

IAF Committee Briefs

November 2021

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. Summary

The biennial IAA Planetary Defense Conference was held in April this year, hosted by the United Nations Office of Outer Space Affairs (UNOOSA). Over 700 individuals from 50 countries attended the virtual event. Highlights of the conference included a realistic but fictitious Asteroid Threat Exercise, as well as a panel that featured representatives of seven national space agencies, demonstrating awareness and support of planetary defense activities. A primary outcome of the conference was unanimous attendee support for an International Year of Planetary Defense (IYOPD) similar to like the 2009 International Year of Astronomy. The 2029 close passage of asteroid Apophis is a natural opportunity to hold the event, raise awareness about the hazard, demystify the topic, and connect current and future communities.

3. Highlights

Recent highlights include the two asteroid sample return missions. JAXA's Hayabusa2 mission to asteroid Ryugu yielded 5.4 grams of material when it returned the sample on 5 December 2020, while NASA's OSIRIS-REx took a sample from asteroid Bennu on 20 October 2020, which is expected back on Earth on 24 September 2023. While primarily science missions, knowledge about the physical properties and composition of asteroids is critical for designing and implementing a deflection mission when needed. In fact, scientists were surprised by the size of the crater that was created when Hayabusa2 fired a small projectile into the surface on the asteroid in order to take a subsurface sample, as it was bigger than expected, proving that there is still much to learn about asteroids and their characteristics.



Figure 1- left: sample site on Bennu, right: sample from Ryugu

4. Future Outlook

On 24 November 2021, the launch period for NASA's Double Asteroid Redirect Test (DART) spacecraft will open. DART will journey 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. In this case, DART will hit Didymos' moon, Dimorphos, on 2 October 2022 and will allow scientists to compare the actual outcome with the expected one. Two years later, ESA's Hera mission will launch to the same binary asteroid system to measure in detail the effect the impact had on Dimorphos after it arrives in December 2026.

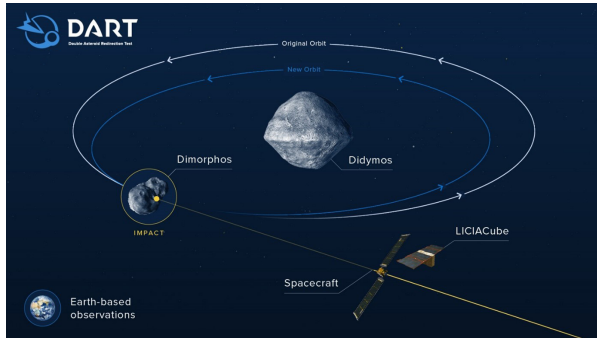


Figure 2- DART kinetic impactor schematic

As we can only deflect what we know, finding objects before “they find us” is of paramount importance. NASA plans to launch an infrared space telescope called NEO Surveyor in 2026 that is dedicated to finding asteroids that are potentially hazardous to Earth. In combination with the ground-based Vera C. Rubin Observatory, which is expected to start observing in 2022/2023, an exponential increase in the number of asteroid discoveries is expected, reducing the uncertainty of asteroid impacts with Earth.

5. Committee activities

The committee has been renamed to stress its focus on planetary defense and to help clarify the topics covered as the committee will have for the first time a dedicated technical session at the IAC 2022. After successful Special Sessions in 2019 and 2021, the committee intends to continue submitting quality proposals for the IAC programme.