Directorate of Operations; Ground Systems, Mission Operations, and Space Safety

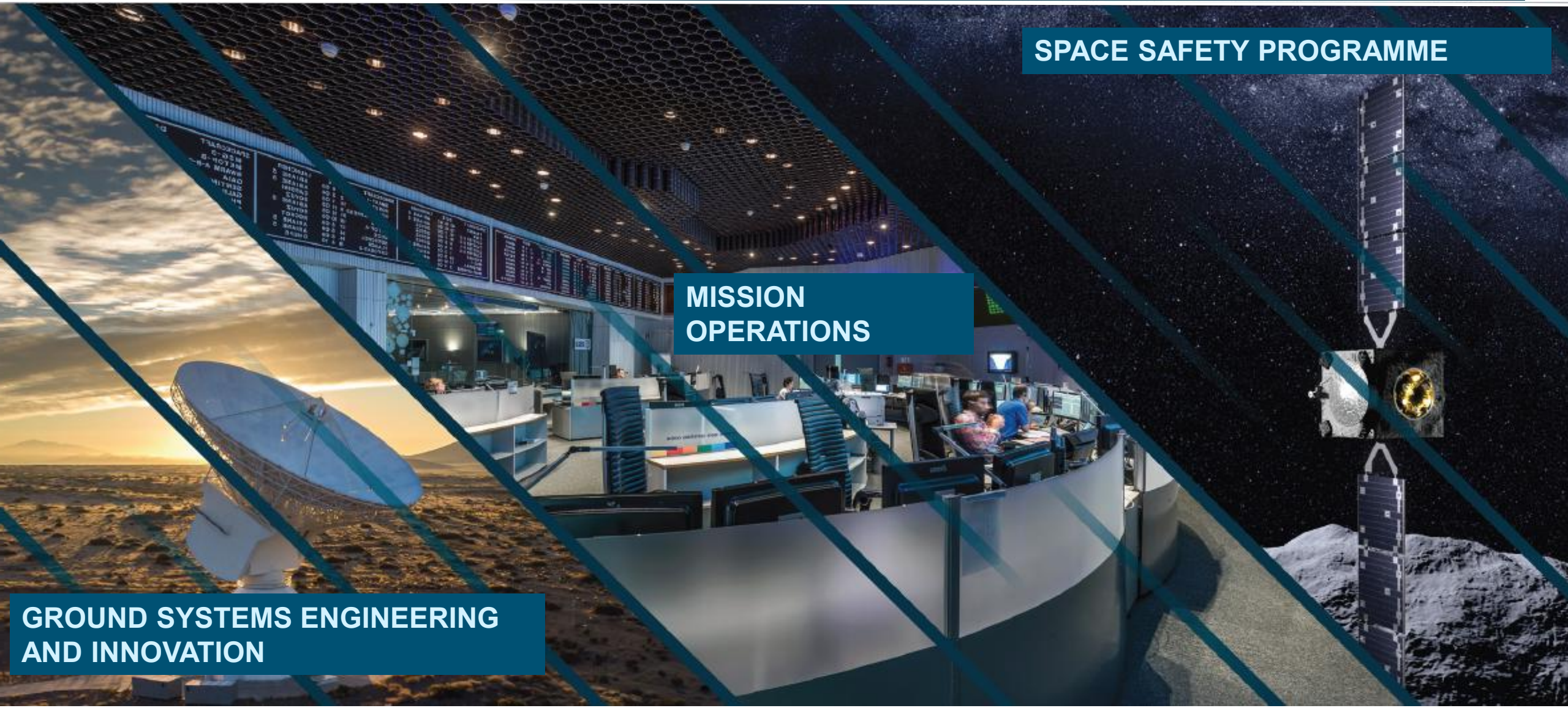
Industry Space Day 2026

Rolf Densing
Director of Operations, Head of ESOC Establishment

2026-09-16

EUROPEAN SPACE AGENCY

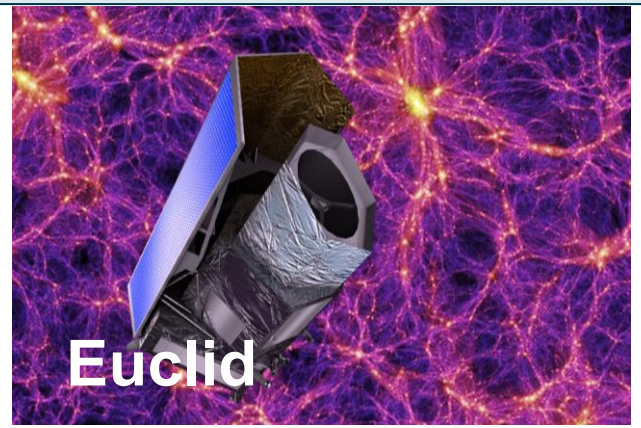
European Space Operations Centre

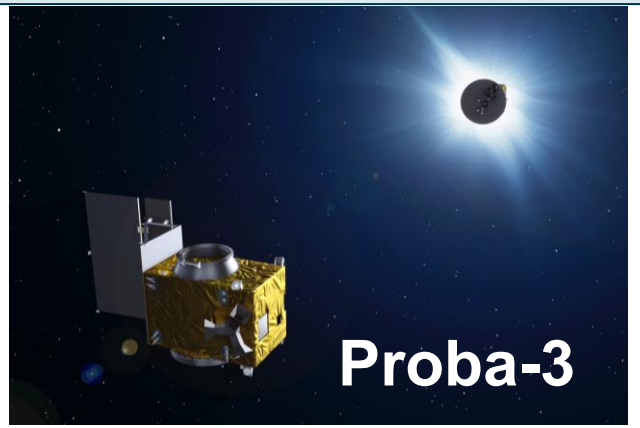


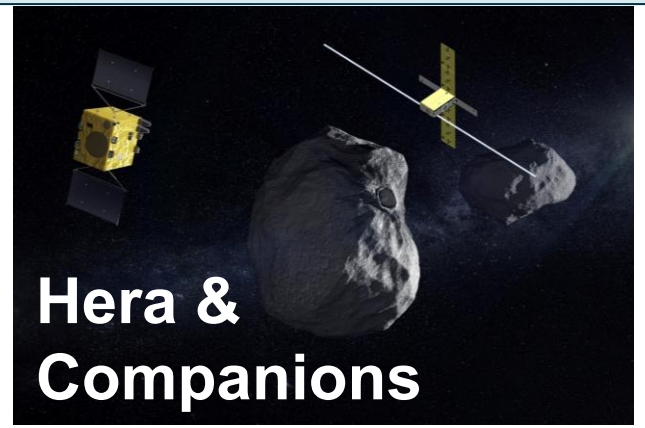
Mission Operations – Highlights

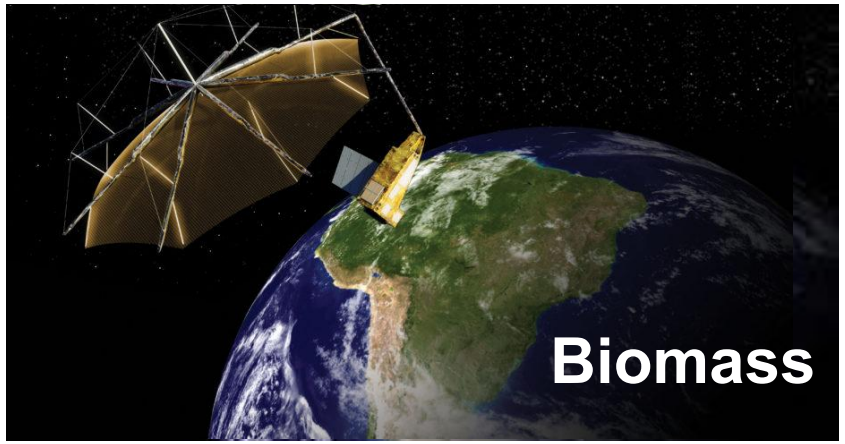
Record number of mission conducted at ESOC

- Ensuring Mission Objectives are met -









(Deep) Space Communication Services – ESTRACK

4 x 35m Deep-Space Antennas

Antenna 5 in South America to ITT 2026

http://estracknow.esa.int

Ground Systems Engineering & Innovation

End-to-end engineering

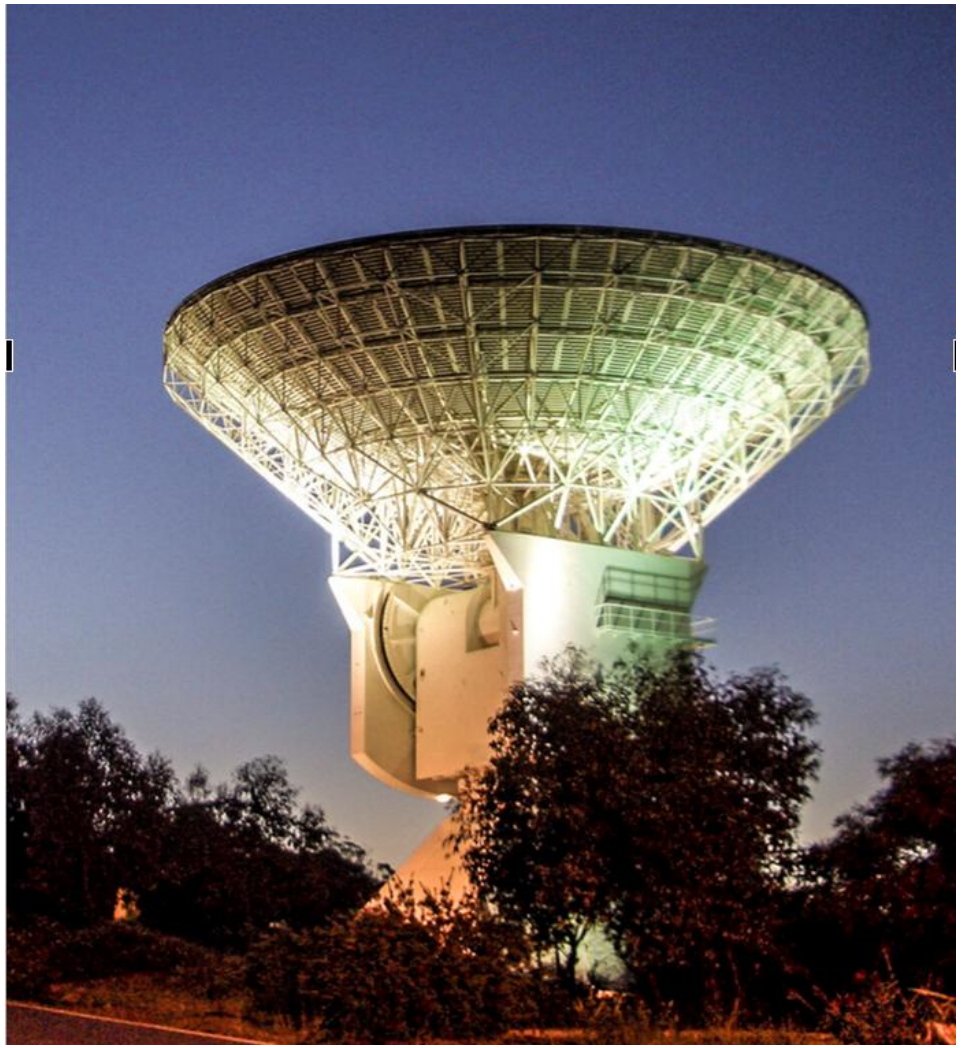
Ground infrastructure and mission systems across hardware and software, engineered for reliable, highly available operations.

Research & development

Innovative solutions and new technologies developed for future ground-segment needs.

European centre of competence

Focused expertise in ground-segment engineering for Europe.



Ground Systems - Core Competencies and upcoming ITTs

- **Ground Station Engineering**
  - RF and Optical Ground Assets for Near-Earth and Deep-Space,
  - Communication Architecture in Solar System.
- **Ground Data Systems Engineering**
  - Mission Control Systems, Mission Planning Systems, Spacecraft Simulators,
  - Multi-Mission Systems.
- **Flight Dynamics**
  - Mission Analysis, Precise Navigation.
- **Ground Segment Cybersecurity**
  - Ready to provide secure end-to-end mission operations.
- **Standardisation**
  - Enabling Industry for Interoperability and International Cooperation.

Cybersecurity for Ground Segments

- **Building** Secure Ground Segments

  Zero Trust Architecture, DevSecOps, Encryption, Secure Architectures, System Security Engineering tools

- **Proving** Cyber Resilience

  Certification and security assurance, SpaceSecLab for penetration testing and attack simulation

- **Shaping** Future Cybersecurity

  Post-quantum security, AI-assisted security monitoring, standards and next-generation technologies (e.g. secure Solar System Internet)

Operational Software for Europe

More than 25 Community Licensed Software Solutions

- More information: **https://esoc.esa.int/services-software**

Includes:

- Mission Planning systems
- Payload Data Processing (e.g. for Space Safety Program SWE)
- Smart Preparation and Simulation Suite
- AI enhanced tools for Operations

Upcoming:

- **Pulse** – the next generation Mission Control System Infrastructure
- **EGOS-MG -** Secure E2E multi-mission ground segment platform

ESOC will leverage industry capabilities - more than ever

Supporting Europe's most complex Missions

- Higher Service Utilization for ESOC core services
- New operational concepts and supporting systems

Working hand-in-hand with industry

Enabling Industry in Ground Systems and Operations Domains

Mission Operations Training:

- Small Sat hands on course (1 day)
- ESOC mission operations hands on course (4 days)

Test facilities and expertise:

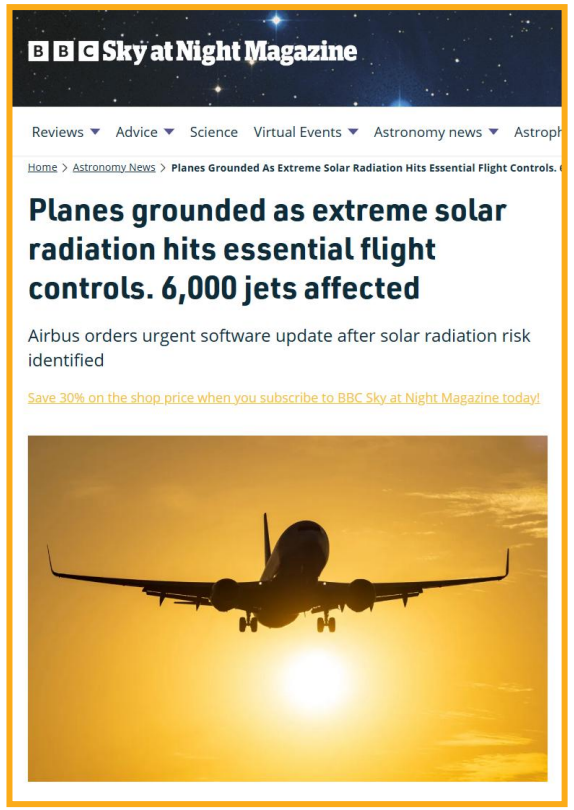
- Ground Segment Reference Facility
- Advanced Ground Software Applications lab
- Facility for Operations Experimentation (FOX)

De-risking through:

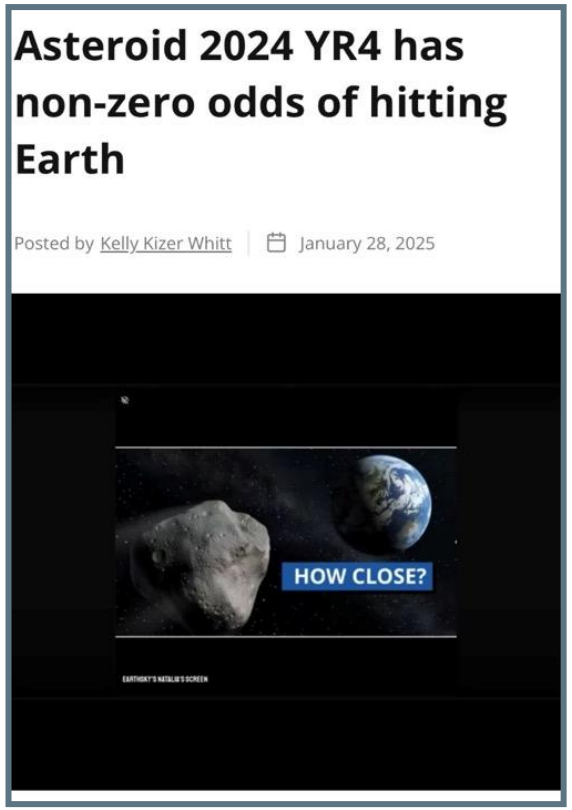
- Mission/Operations concept Certification
- Access to in-orbit demonstration satellites

Space safety in society

Space Weather

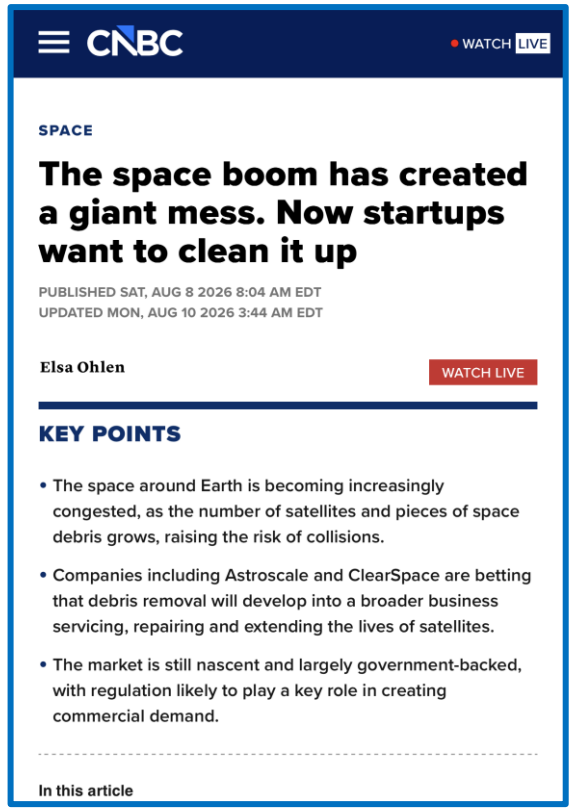


Planetary Defence

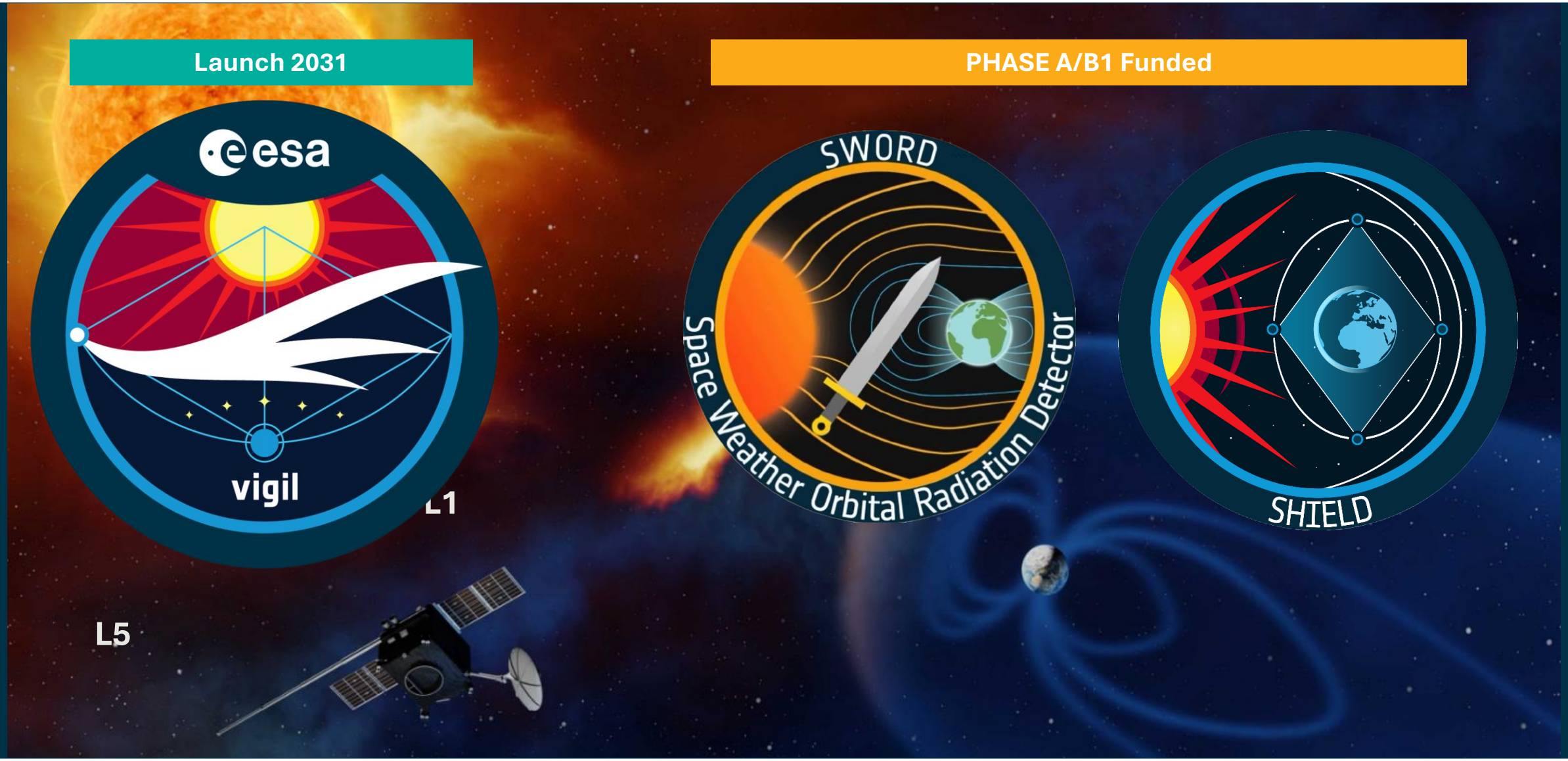


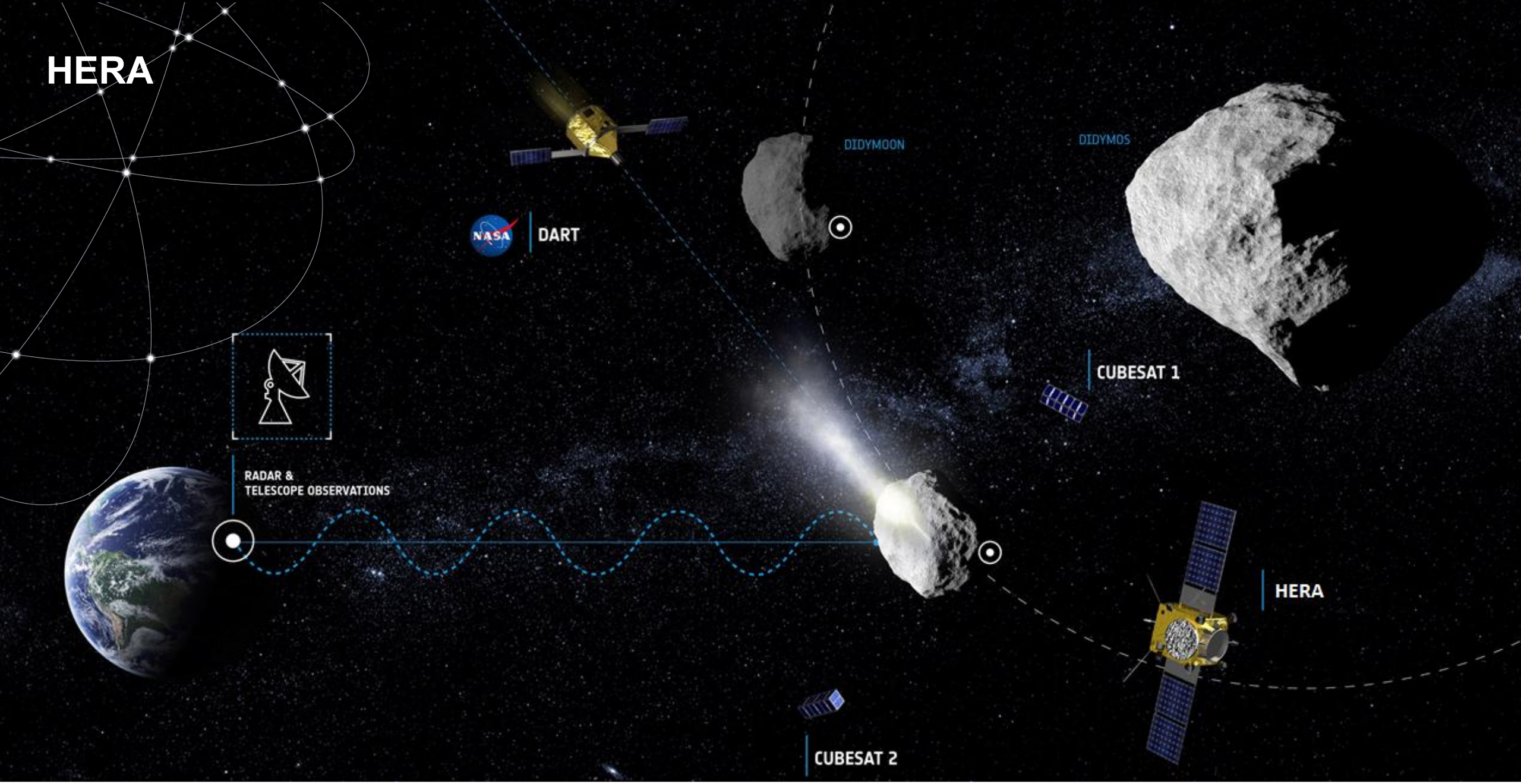
Space Debris

Clean Space

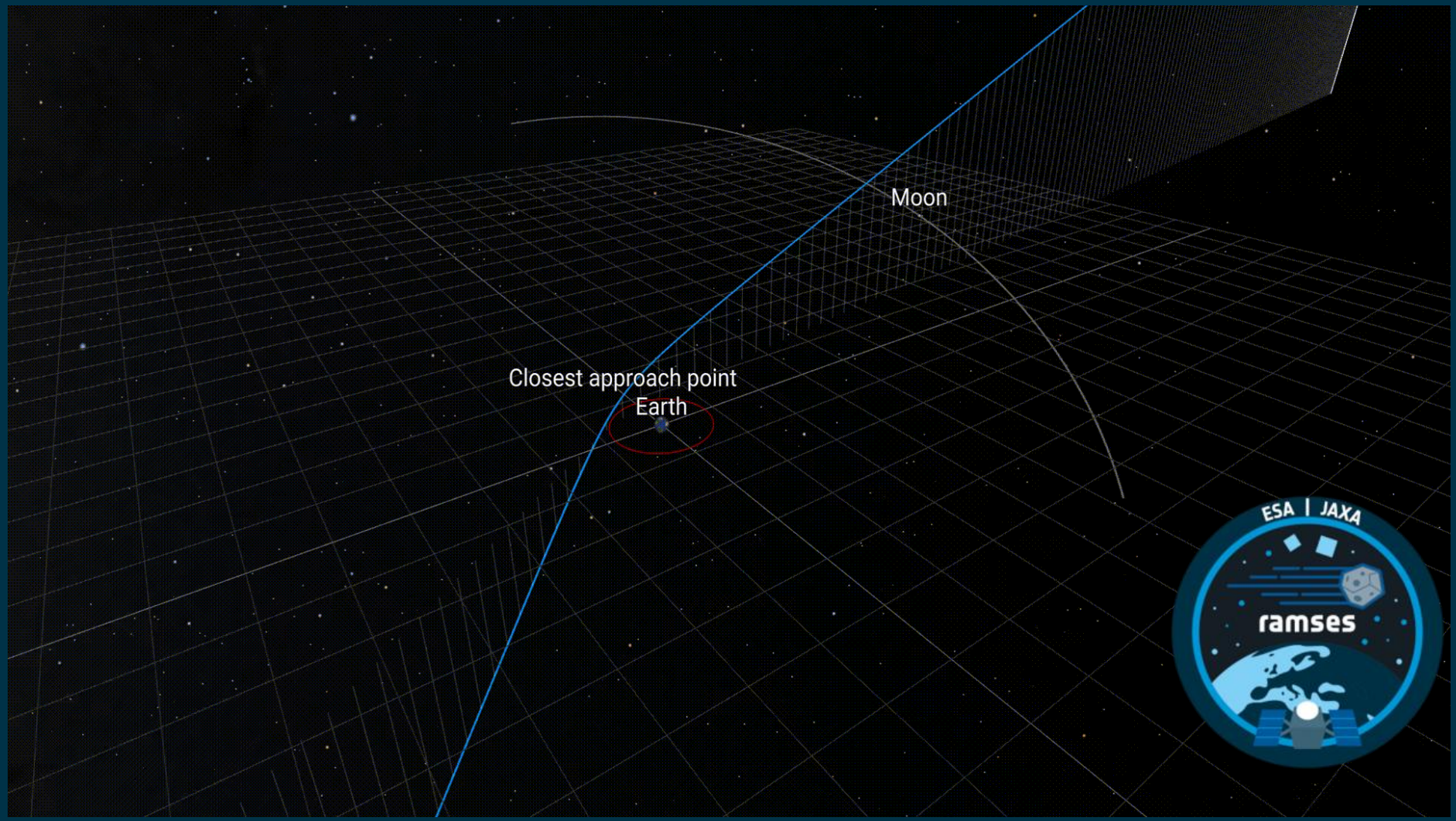


Vigil and Distributed Space Weather Sensors System (D3S)

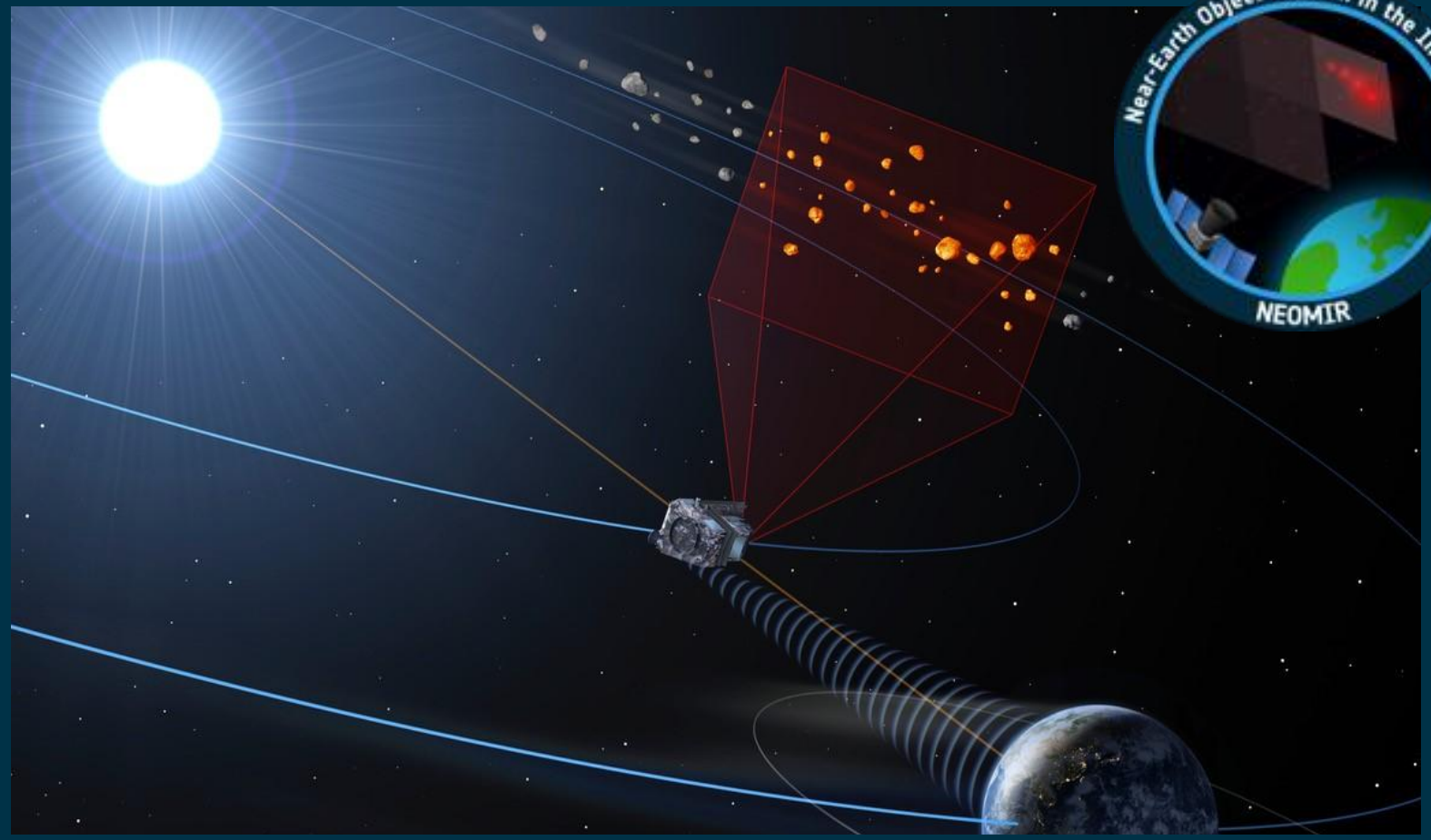



HERA
DIDYMOON
DIDYMOS
NASA
DART
CUBESAT 1
RADAR &
TELESCOPE OBSERVATIONS
HERA
CUBESAT 2

RAMSES



Early Warning is the key - NEOMIR

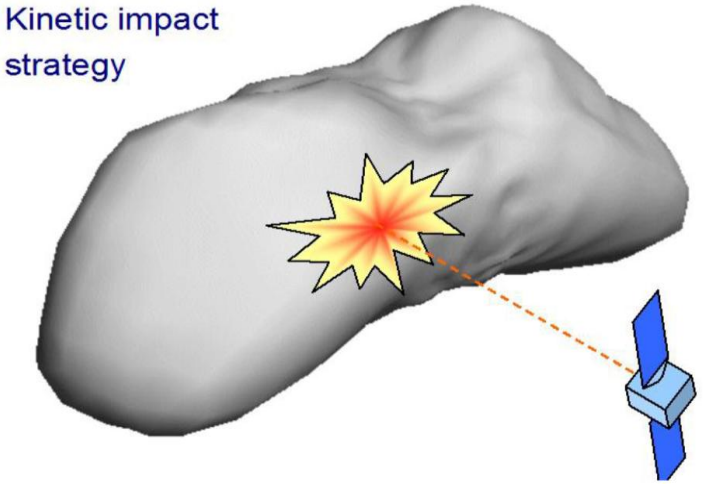


- Subsystem scope can reflect industry and national interest
- **Objective: implementation proposal ready for CMIN28**

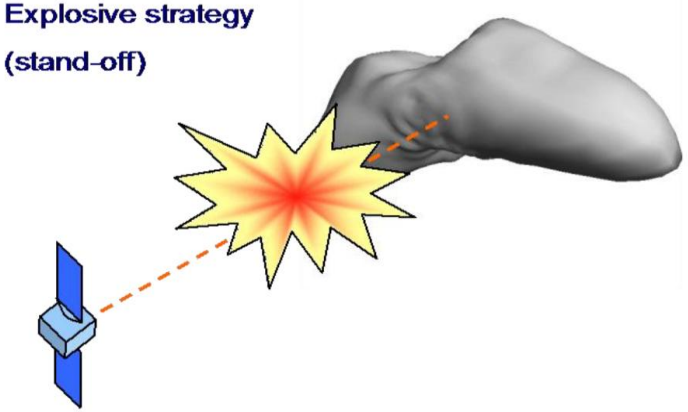
Ion Beam Shepherd Deflection of an Asteroid using ERO

High-push methods

Kinetic impact strategy

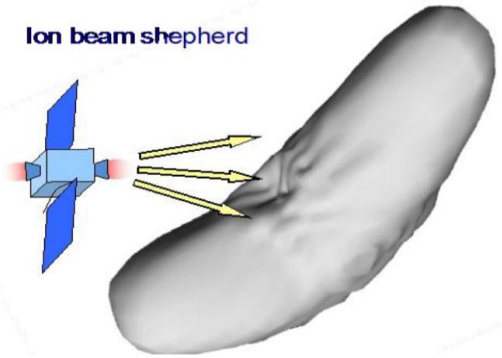


Explosive strategy (stand-off)

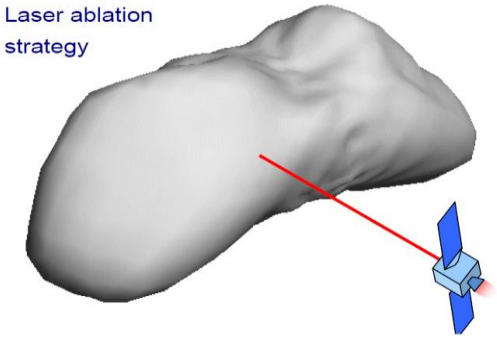


Slow-push methods

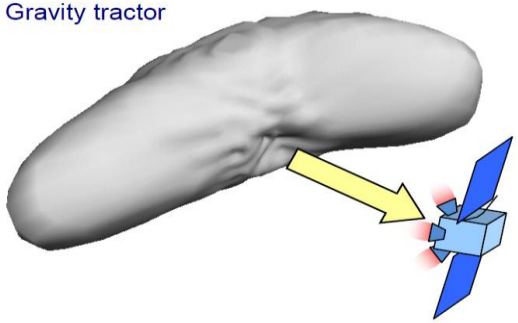
Ion beam shepherd



Laser ablation strategy



Gravity tractor



Credit ESA / Deimos Space

On the way to a circular economy in Space

Missions under development

DEBRIS REMOVAL

CS-1 Mission

SATELLITE REMOVAL

CAT Mission

INSPECTION

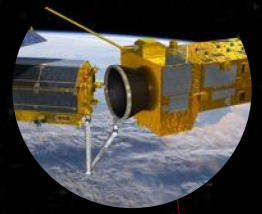
PRELUDE Mission

AOCS TAKEOVER/
LIFETIME EXTENSION

RISE Missions

PRE-PHASE A ACTIVITIES UNDERWAY

ERASE



ORUM

Upcoming Directorate of Operations presentations at ISD

- **OPS: Ground Systems Engineering and Innovation**
- **OPS: Services supporting Europe's most complex Space Missions**
- **OPS: Space Safety**

book a **face-to-face meeting**

with our OPS colleagues

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HOME OF SPACE SAFETY

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