

Updates on Occultations of Stars by Didymos

Small Bodies Assessment Group (SBAG #27), June 9, 2022

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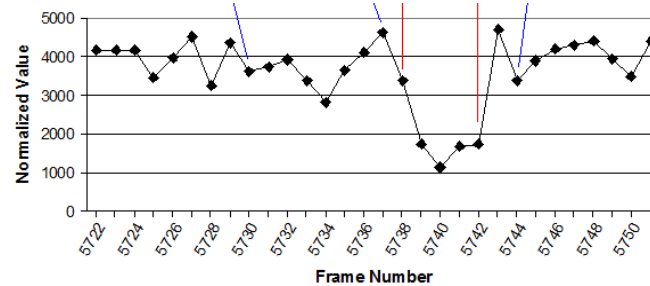
A link to my SBAG26 talk, and other resources, is near the top of the IOTA 2022 NEA occultations page at

<https://occultations.org/publications/rasc/2022/nam22NEAoccs.htm> .

After that talk, the DART project said they had enough observations secured to determine Dimorphos' period well enough for mission success, confirmed in the DART presentation at this SBAG. We feel occultations could still be of use to improve the orbits. The above Web site now has maps & info. of all 2022 North American Didymos occ'ns of stars of mag. ≤ 12.0 . Since SBAG26:

The Asteroid Collaborative Research via Occultation Systematic Survey (**ACROSS**) was launched, funded by **ESA**, see last 2 slides. On April 9, R. Venable recorded a 0.01s occ'n of an 8.4-mag. star by Apophis in Georgia at 380 fps, extending its occ'n baseline

to over a year. His light curve is to the right.



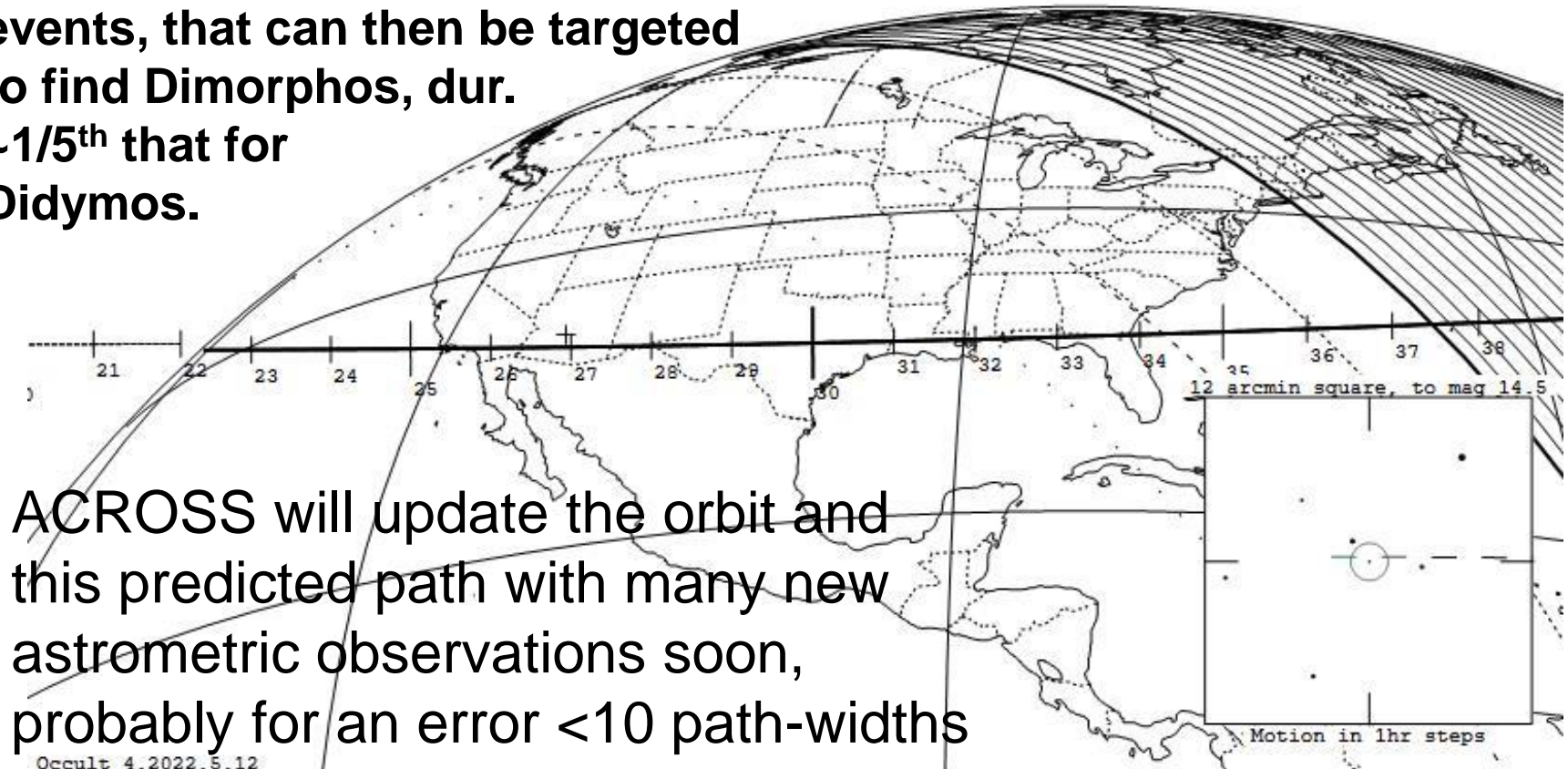
First IOTA Didymos Occ'n Campaign – June 25, 9.5h UT Long Beach-Tucson-El Paso-Houston-Pensacola-Jacksonville

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65803 Didymos occults UCAC4 360-211493 on 2022 Jun 25 from 9h 22m to 9h 42m UT
Star: (Dia < 0.1 mas)      Durations: Max = 0.11 secs      Asteroid:
Mv 13.5; Mb 13.8; Mr 13.3   1km = 0.14 secs, 1mas = 0.063 secs   Mag = 19.3
RA = 21 54 25.1445 (astrometric) Mag Drop: 5.8 [100%]v, 5.6 [99%]r   Dia = 0.80 ±0.10km, 1.7 mas
Dec = -18 10 45.702      Sun : Dist = 129°   Parallax =13.825"
[of Date: 21 55 39, -18 4 22] Moon: Dist = 88°, illum = 12%   Hourly dRA = 3.850s
Prediction of 2021 Aug 16.0 Error 4.7 x 0.6 mas in PA 106°   dDec = 0.29"
Reliable 1.0 (good),      JPL#181:2021-Feb-13, Known errors
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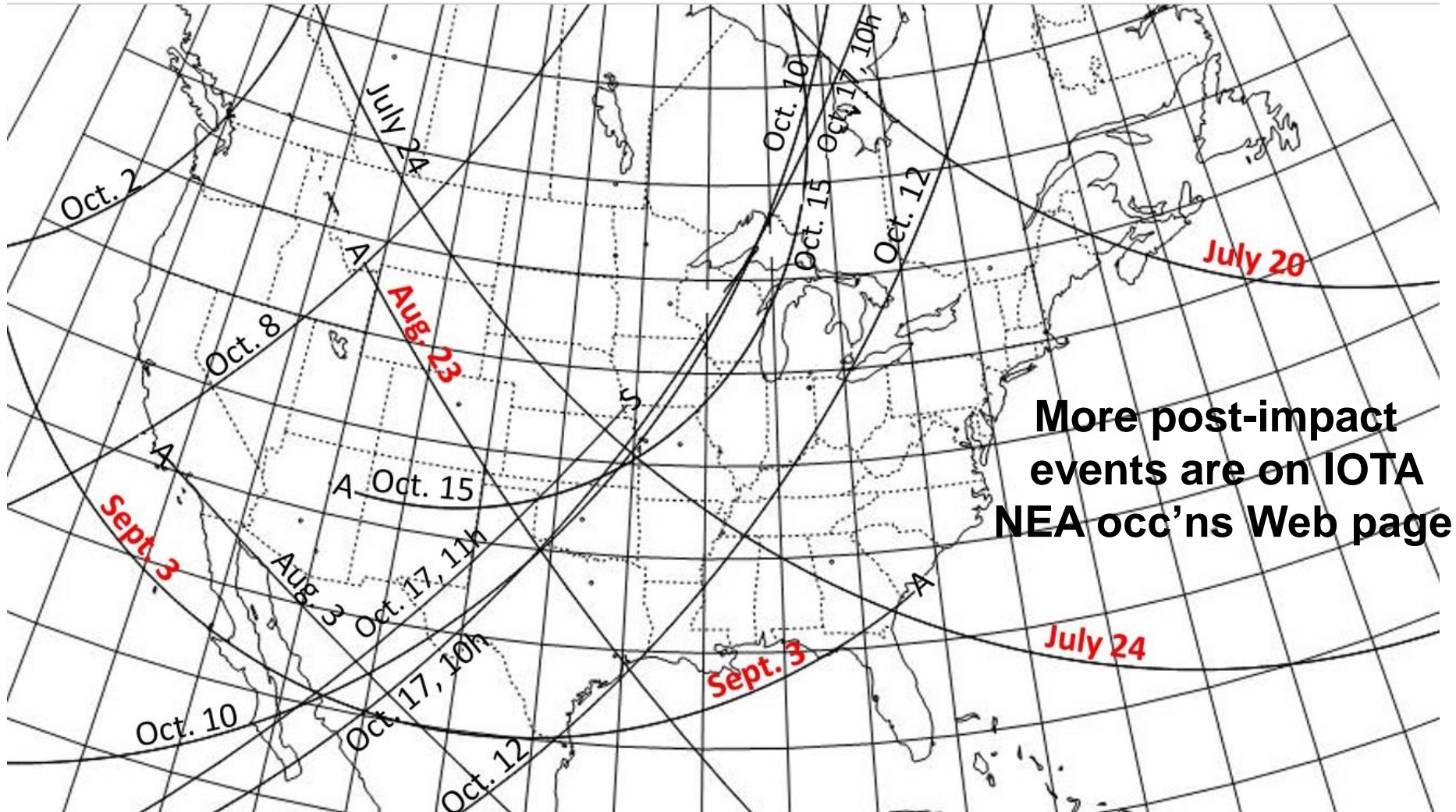
1 moon. {?} 0km at 1km, Period 0.496days

Mag. 13.5, dur. 0.11s, needs 11in scopes. **A 1st multi-station deployment is needed, to obtain ≥ 1 chord, allowing good orbit update for later events, that can then be targeted**

to find Dimorphos, dur. $\sim 1/5^{\text{th}}$ that for Didymos.



Other Didymos Opportunities, 2022 Summer



July 20, 7.2h UT, mag. 11.2, dur. 0.18s, 8in scope, Que., n. Maine, N. Scotia
July 24, 8.8h UT, mag. 11.7, dur. 0.19s, 10in scope, AB – MT – NE – MO – GA
Aug. 23, 5.7h UT, mag. 11.9, dur. 0.21s, 10in scope, Colo. to Texas (Houston)
Sep. 3, 10.8h UT, mag. 10.4, dur. 0.19s, 8in scope, s. Tex.; FL, GA (low)

ACROSS

**Asteroid Collaborative Research
via Occultation Systematic Survey**

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In March this year, the Asteroid Collaborative Research via Occultation Systematic Survey (**ACROSS**) was launched, funded by **ESA**, to predict & observe occultations by Didymos and by other NEA's of interest to the **DART/Hera collaboration**.

Predictions are updated monthly and are available at

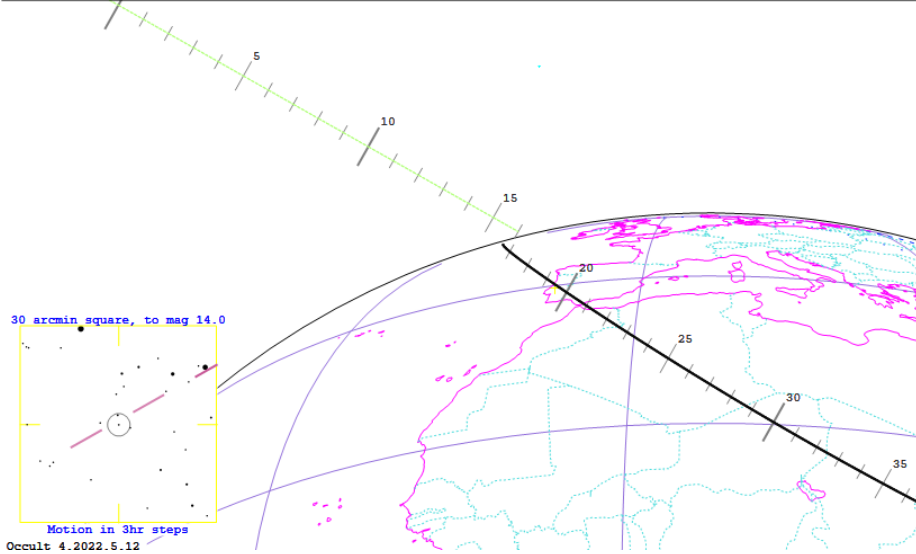
<https://lagrange.oca.eu/fr/home-across>

The predictions are made available via IOTA's widely-used Occult Watcher system that allows observers to filter the many predictions to those visible from or near their observatory. Events as faint as mag. 16 that might be recorded with large telescopes, are included.

Astrometric observations are made at observatories in Spain and France, to improve the orbits for the occultation predictions.

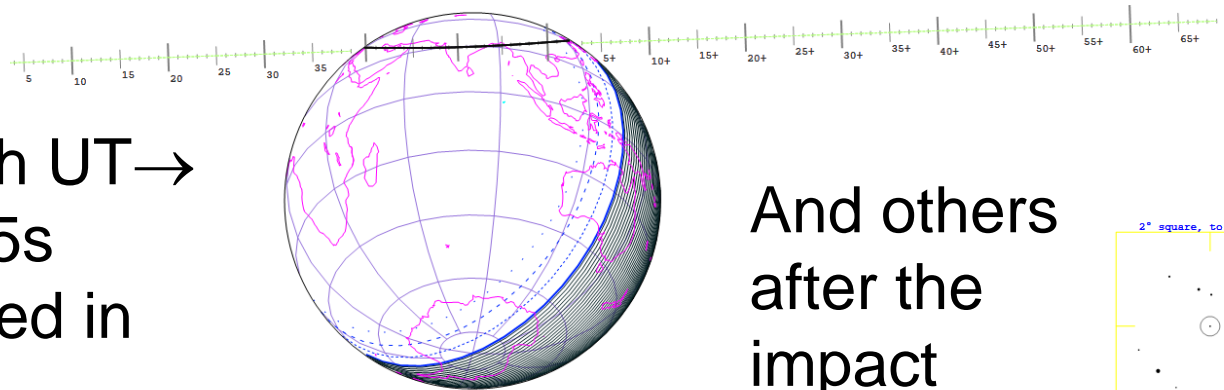
Planned ACROSS Observational Campaigns

65803 Didymos occults UCAC4 314-251595 on 2022 Aug 25 from 1h 16m to 1h 54m UT
 Star: (Dia < 0.1 mas) Durations: Max = 0.23 secs Asteroid: Mag = 15.8
 Mv 13.0; Mb 13.5; Mr 12.4 1km = 0.26 secs, 1mas = 0.033 secs Dia = 0.90 ± 0.10km, 7.0 mas
 RA = 23 38 56.8190 (astrometric) Mag Drop: 2.9 [93%]v, 3.0 [94%]r Sun : Dist = 154° Parallax = 49.938"
 Dec = -27 23 58.904 Moon: Dist = 139°, illum = 5% Hourly dRA = 7.118s
 [of Date: 23 40 9, -27 16 22] Prediction of 2021 Dec 6.0 dDec = -53.58"
 Reliable 1.4 (good), Error 20.0 x 20.0 mas in PA 90° AstDyS2022Aug15, Star+PeakEphemUncert



← 2022 Aug. 25, 1h UT
 mag. 13.0, dur. 0.23s
 Expeditions planned in
 Portugal, Spain, and
 Algeria

65803 Didymos occults TYC 7009-01233-1 on 2022 Sep 20 from 20h 40m to 21h 2m UT
 Star: (Dia < 0.1 mas) Max Duration = 0.15 secs Asteroid: Mag = 14.6
 Mv 9.4; Mb 9.6; Mr 9.0 1km = 0.26 secs, 1mas = 0.033 secs Dia = 0.80 ± 0.08km, 12.9 mas
 RA = 2 14 35.7655 (astrometric) Mag Drop = 5.2 (5.1r) Sun : Dist = 132° Parallax = 102.738"
 Dec = -35 30 32.811 Moon: Dist = 104° Hourly dRA = -25.802s
 [of Date: 2 15 35, -35 24 2] Prediction of 2021 Dec 6.0 dDec = 11.20"
 Reliable 1.0 (good), Error 341.3x25.3 mas in PA 56° JPL#181:2021-Feb-13, Known errors
 1 moon. (?) 0km at 1km, Period 0.496days
 Amor + PHA



2022 Sept. 20, 20h UT→
 mag. 9.4, dur. 0.15s
 Expeditions planned in
 U.A.E. and India

And others
 after the
 impact

Occult 4.12.16.0