

Hera mission status

ESA UNCLASSIFIED - For Official Use



AIDA international collaboration with NASA

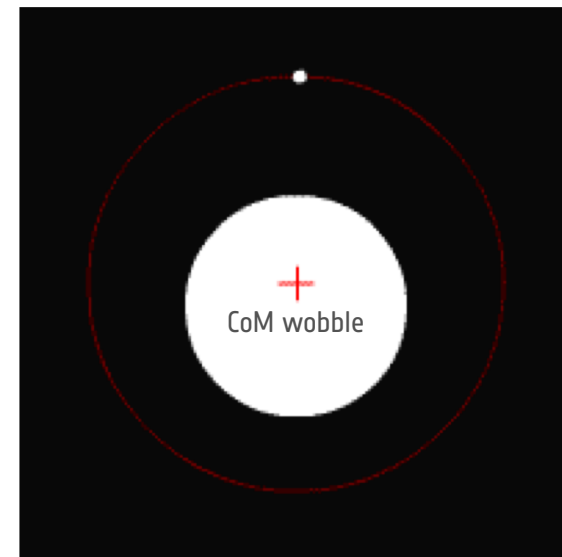
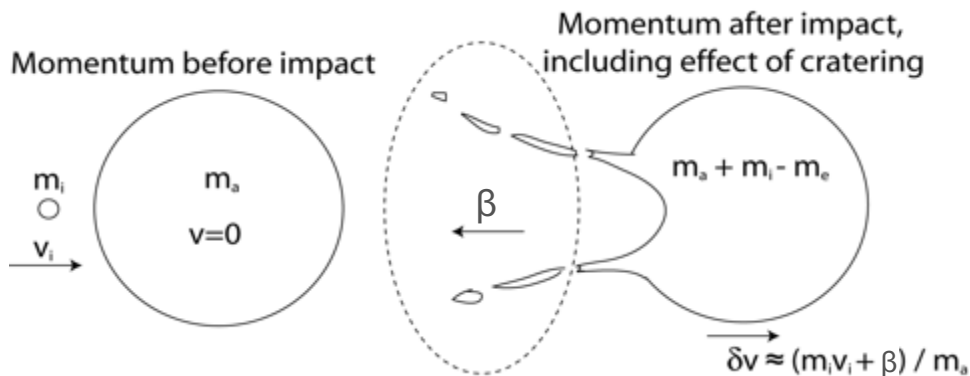


“kinetic impactor” validation requires impactor (NASA/DART) + observer spacecraft (ESA/Hera) to retrieve all physical and dynamical parameters of asteroid Didymos necessary to validate numerical impact codes

HERA asteroid deflection objectives

1. Measure the momentum transfer (incl. ejecta enhancement β) from a kinetic impactor on the binary asteroid

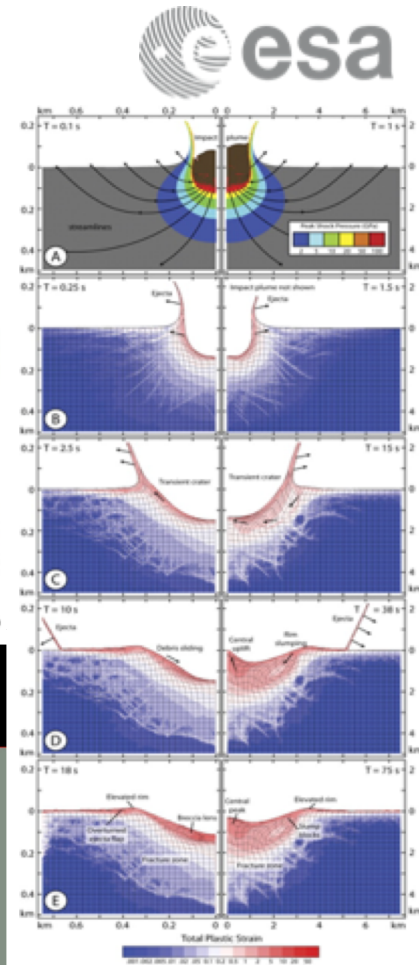
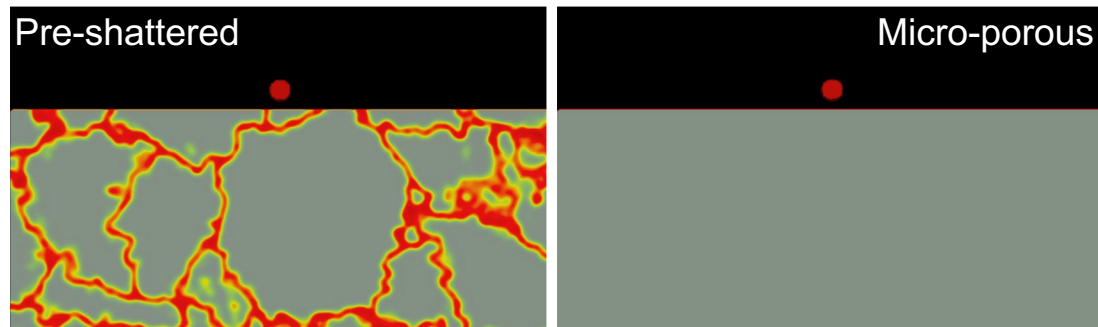
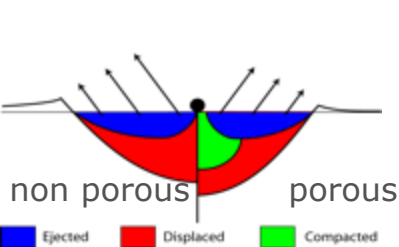
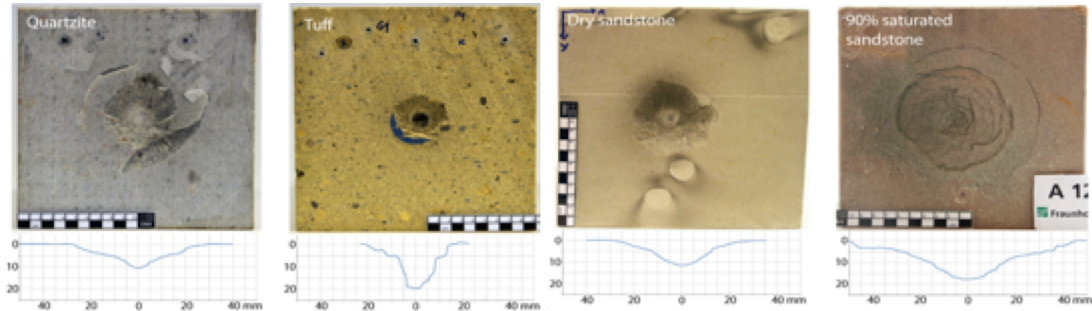
- Asteroid (Didymoon) mass by measuring wobble and through radioscience
- Asteroid dynamical properties via navcam



HERA asteroid deflection objectives

2. Impact models validation and extrapolation to other asteroids

- Crater size/morphology, density, *change in the surface material*

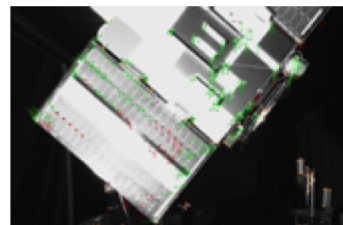
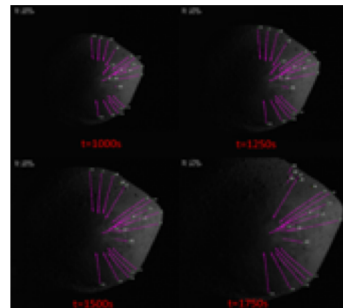


HERA technology experiments



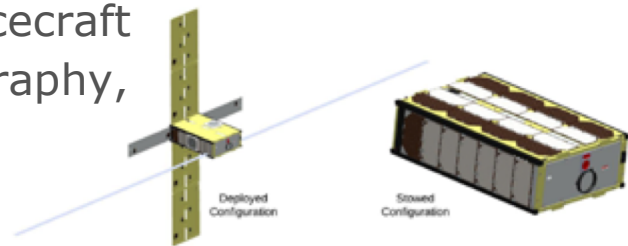
1. Validate spacecraft feature-tracking navigation increasing on-board autonomy

- *Synergies with technologies under development for in-orbit servicing, including novel FDIR based on sensor data fusion.*



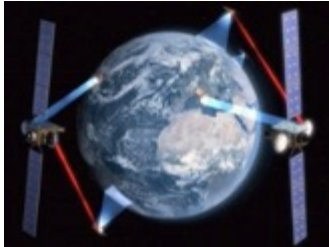
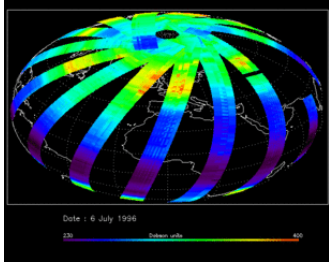
2. Demonstrate deep-space (6U) CubeSats relayed via an inter-satellite link with ranging capability (supporting planetary defence objectives):

- Very high-resolution close up asteroid imaging incl. crater and subsurface material
- Provide complementary measurements to main spacecraft (e.g. spacecraft-CubeSat radioscience, radar tomography, volatiles...)

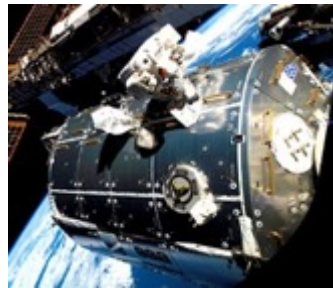
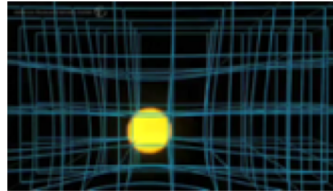


Main Programmatic Categories for CM19

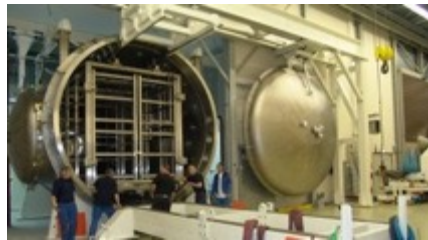
Applications



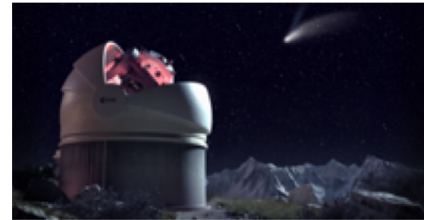
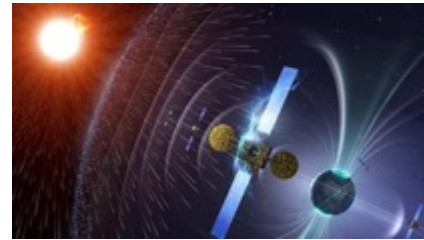
Science and Exploration



Enabling and Support (transp., tech, & ops)



Safety and Security



A graphic showing a bright orange and red sun-like sphere on the left, with several curved, glowing lines in purple and blue extending from it towards the right, representing solar wind or magnetic field lines.

Space Weather


A graphic showing a blue and green Earth in the lower-left corner. In the upper-right corner, there is a yellow, pill-shaped object with a dark opening, representing an asteroid or comet, set against a dark blue space background with small white stars.

**Planetary
Defence**

Cornerstones of Space Safety

A photograph of a satellite in orbit above Earth. The satellite is gold-colored with a large black cylindrical antenna pointing forward. It has solar panels and various instruments. The Earth's blue and white surface is visible in the background.

**Debris and Clean
Space -
Prevention**

An illustration of a bright orange sun on the left, with glowing yellow and purple magnetic field lines extending to the right. A small white dot is visible within the field lines.

**Space Weather
(L5)**

An illustration of the Earth with green continents and blue oceans. A yellow asteroid is shown in the upper right, with a blue line indicating its deflected path.

**Asteroid
deflection
(Hera)**

Cornerstone Missions

An illustration of a yellow robotic spacecraft with a large black circular end effector, positioned in space above the Earth's blue and white cloud-covered surface.

Debris removal

An illustration of a dense field of white dots of varying sizes against a black background, representing a large number of orbital objects.

**Spacecraft
Collision
Avoidance Sys.**

Planetary Defence Roadmap



ESA/Europe

**Predictive
KI test
Impactor
+
Verification
spacecraft**

International

Capability development
ESA Mission studies
Mitigation test mission
Mitigation support missions
Relevant science missions



FlyEye 3

FlyEye 4

Explorers (12U)

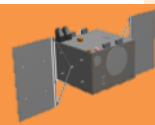
Space-based observatory

Multi-object
tours
Low cost s/c
Physical
properties/
tomography

FlyEye 2

AIDA

Hera



2020

1

2030

2

2040

3

Gravity tractor demo

DART

Earth-based
observation

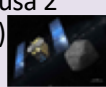


OSIRIS-Rex
(NASA)



NASA
NEOcam
observatory

Hayabusa 2
(JAXA)



Hayabusa
(JAXA)



Chang'e 2
(CNSA)



Deep Impact
(NASA)



NEAR-Shoemaker
(NASA)



Discovery programmes
NEAT, LONEOS, LINEAR, Spacewatch, Catalina, NEOWISE, Pan-STARRS

UN IAWN/SMPAG

US Planetary defense programme

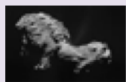
FlyEye 1

AIM



NEOSShield 1 + 2
(EU)

Rosetta

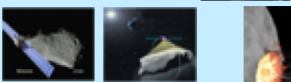


**ESA Space Situational
Awareness Programme**

NEO coordination centre
NEO characterisation
Technology readiness

ESA NEOMAP

Euneos Nero Earthguard 1



Simone Ishtar

Don Quijote
Phase A study



Phase 0 studies

2000

2010

2020

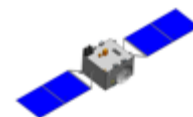
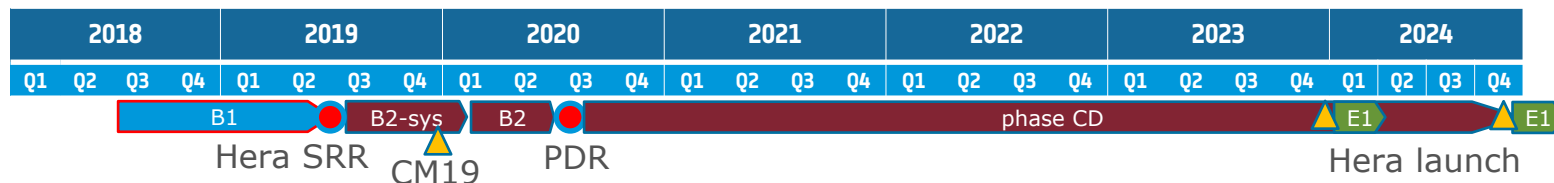
2030

2040

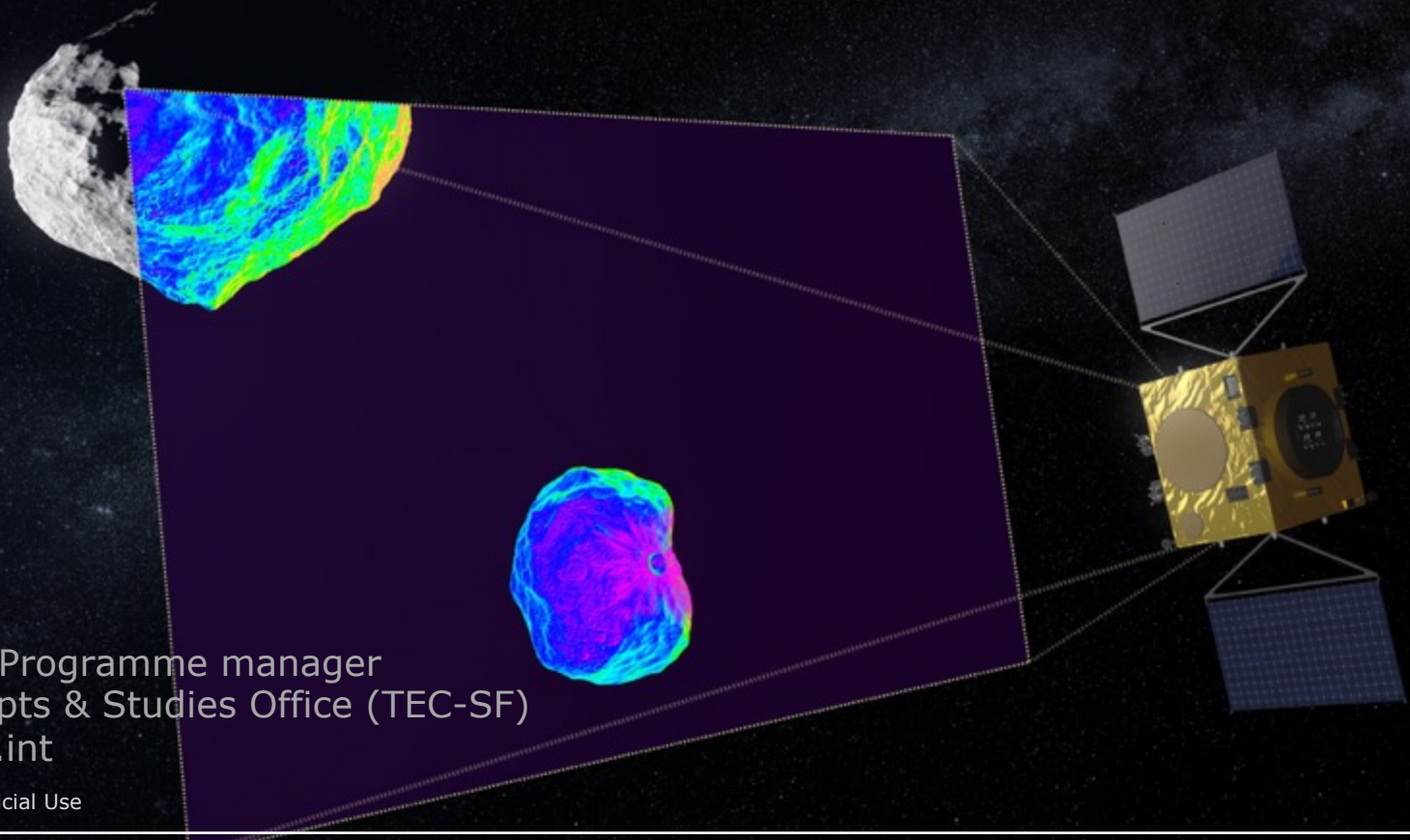


European Space Agency

Workshop objectives



- Consolidate bonus science opportunities for implications to be assessed by industry during phase B1 on spacecraft design and operations
- Explore potential additional instrumentation with high-TRL
- Identify potential technology demonstration relevant to future missions
- Consolidate organisation of the user community and data processing to achieve mission objectives



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