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Topic: Ongoing and Upcoming Mission Highlights

Observations of the DART impact from Kenya and Chile

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ABSTRACT

We report on our observations of the Didymos-Dimorphos asteroid system before, during, and after the impact of the NASA DART spacecraft in September 2022. We combine data from established observatories in Chile, which have highly capable facilities but could not observe the moment of impact, with images collected at a newly established observatory in northern Kenya that was at the right longitude to see the impact 'live'.

The Kenyan observatory was set up at the Ileret research facility of the Turkana Basin Institute (TBI), in the arid north of the country. This area has long been suggested as an excellent site for astronomical observations due to its very dark skies and unusually (for an equatorial site) dry climate, with the advantage of the infrastructure provided by TBI's camp, which primarily supports archaeological and anthropological research in the area. The University of Edinburgh and TBI set up a 40cm telescope with a research-grade high-speed cooled CMOS camera, which is currently the largest optical telescope in the country, to take advantage of the unique

opportunity for African observatories to observe the moment of the DART impact. In addition to supporting the DART mission, this telescope has been used to train Kenyan students in astronomical observation, and to demonstrate the quality of the site for astronomical observations, with a goal of establishing a larger, permanent, and remotely operable research observatory in the area. This capacity building and site testing is also of great importance in supporting Kenya's goal of contributing to planetary defence through observations of asteroids as part of the International Asteroid Warning Network.

In Chile we made use of telescopes at the La Silla and Paranal sites of the European Southern Observatory (ESO). As part of the NEOROCKS and MiNDSTEp projects, we used the 1.54m Danish telescope at La Silla to obtain high precision photometry before and after the impact to contribute to measurements of the change in orbital period of Dimorphos, and to characterise the evolving ejecta morphology over the days and weeks post-impact. We also used all four of the 8m telescopes that comprise the ESO Very Large Telescope at Paranal to perform unique observations of the Didymos system, in particular characterising the early ejecta evolution with an adaptive-optics equipped integral-field spectrograph, studying the polarisation of the reflected light from the system, obtaining before- and after-impact thermal infrared measurements, and measuring the visible and near-infrared spectrum of the system with high precision and high resolution.

We will summarise the results from this diverse observation campaign, including the minutes around the impact observed from Kenya and the immediate and longer-term post-impact characterisation of the system from Chile.

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Comments:

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