

## IAF COMMITTEE ON PLANETARY DEFENSE AND NEAR-EARTH OBJECTS (NEOs)

### 1. Introduction

Planetary defense is the term used to encompass all the capabilities needed to detect and warn of potential asteroid or comet impacts with Earth, and to prevent and mitigate their possible effects. A Near-Earth object (NEO) is an asteroid or comet whose orbit brings it within about 50 million kilometers of Earth's orbit. The primary objective of the IAF Technical Committee (TC) on Planetary Defense and Near-Earth Objects (NEOs) is to raise awareness among the global space community, in particular the IAC audience, about the ongoing work within the planetary defense community and to get more people, especially students and young professionals, interested and actively participating in the field.

### 2. Latest Developments

Many conferences and science meetings are taking place throughout the year covering topics related to planetary defense. To highlight just two of those:

#### Planetary Defense Conference

The biennial Planetary Defense Conference (PDC) took place 3-7 April in Vienna and was attended by 275 in-person participants as well as over 200 online. The latest developments were presented in ten different sessions ranging in topics such as discovery, characterization, mission design, impact effects, disaster management, public education and communication as well as political, legal, social and economic aspects. Highlights were the hypothetical threat scenario exercise and several expert panels taking advantage of the conference being held at the United Nations with international experts and decision makers participation. You can find all details including recordings at: <https://iaaspace.org/pdc/>

The site of the 2025 PDC has not yet been selected interested hosts can contact the committee chair Alex Karl for more information.

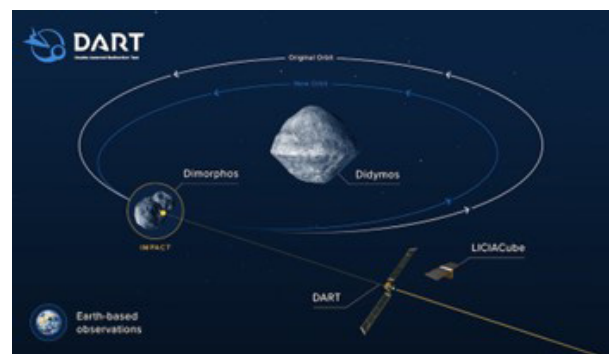
#### Apophis T-6 Workshop

The Apophis T-6 workshop took place virtually on May 10-11, with up to a hundred participants. Advances in our understanding of this 300m object and concept studies taking place in Europe and in the US to visit Apophis with a space mission before and during its closest approach with the Earth on April 13<sup>th</sup>, 2029 (at 31,000 km distance) were presented.

The OSIRIS-APEX mission by NASA (which uses the OSIRIS-REx spacecraft after its deployment of asteroid Bennu's sample in Earth's atmosphere) will reach Apophis about a week after its closest approach to the Earth, and there is a strong interest of the science and planetary defense community to also be able to visit it before and during closest approach, so that the potential effects of tidal forces from the Earth on its surface and interior can be measured.

### 3. Breakthroughs

#### DART



After launching on 24 November 2021 from Vandenberg Space Force Base on a SpaceX Falcon 9 rocket, NASA's Double Asteroid Redirect Test (DART) spacecraft was headed to the non-hazardous, binary asteroid system Didymos to demonstrate the viability of the kinetic impactor – an asteroid deflection technology that

works by colliding a spacecraft into an asteroid to give it a push years before it would impact Earth in order to move it sufficiently out of the way. On 26 September 2022 DART successfully hit Didymos' moon, Dimorphos. The impact was observed by several ground and space-based telescopes and the measurements of the binary system allowed scientists to announce that the orbit of Dimorphos had changed by 32 minutes, shortening the initial orbit from 11 hours and 55 minutes to 11 hours and 23 minutes – that is 25 times more than the 73 seconds that NASA had defined as minimum successful orbit change – a smashing success!

However, we still need to understand why such a change occurred, so that we can validate the numerical impact models aimed at reproducing DART's impact and extrapolate this knowledge to other scenarios. In 2024, ESA's Hera mission will launch to the same binary asteroid system. After its rendezvous with the binary system at the end of December 2026, it will measure in detail the effect the impact had on Dimorphos as well as the physical and compositional properties of the asteroid, including for the first time the internal structure, which have great influence on the impact outcome. With DART, it will offer the first fully documented impact deflection test at the scale of an asteroid and improve greatly our understanding of the geophysics of near-Earth asteroids.

The US *National Academies of Sciences, Engineering, and Medicine* released its Decadal Survey (Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology 2023-2032) that, for the first time, includes Planetary Defense with several recommendations.

China has also recently announced their plans for an asteroid deflection mission to be launched in 2025 or 2026.

#### 4. Action plan for the year

##### June

30 June is Asteroid Day. It is the United Nations sanctioned day of public awareness of the risks of asteroid impacts. Find an event near you or watch the live broadcast. <https://asteroidday.org/>

##### October

The committee is looking forward to the IAC in Baku with several planetary defense related activities.

The committee is having two dedicated Technical Sessions about Planetary Defense and Near-Earth Objects. Additionally, after successful Special Sessions in 2019, 2021 and 2022, the committee will organize again a Special Session in 2023. "Would You Look Up? The Fiction and Reality of Planetary Defense" will let you participate in a fun workshop using examples from the movie "Don't Look Up!" to learn about planetary defense.

Join us and learn more about planetary defense and NEOs!