos occultations slide in that talk that I removed from this, since they will also be discussed more in the next talk.

*10: 2001 CC21 is a 600m flyby target of Haya-busa2. Without radar, the ephemeris errors were large, but after 3 large efforts in Japan, an occultation was recorded on March 5th; the sky plane plot shows the coverage by earlier observations, and where the NEA was found. But Gaia RUWE for the star for that event was large, so more efforts are needed for this object. For this event and the Didymos/Dimorphos occultations, we upgraded our analysis software to take into account Fresnel diffraction, important for small objects.

*11: In Early May, we secured the first recording of an occultation by the PhA Tantalus in a ten-station effort near Socorro. Like for our first Apophis event, most of the stations were pre-pointed and unattended. A single-station effort got the first recording of an event by Sisyphus, a larger NEA.

*12: Most of IOTA's efforts have been for occultations by main-belt objects. A good example was the discovery of the large moon of (4337) Arecibo in 2021. Two in Australia discovered the moon as part of their trying many occultations from their observatories, and 3 weeks later confirmed by a mobile 2-station team.

*13: In February last year, the first unambiguous multi-chord occultation by a comet nucleus was observed. Late last year, IOTA participated in a series of occultations by SW1, which is better called a centaur than a comet; see Buie's e-Poster for more.

*14: Besides asteroids, we also discover and characterize well, close double stars.

*15: Take a picture of this last slide, to get the URL of our ACM2023 Web page with this presentation and many occultation resources. We hope that more will try to accurately time occultations by various solar system objects, to learn more about them and their orbits. The mobile campaigns for NEO's may one night improve the orbit of a threatening object, allowing a mitigation that could save a city or even a country.

Thanks for your attention.