Space Debris Mitigation Activities at ESA in 2019

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ESA Launches and Mitigation Efforts in 2019 (1/2)

EDRS-C

- Launch: August 6th, from Kourou (Ariane 5), GEO
- Mission: Oceanography and land-vegetation monitoring
- Data relay for Earth Observation Data from LEO
- Ariane 5 and Adapter cleared GEO but remain on GTO

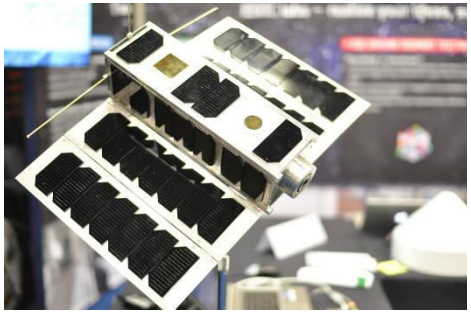
Debris Mitigation Efforts by ESA in 2018 (2/2)

Cheops

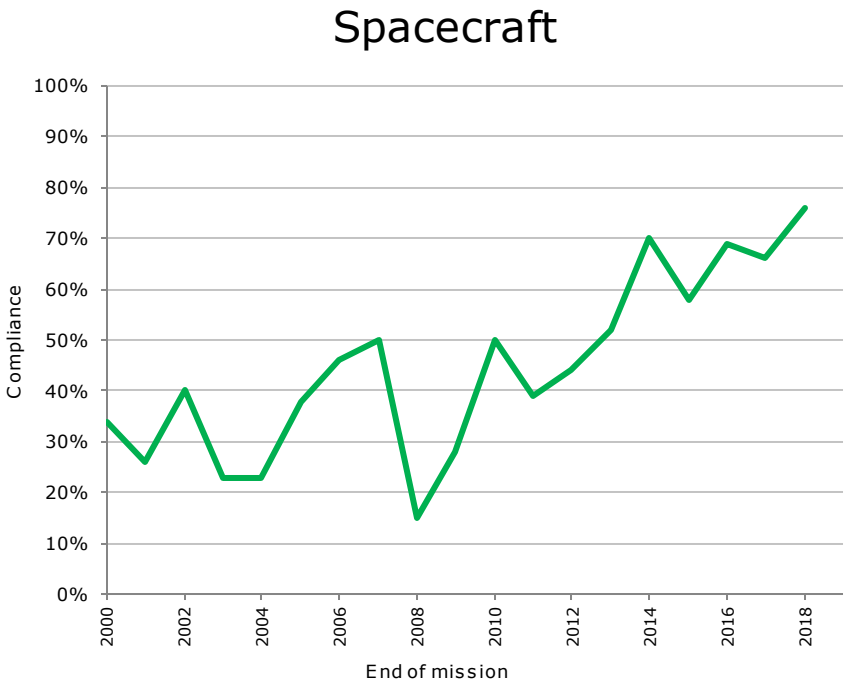
- Launched: December 18th, 2018 Kourou (Soyuz Fregat)
- 712km x 695km @ 98.23°
- Mission: Characterisation of exoplanets
- Soyuz stage performed direct re-entry

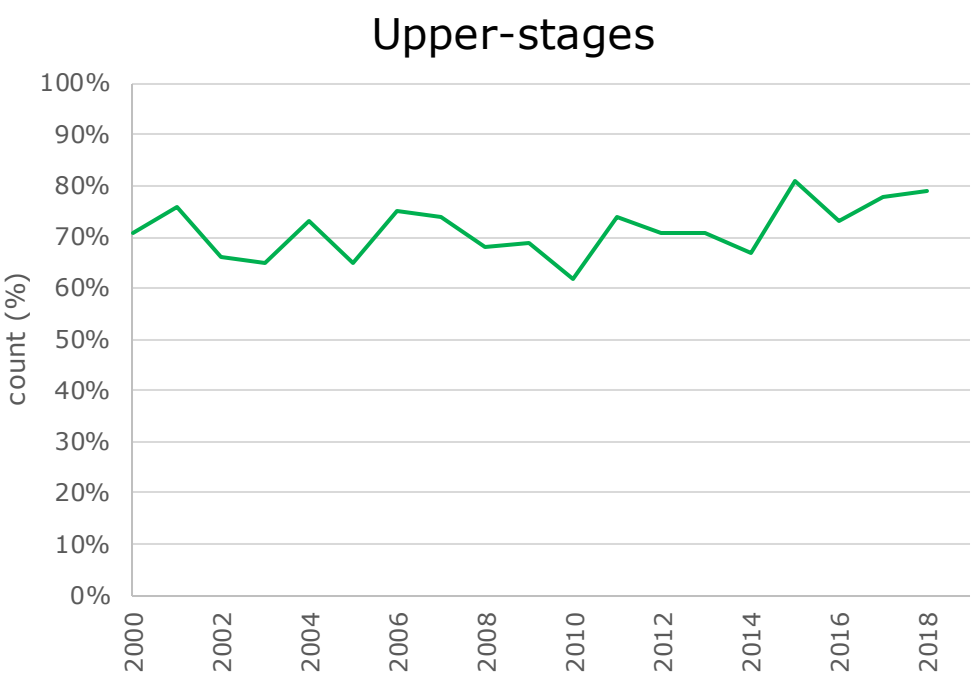
OPS-SAT

- Launched together with Cheops
- 531km x 510km @ 97.46°
- Mission: Technology Demonstration
- Will comply, naturally, with 25 year rule



Post Mission Disposal in LEO



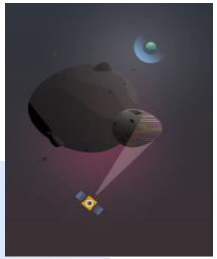


https://www.sdo.esoc.esa.int/environment_report/Space_Environment_Report_latest.pdf

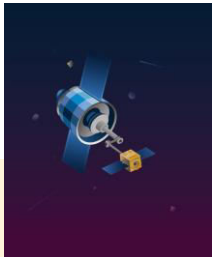
Main Activity Areas and Cornerstones

1 **Core**

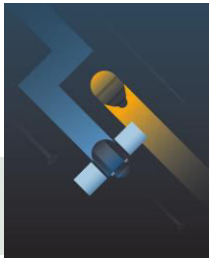
2 **Lagrange Mission**



3 **HERA**



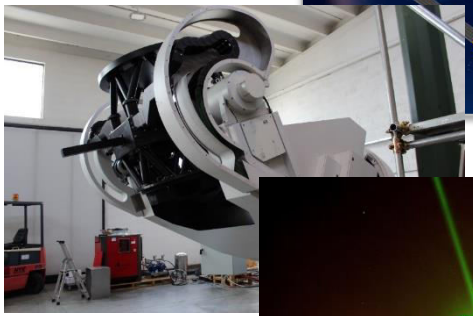
4 **ADRIOS**

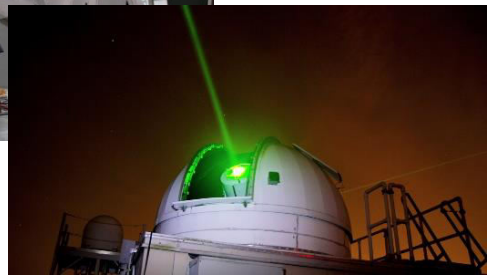


5 **CREAM**

1 Core

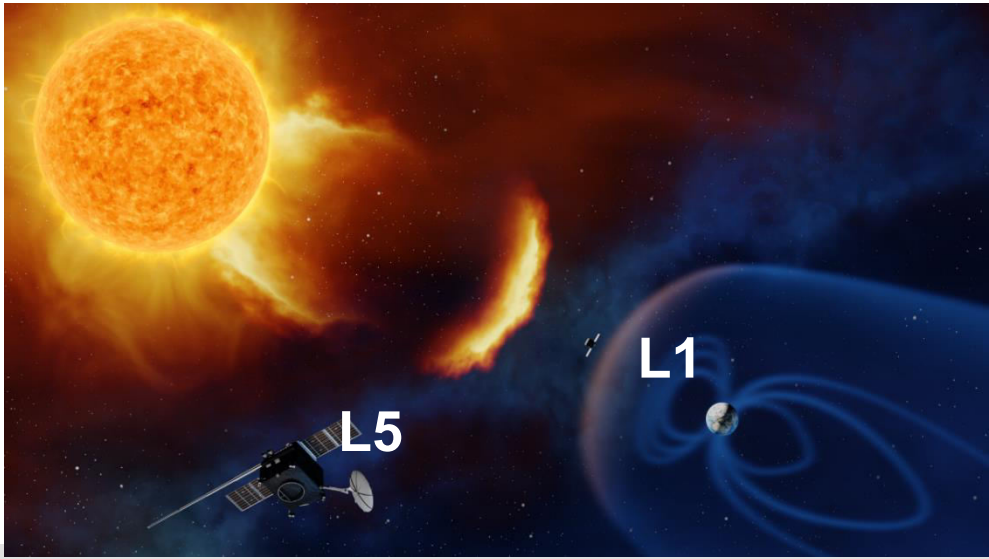
- Fundamental activities in the areas of Space Weather, Planetary Defence, Space Debris and Cleanspace
- Highlights:
  - Space Weather Service Network
  - Distributes space weather sensor system
  - Fly-Eye Telescope
  - Orbital debris sensor
  - Laser tracking to space debris targets





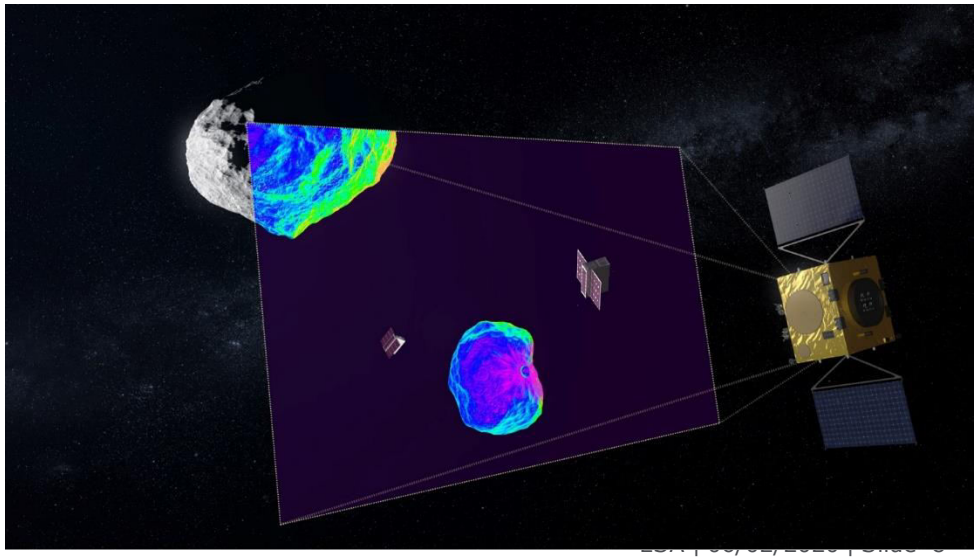
2 Lagrange Mission

- First ever operational Space Weather mission (outside of the Earth-Sun line)
- Deep collaboration with NOAA/NASA
- Launch in 2027
- First mission to L5



3 HERA

- Asteroid inspection and interception test (jointly with NASA DART)
- Launch in 2024
- 2 interplanetary cubesats

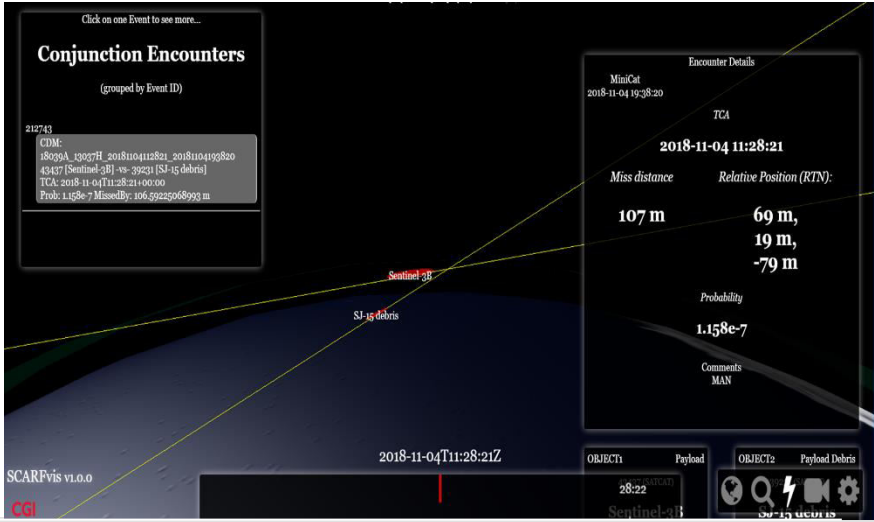


4 In-Orbit Servicing/Removal Mission

- First ever removal of a piece of space debris
- Funded significantly above threshold
- End-to-end contract as industrial service with contributions by investors
- Removal target: VESPA

5 CREAM

- CREAM = Collision Risk Estimation and Automated Mitigation
- Automated decision taking, alternate uplink routes, conflict-free maneuvering
- Successful machine learning competition held
- Demonstration by 2023



Space Sustainability Rating

- Purpose:
  - Serve as a design metric which allows a mission to minimise its impact on the space environment
  - Provide a link with the long term evolution of the space environment
- In 2019 a consortium was formed to define a Space Sustainability Rating
  - World Economic Forum, Massachusetts Institute of Technology, Bryce Space and Technology, The University of Texas at Austin, the European Space Agency