



Space for Education & Development

Sandra Benítez Herrera

**Education Scientist and ESAC
Communication Officer**

How does the European Space Agency contribute to the SDG?



The International Space Station, the world's largest-ever international scientific venture. The partnership includes the USA, Russia, Canada, Japan and Europe.



The Explorers and Their Challenge

1. EXPLORE THE UNIVERSE

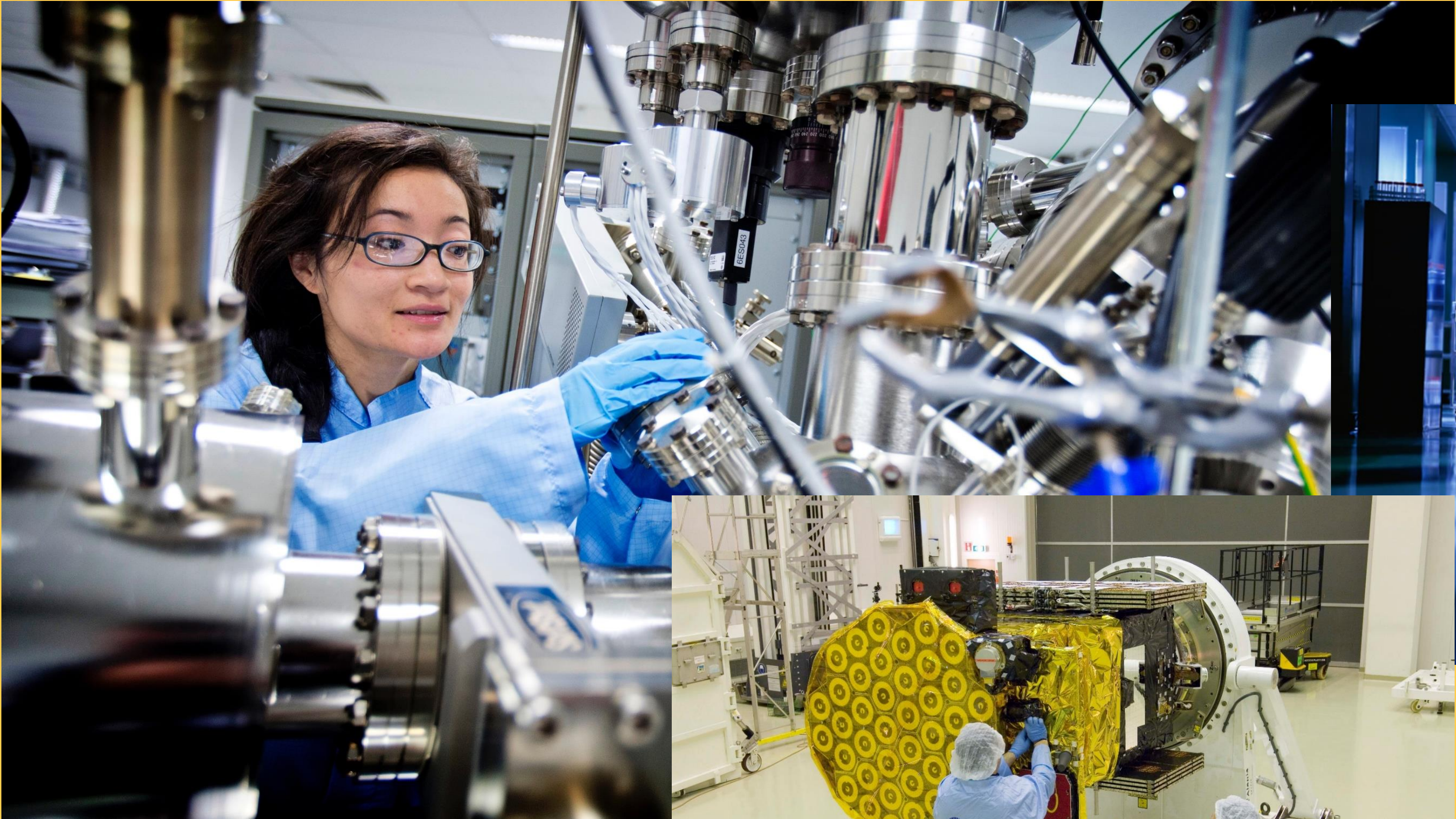
2. IMPROVE LIFE ON EARTH

...WHILE SERVING
PEACEFUL PURPOSES

- Europe's Spaceport,
Kourou, French Guiana
- Webb launch
- @ 25 Dec 2021



- ESTEC, The Netherlands



Taking Control



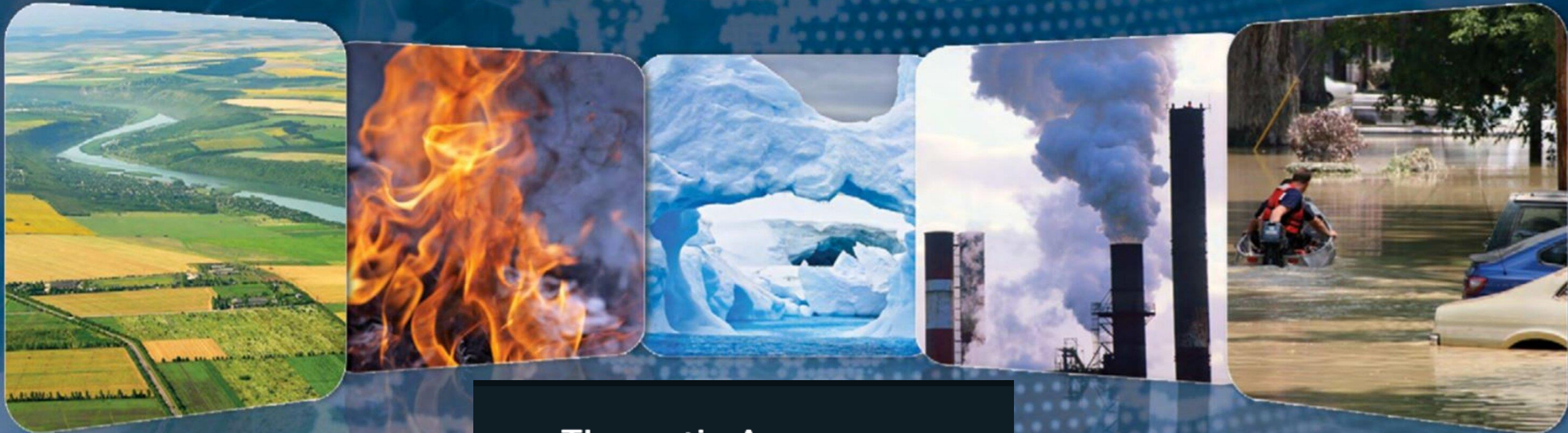
- ESOC
Control Room

Germany

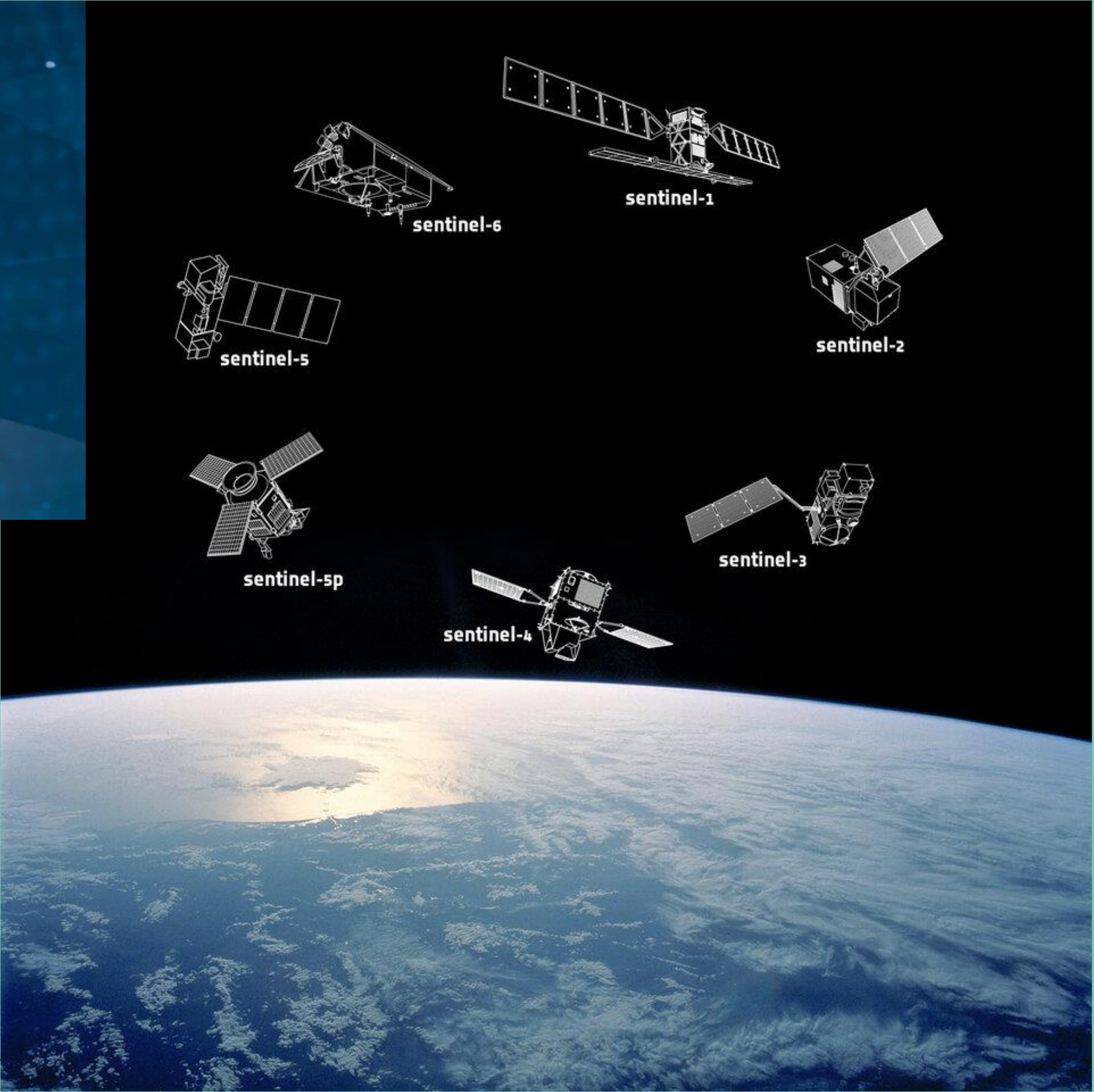


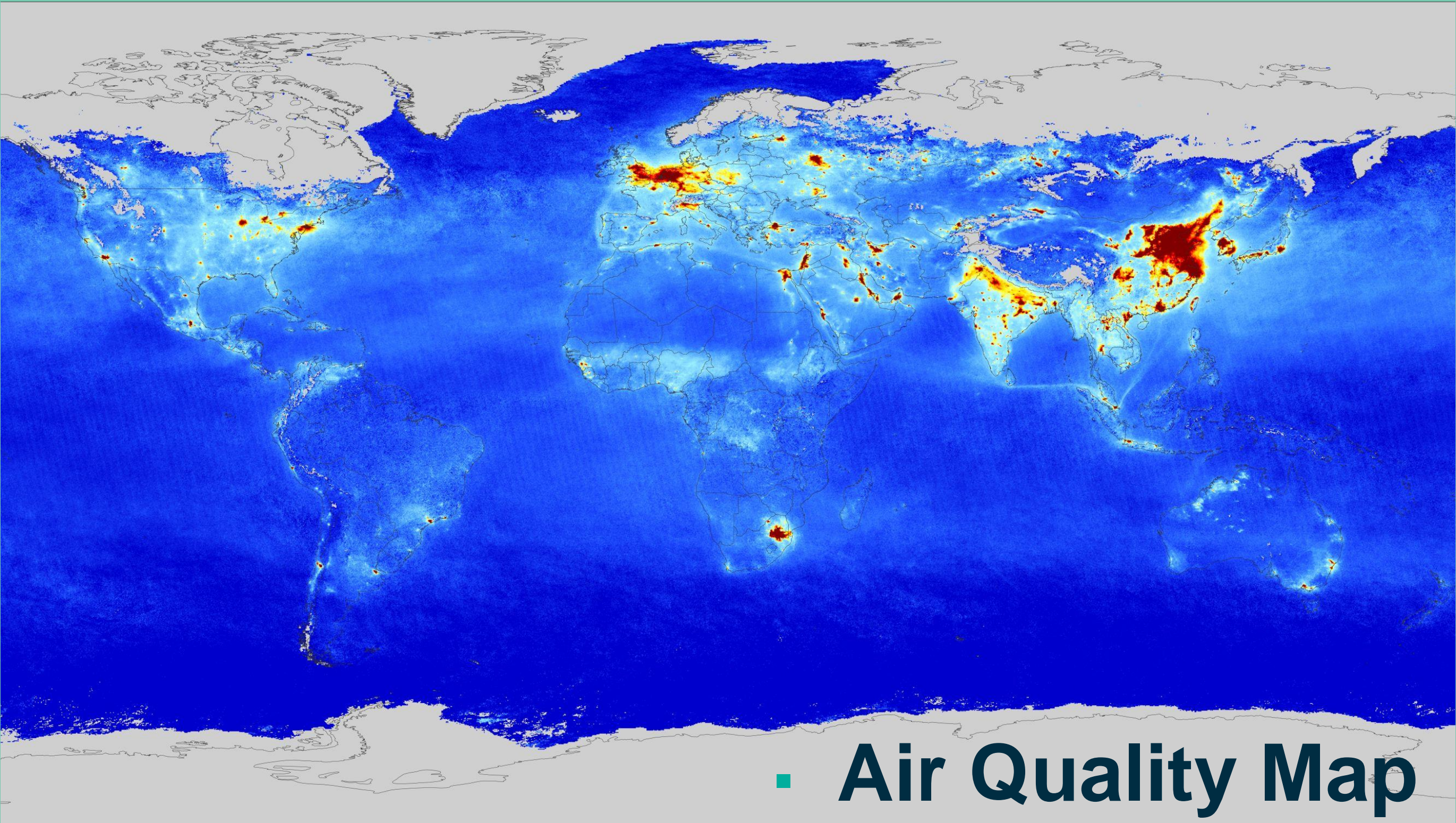
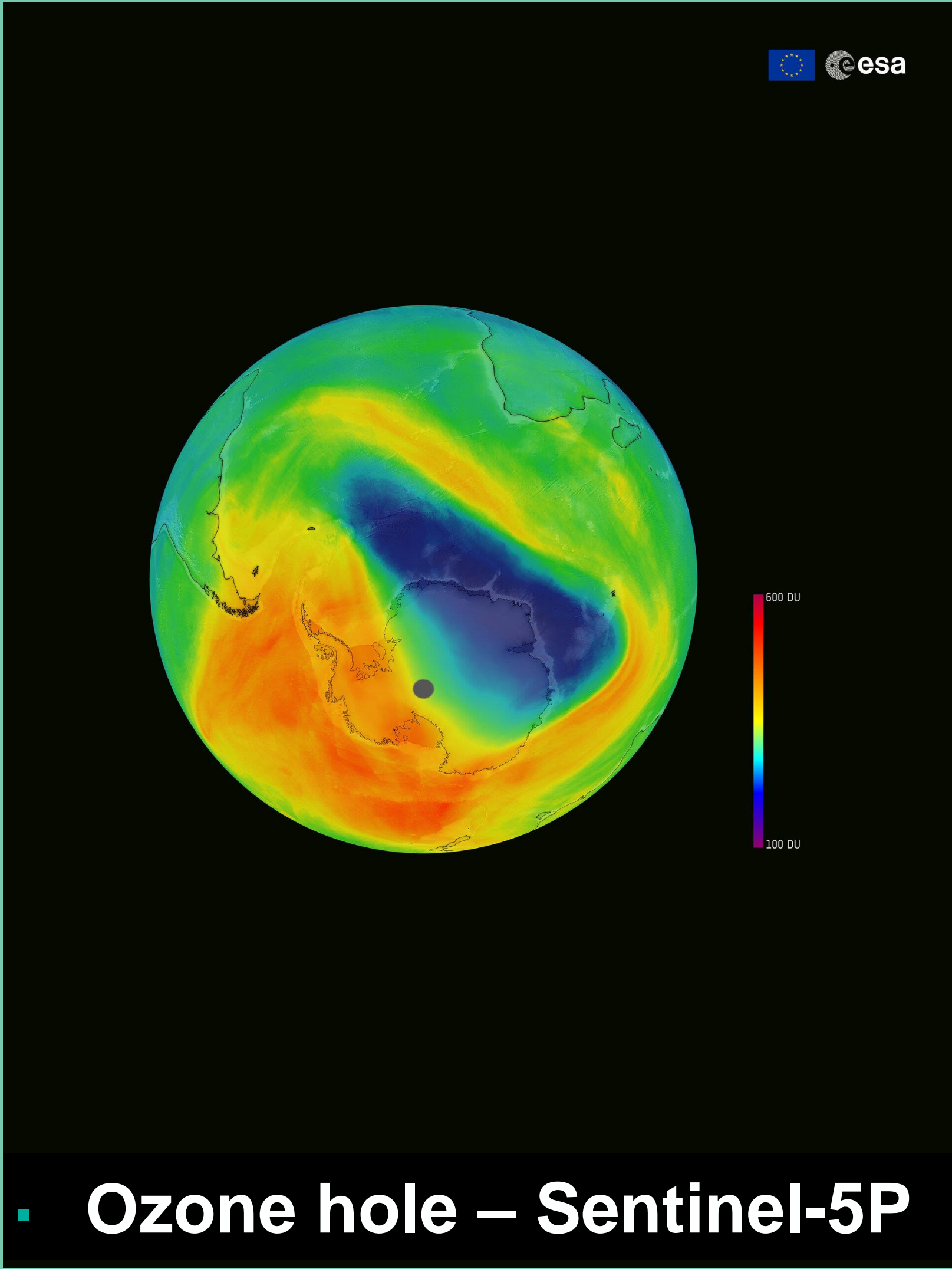
-
- A large radio telescope dish is shown at night, illuminated from below. The dish is a complex structure of white metal trusses supporting a dark, curved surface. It is positioned on a hillside with trees in the background. A crescent moon is visible in the dark blue sky to the left of the dish. The foreground shows a dark, textured ground surface.

Copernicus and Sentinel Programmes

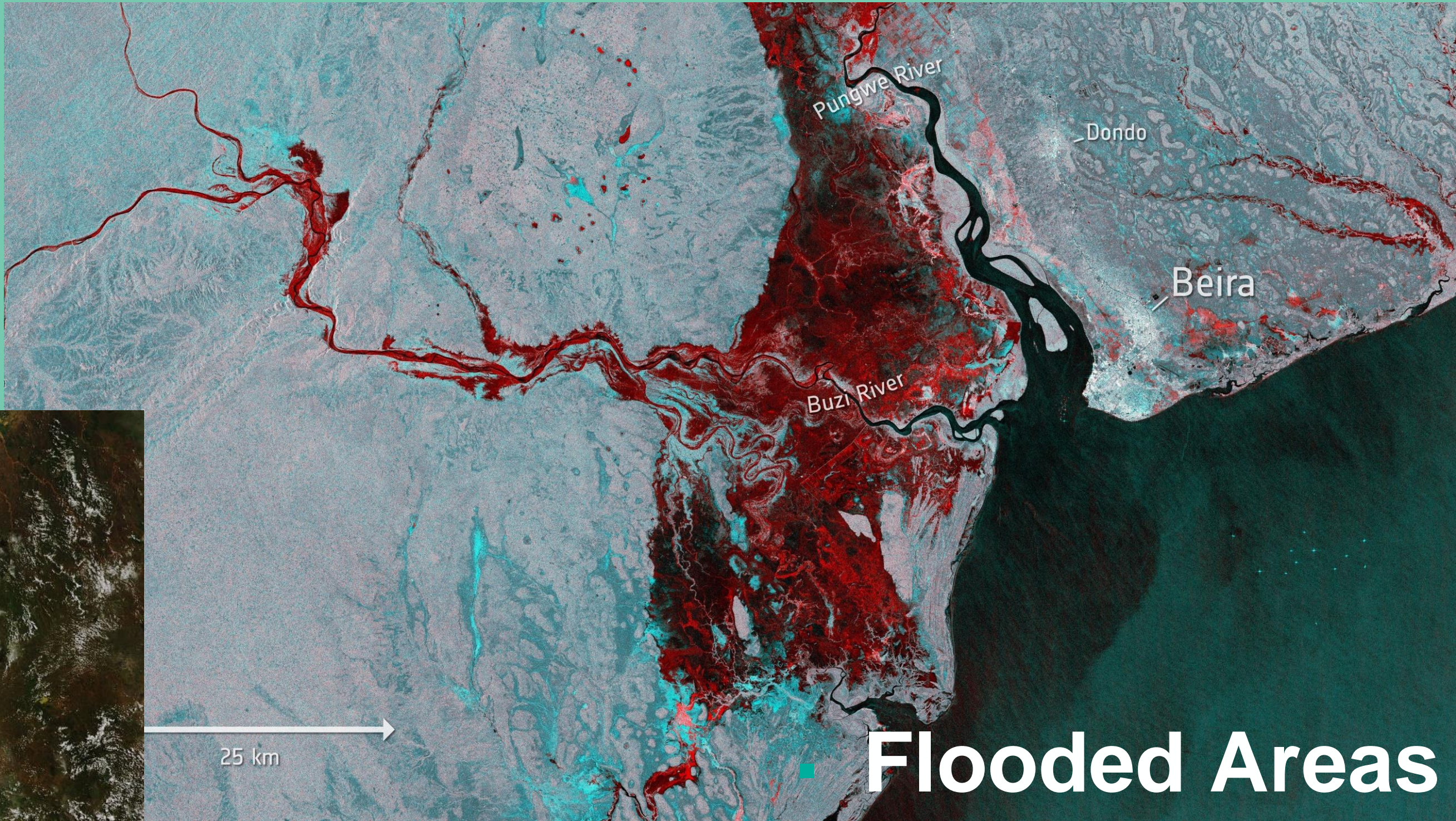
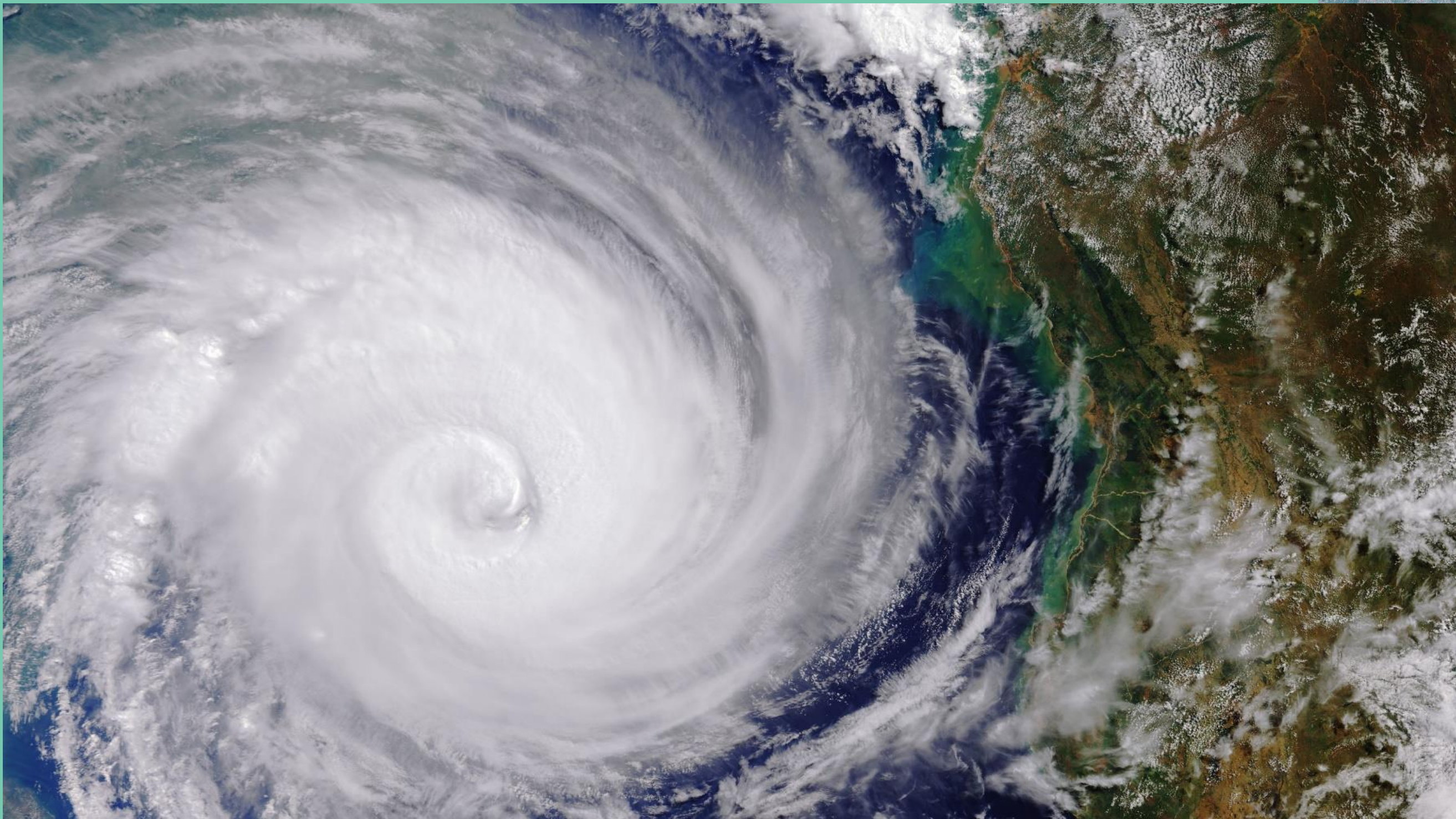


Thematic Areas	
Land Monitoring	→
Marine Monitoring	→
Atmospheric Monitoring	→
Emergency Management	→
Security	→
Climate Change	→





- Cyclone Idai and Sentinel-3

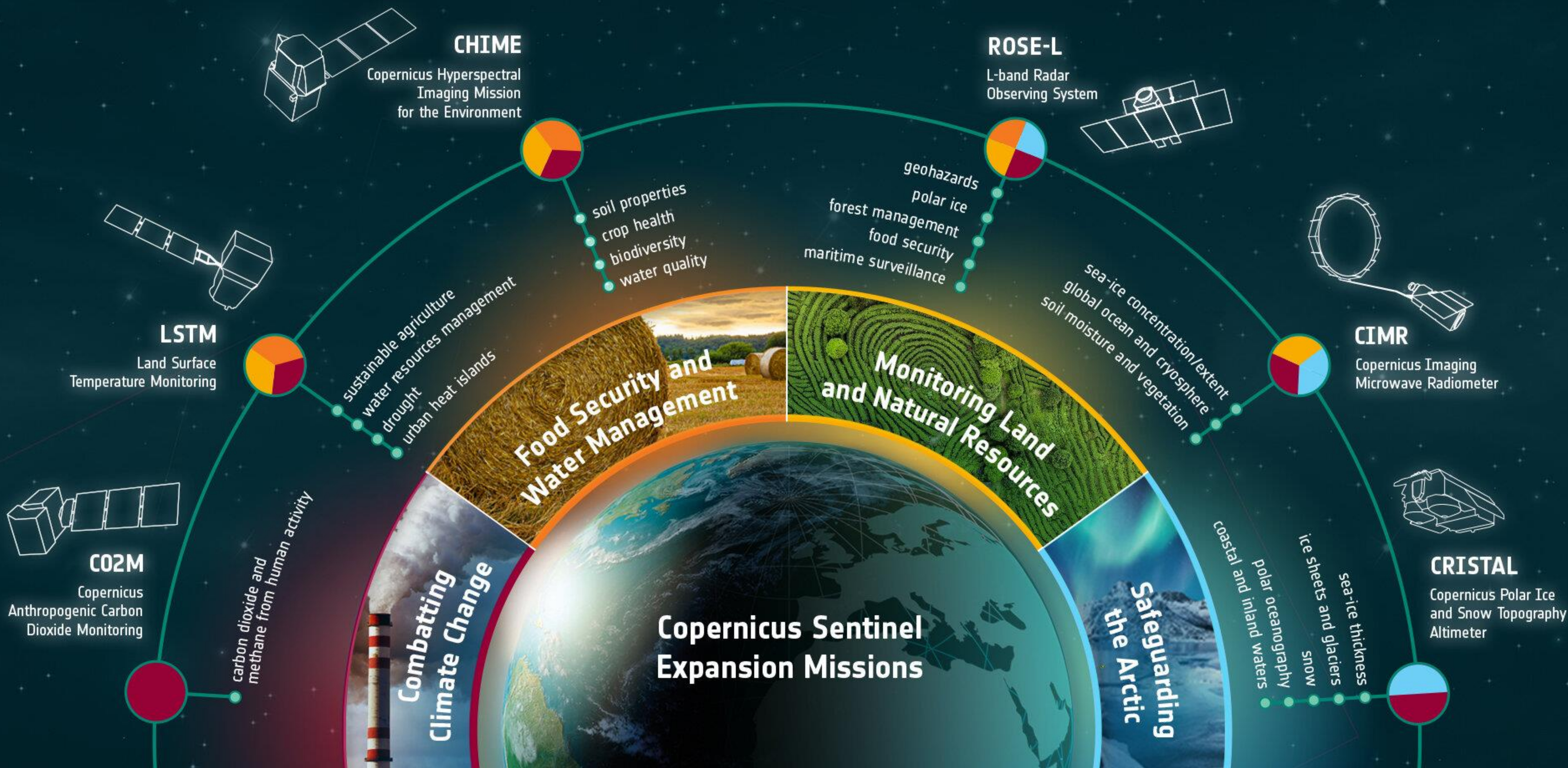




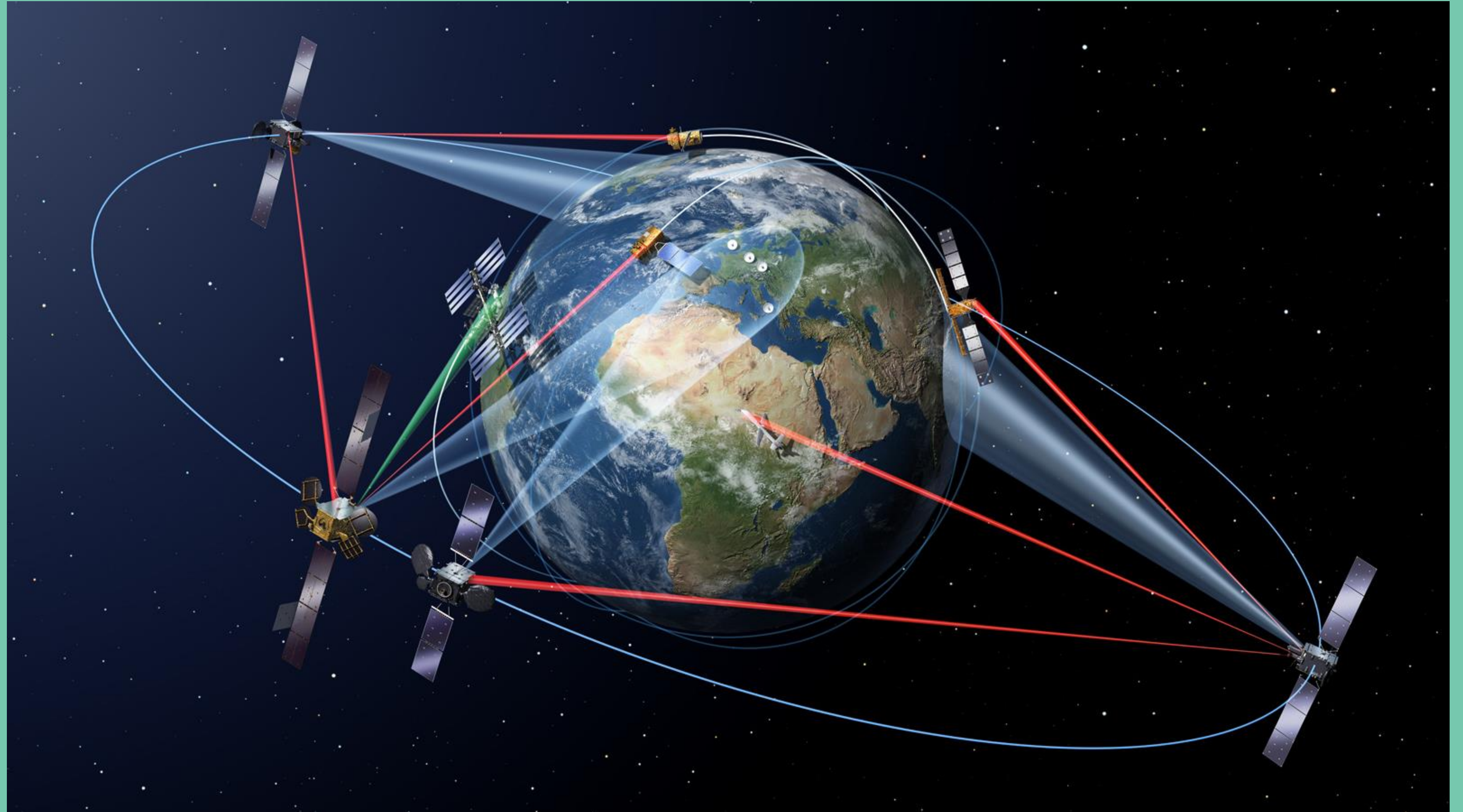
PROGRAMME OF THE
EUROPEAN UNION



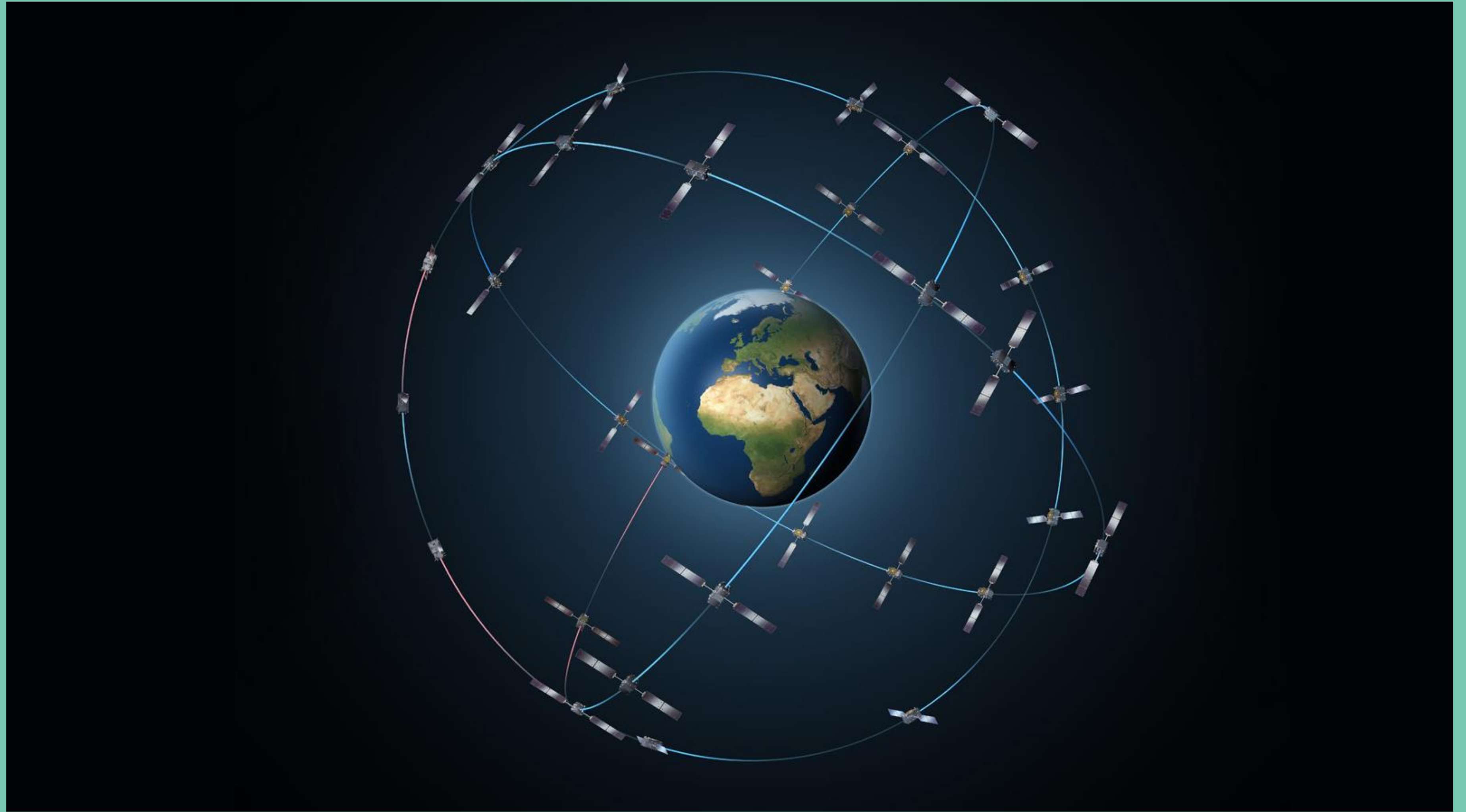
co-funded with



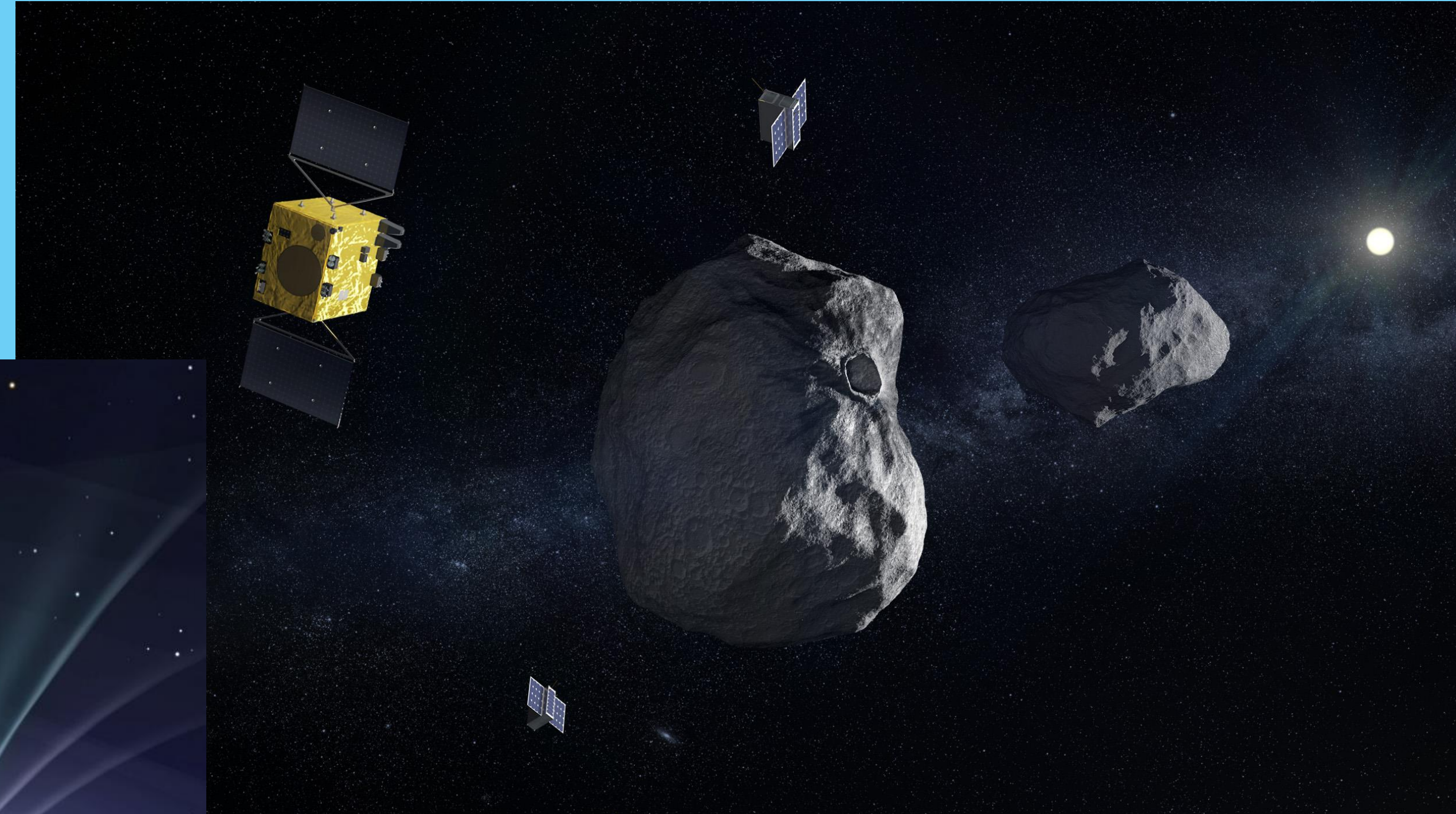
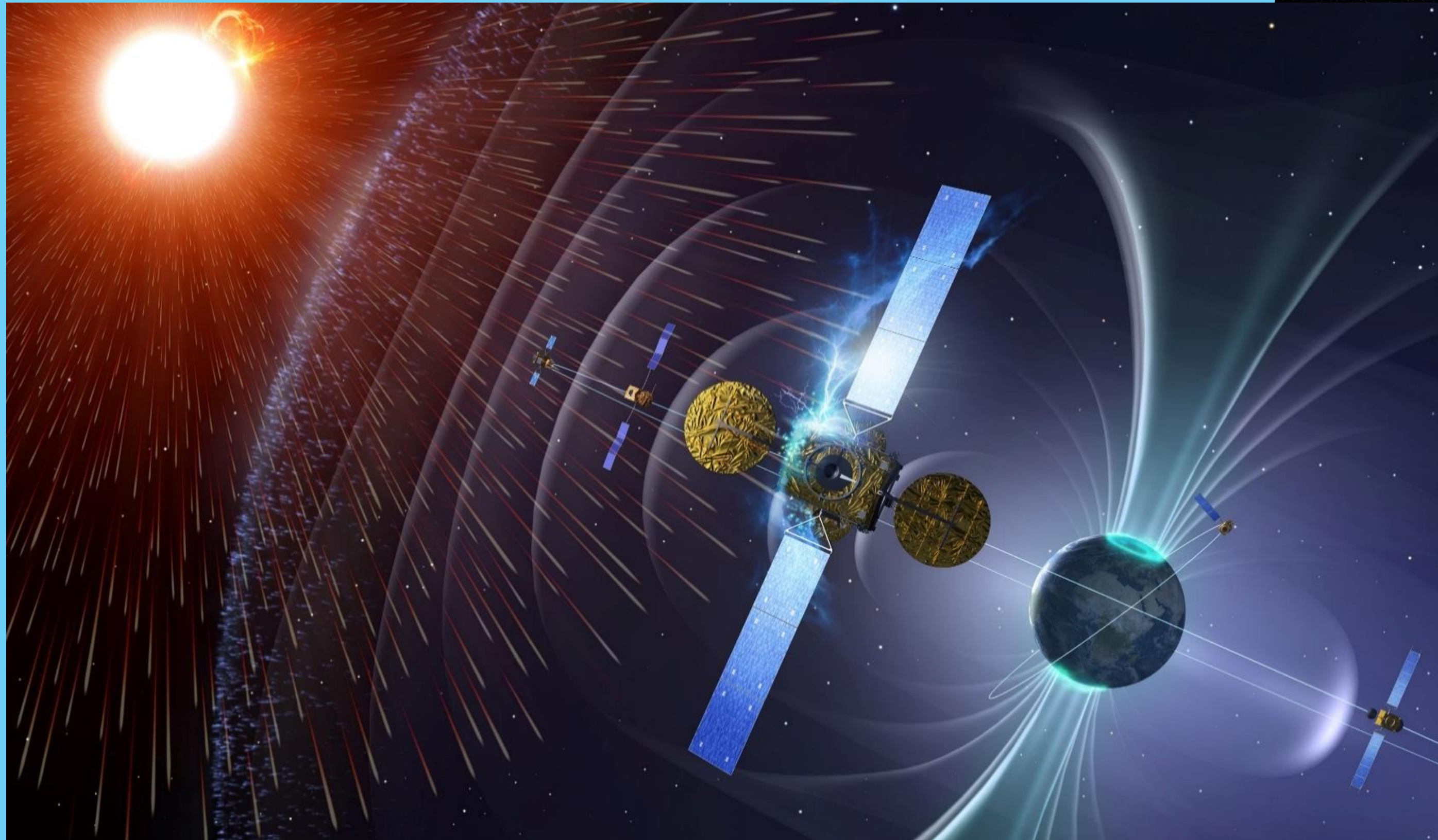
- EDRS
Global



- **Galileo
Constellation**



- Hera



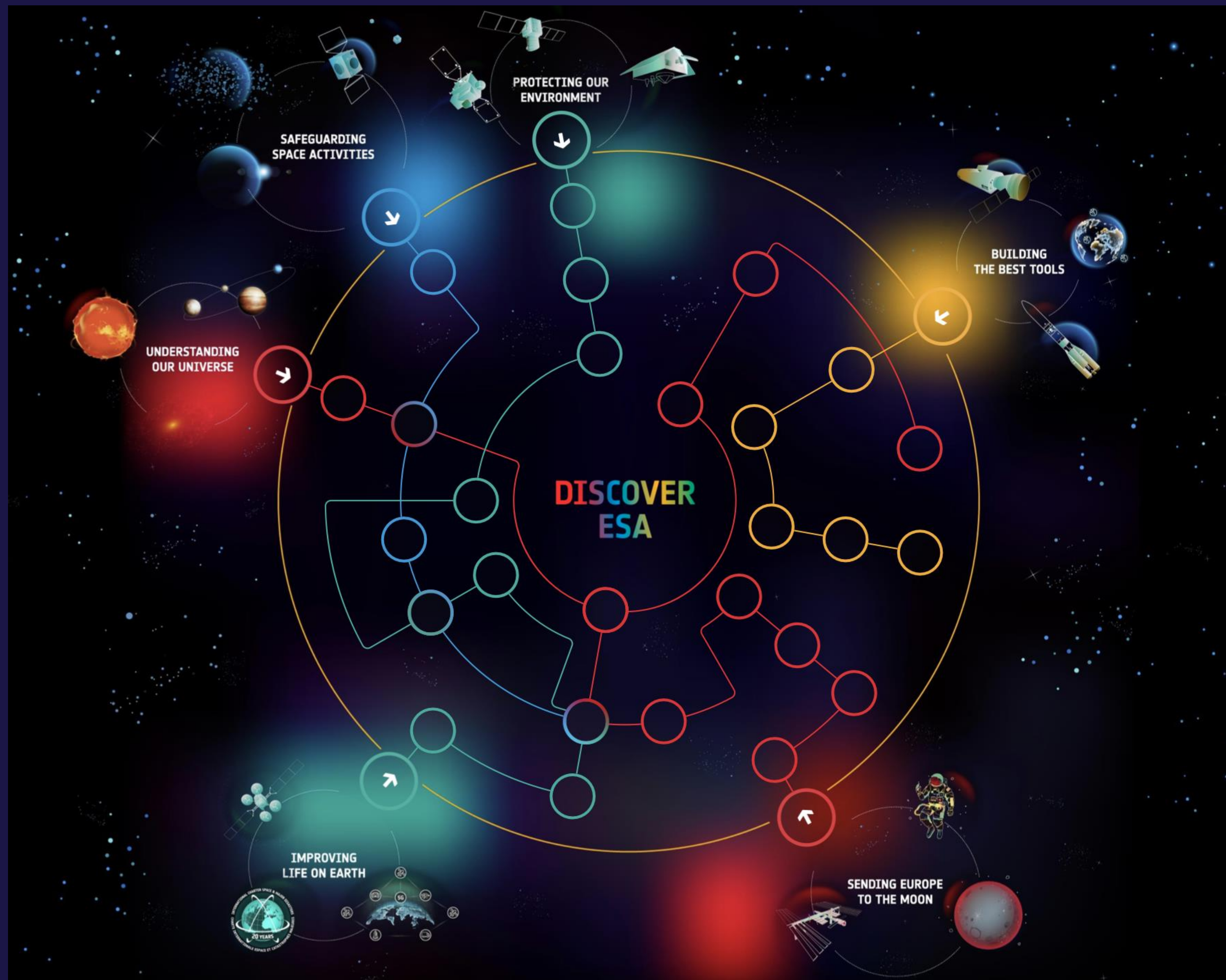
- Space Weather

As the **space debris** environment steadily worsens, ESA is ensuring future **sustainable utilisation of space** by developing the ability to avoid collisions, mitigate the occurrence of any new space debris and fostering a new European industrial capacity to conduct in-orbit servicing.



ESA's space debris resiliency efforts include developing and demonstrating:

- AI-based technology to enable automated collision avoidance
- New data-processing, cataloguing and automation tools shared with European partners
- Novel sensor and monitoring technology for radars, laser ranging and space-based optical sensors



<https://discover.esa.int>

SPACE FOR PLANET

Interview



" Space helps us prepare coastal zones from rising sea water "

Emmanouela Ieronymidi, Project manager
Planetek Hellas, Athens, Greece

In order to mitigate the climate change impacts, our project for a European Coastal Flood Awareness System (ECFAS) uses the Sentinel satellites of the European Union's Copernicus programme, as well as images offered by ESA through the third-party missions' programme. The high revisit frequency and high spatial resolution of the Copernicus Sentinel-1 and Sentinel-2 satellites are used to monitor coastal areas affected by coastal floods, the changes in land use, land cover and the position of the shoreline.



<https://www.space4ourplanet.org>

AGENCY

Education

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Primary classroom resources

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Secondary classroom resources

Teach with space related articles



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European Space Education Resource Office

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The CESAR Project



Cooperation through Education in Science and Astronomy Research

Sandra Benítez Herrera
Education Scientist and ESAC Communication



The CESAR Team



Gaitee Hussain



Vicente Navarro



Sandra Benítez



Ildefonso Vera



Cristina de Rojas



Rosa Pulido
Beatriz González
Juan Ángel Vaquerizo



Miguel Mas-Hesse



✓ Where are we?



@ESAC (European Space Astronomy Center)

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Main Goals

- ✓ Foster interest in Space Sciences and Technology
- ✓ Use of real data in the classroom
- ✓ STEAM scientific vocations, critical thinking, scientific culture

✓ How do we do this?

Teacher Training courses: National and International

Content development using Inquiry-based learning

Astronomy-outreach events

Telescope operation and remote access for schools



Visits to ESAC



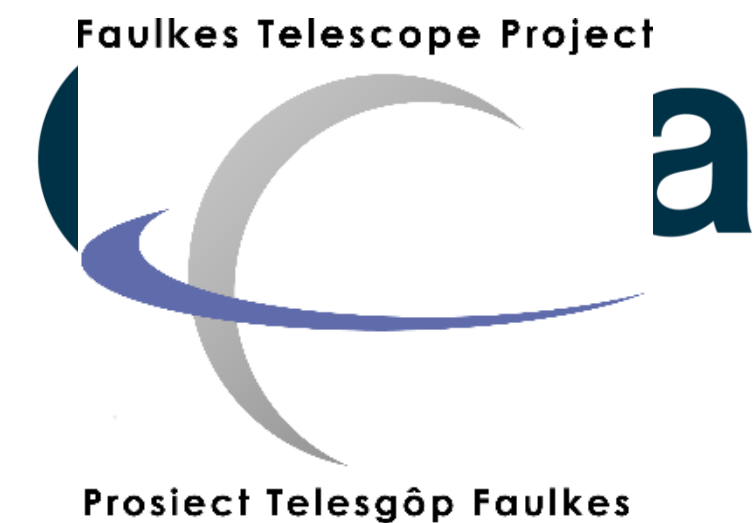
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✓ ESAC on-line visits





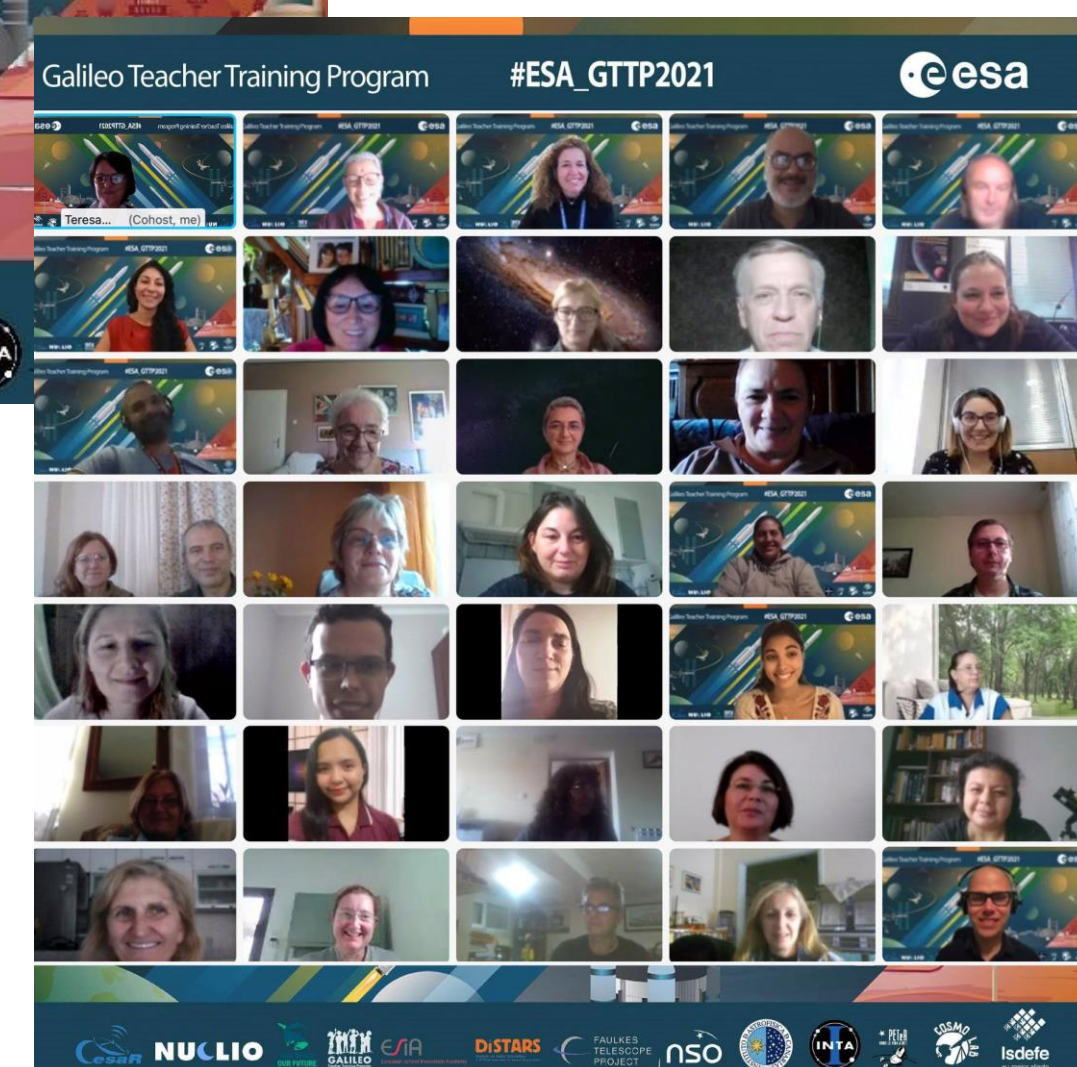


173 participants
from 54
countries

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134 participants from 36
countries



European Space Agency



Critical Thinking

- It makes us wonder about the deepest questions of the Cosmos.
- Using the scientific method we have been able to reconstruct cosmic evolution.

- We wish to pursue the truth, no matter where it leads.
- We will be careful to distinguish speculation from fact.

The colours of Astronomy

The secrets of Galaxies

The interstellar medium

Science Cases with ESASky

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European Space Agency

Galileo Teacher Training Program

#ESA_GTTP2021

Beatriz González García

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Curso dirigido al profesorado
La Agencia Espacial Europea:
estudiar el Sol para viajar al interior
de las estrellas

15 - 18 November 2021



Curso dirigido al profesorado
La Agencia Espacial Europea:
aproximación al estudio de la Tierra

21- 24 February 2022



Curso dirigido al profesorado
La Agencia Espacial Europea:
pequeños cuerpos del sistema solar

4 - 7 April 2022



Curso dirigido al profesorado
La Agencia Espacial Europea:
el Cosmos desconocido

23 - 26 may 2022

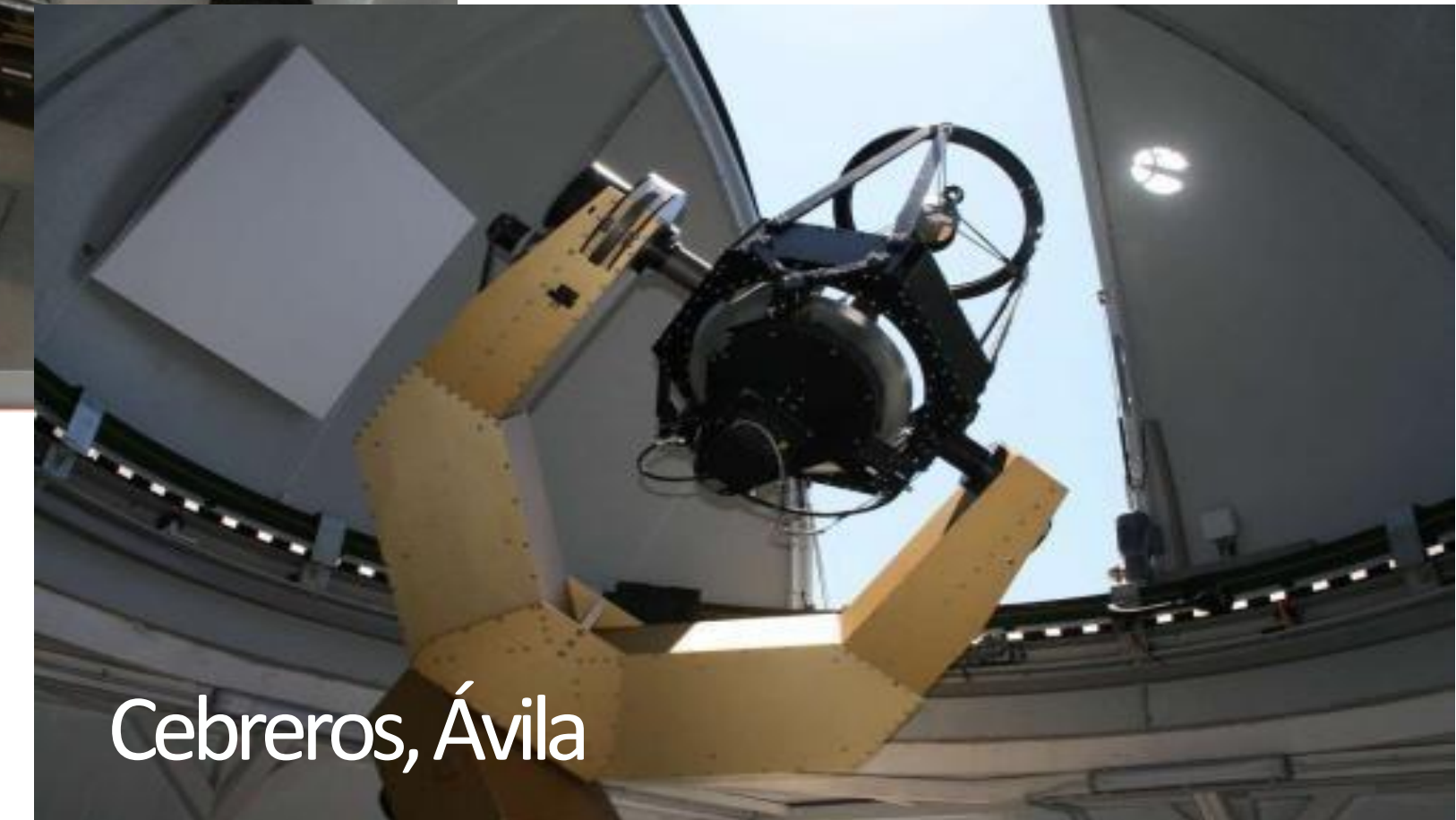
✓ Our Observatories



Solar H-alpha
9 cm
10 cm



2x optical 30 cm



Cebros, Ávila

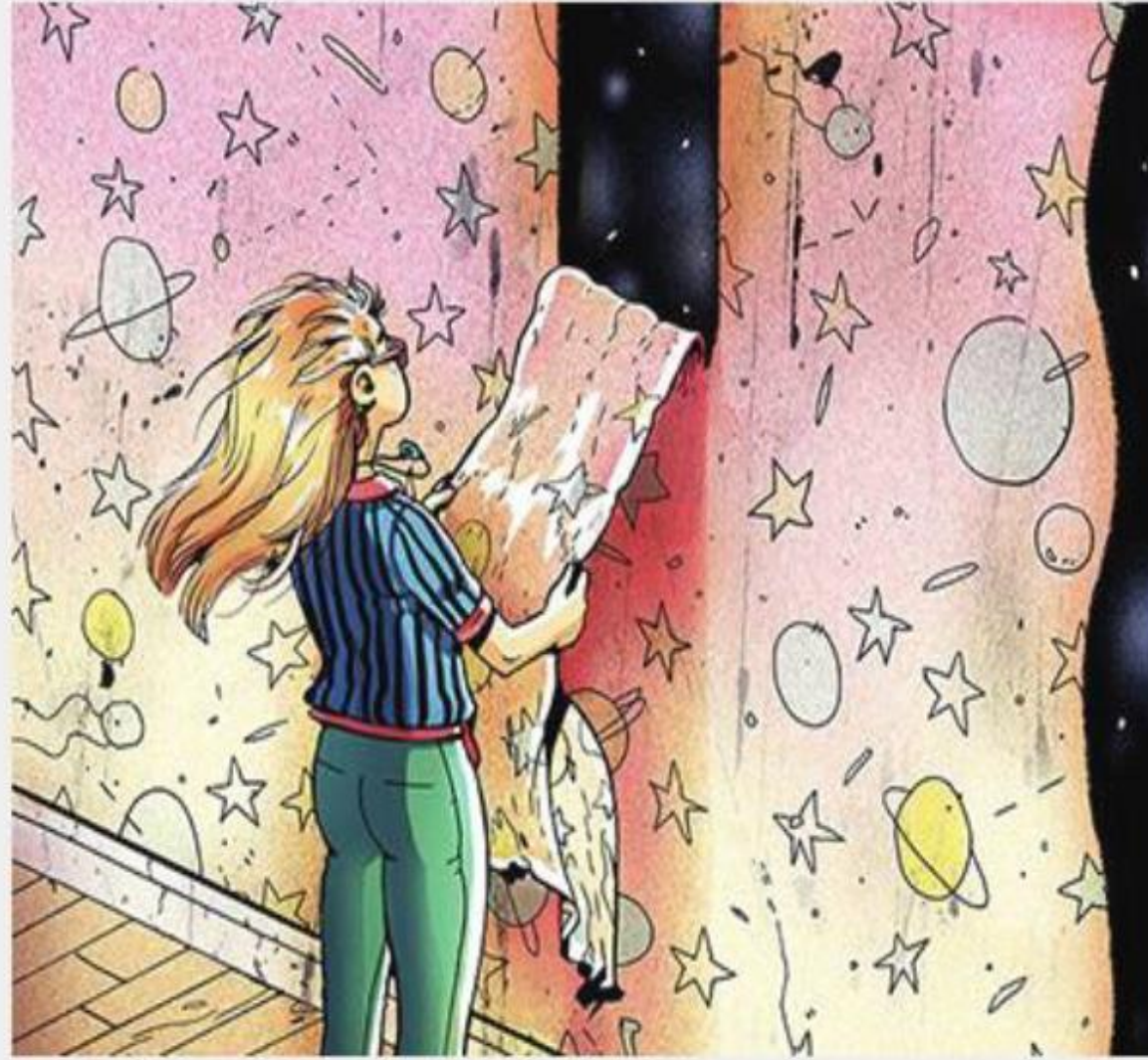


Cubesat
Antenna



Radio frequency Antenna
15 m
S-Band

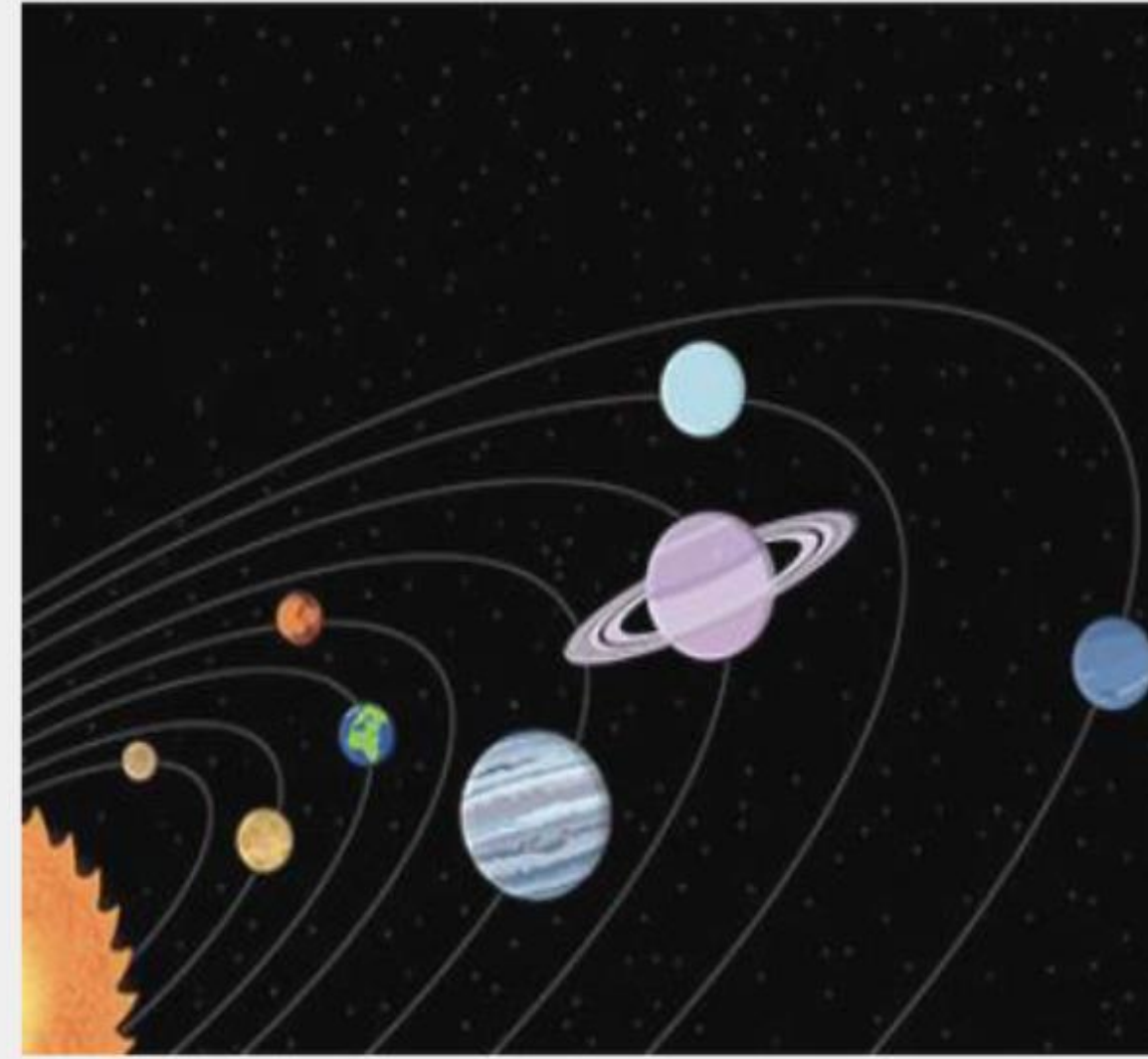
Basic



Fundamental knowledge of the Universe at one-click distance! Without formulae or complicated Math, simple as it is.

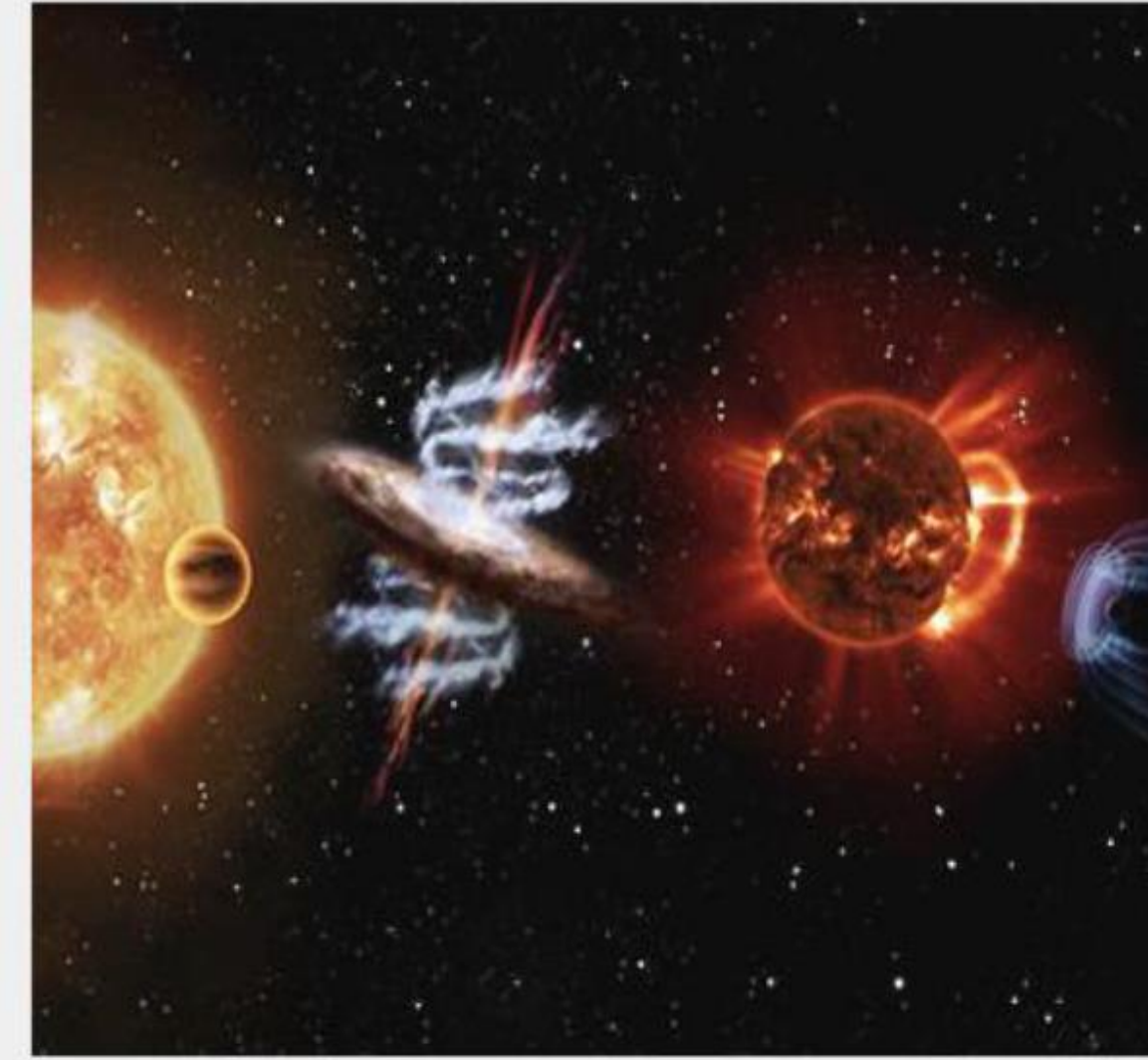
Credits: Nautilus

Intermediate



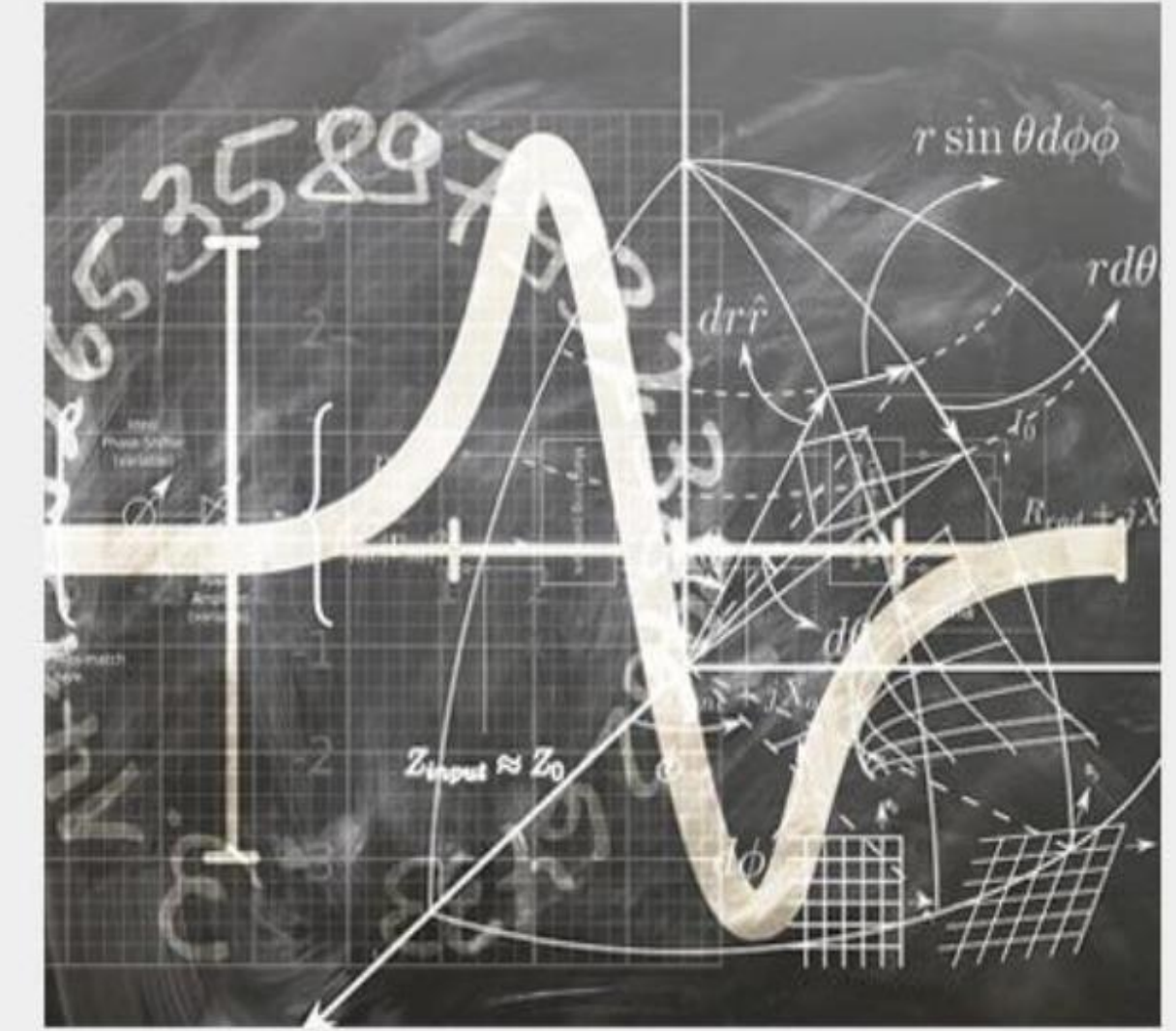
Basic Physics crafting the Cosmos! The next step to expand your knowledge of our Universe with some basic concept and formulae.

Advanced



Go one step forward! Put all your knowledge of Physics and Math to use. Skip no detail, and experience the Universe from end to end.

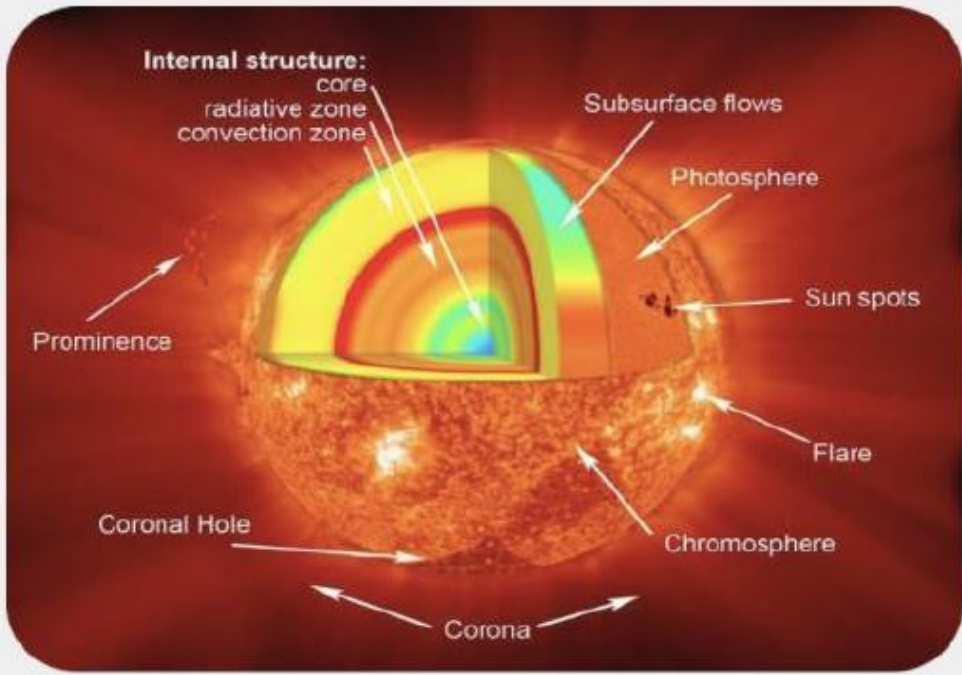
Super Hero



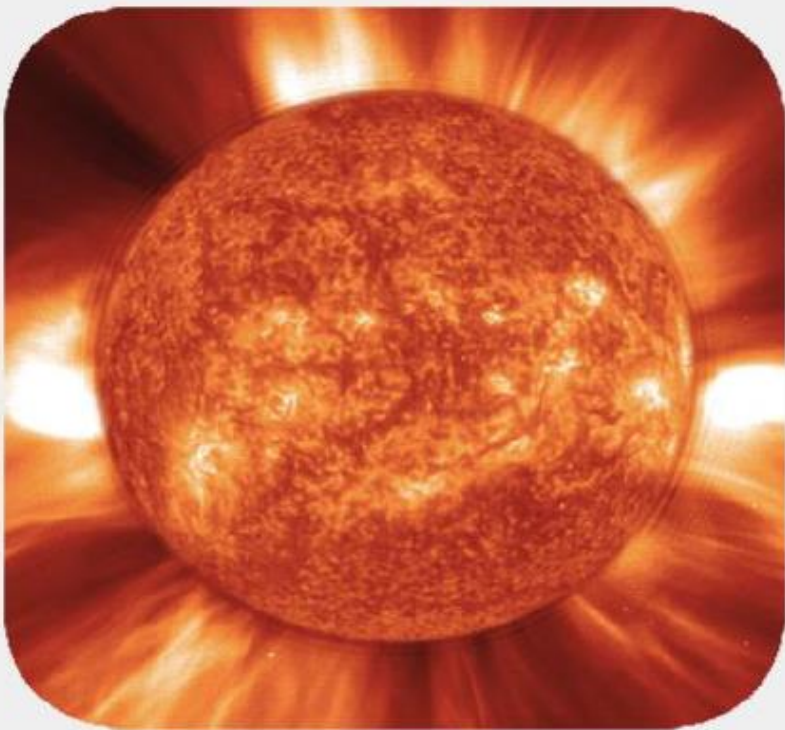
The real pro-level! Science as it is. Advanced Physics, high-level Math, and programming. Use every tool available to reveal the mysteries of the Universe.



THE STRUCTURE OF THE SUN



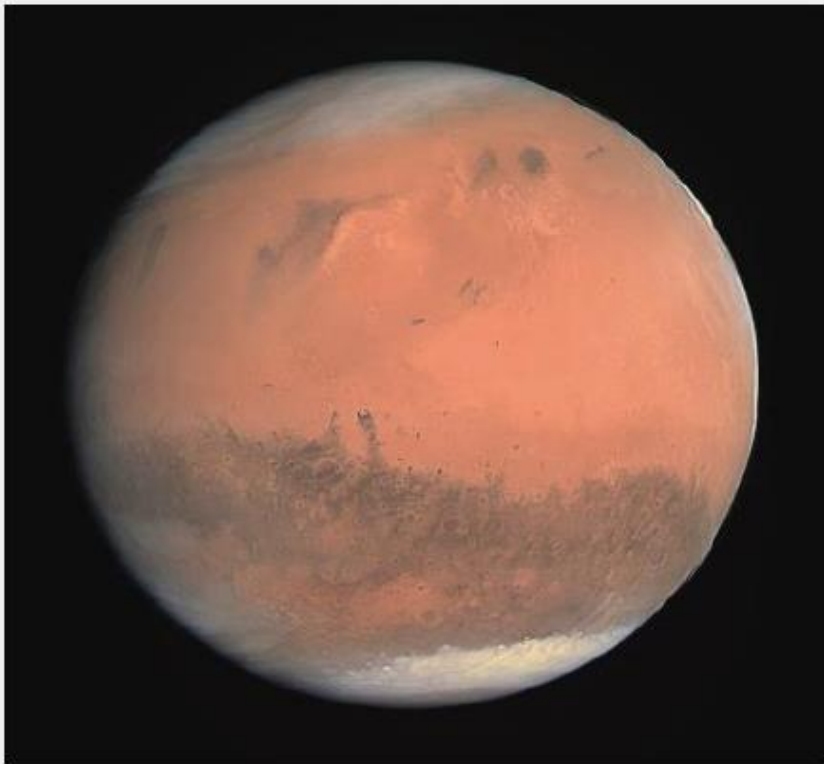
THE MAGNETIC SUN



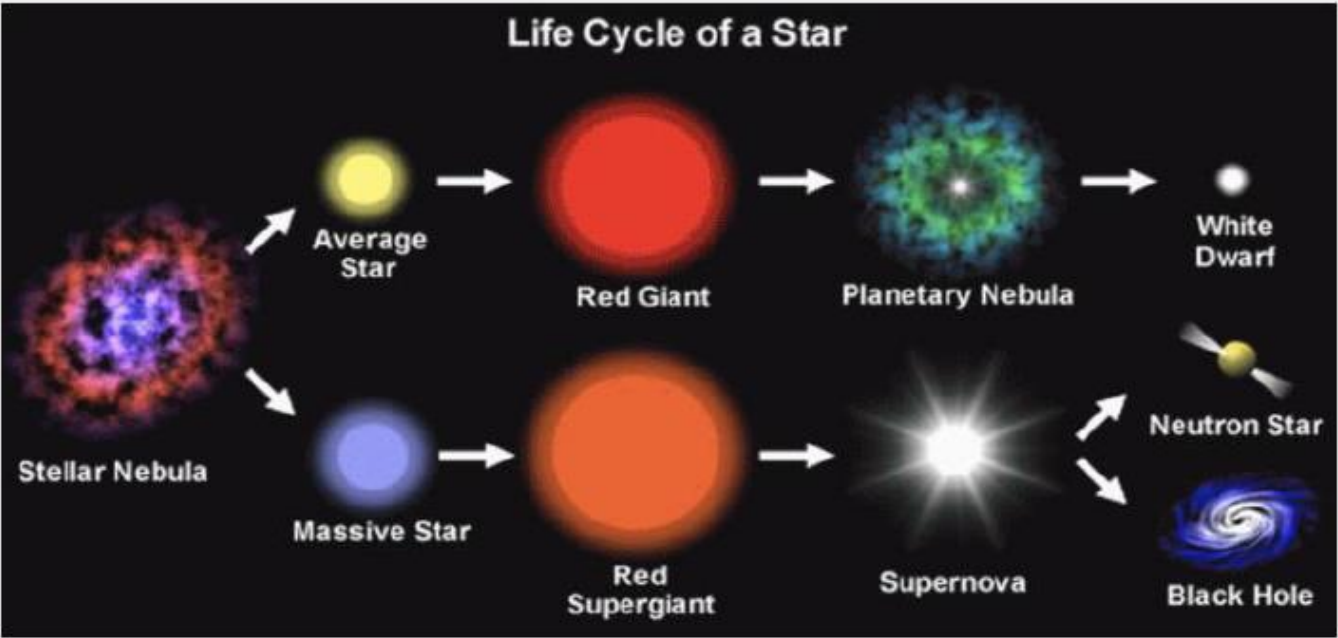
THE SOLAR SYSTEM



MARS



THE EVOLUTION OF THE STARS



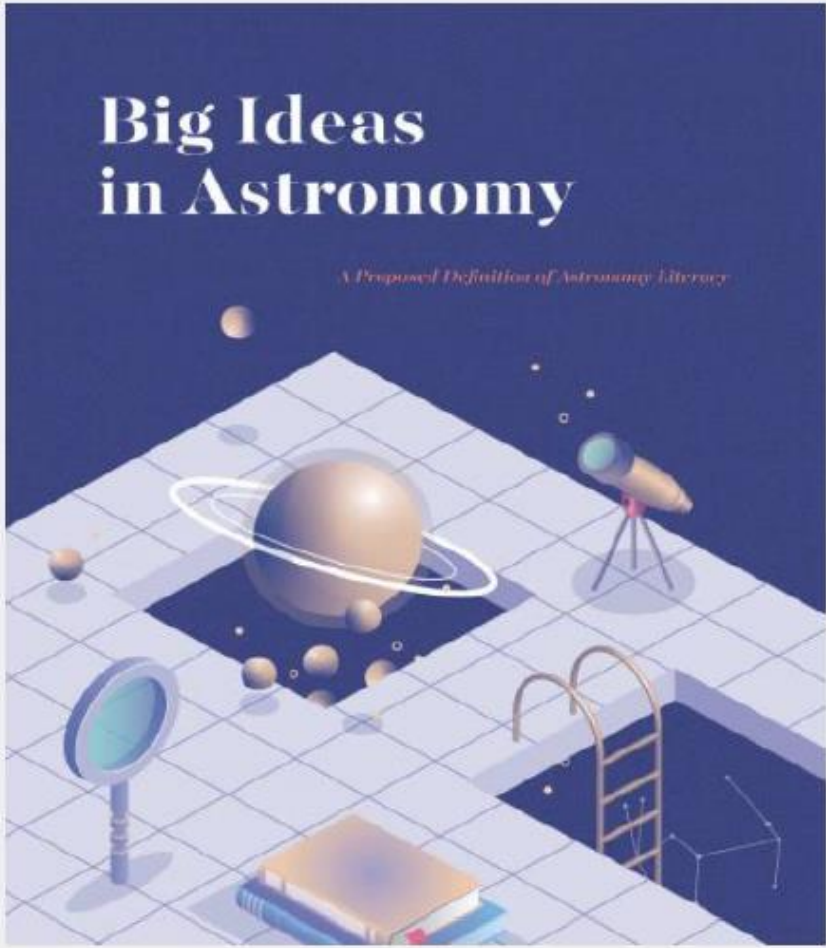
GALAXIES



THE INTERSTELLAR MEDIUM



BIG IDEAS IN ASTRONOMY





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Space Science Experiences

SSE @ ESAC



ON-LINE SSE



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Welcome to the on-line SSE

European Space Agency

ENHORABUENA, HAS COMPLETADO LA FASE 1. BIENVENID@ A LA FASE 2



Online Space Science Experience



Fase 1

Fase 2

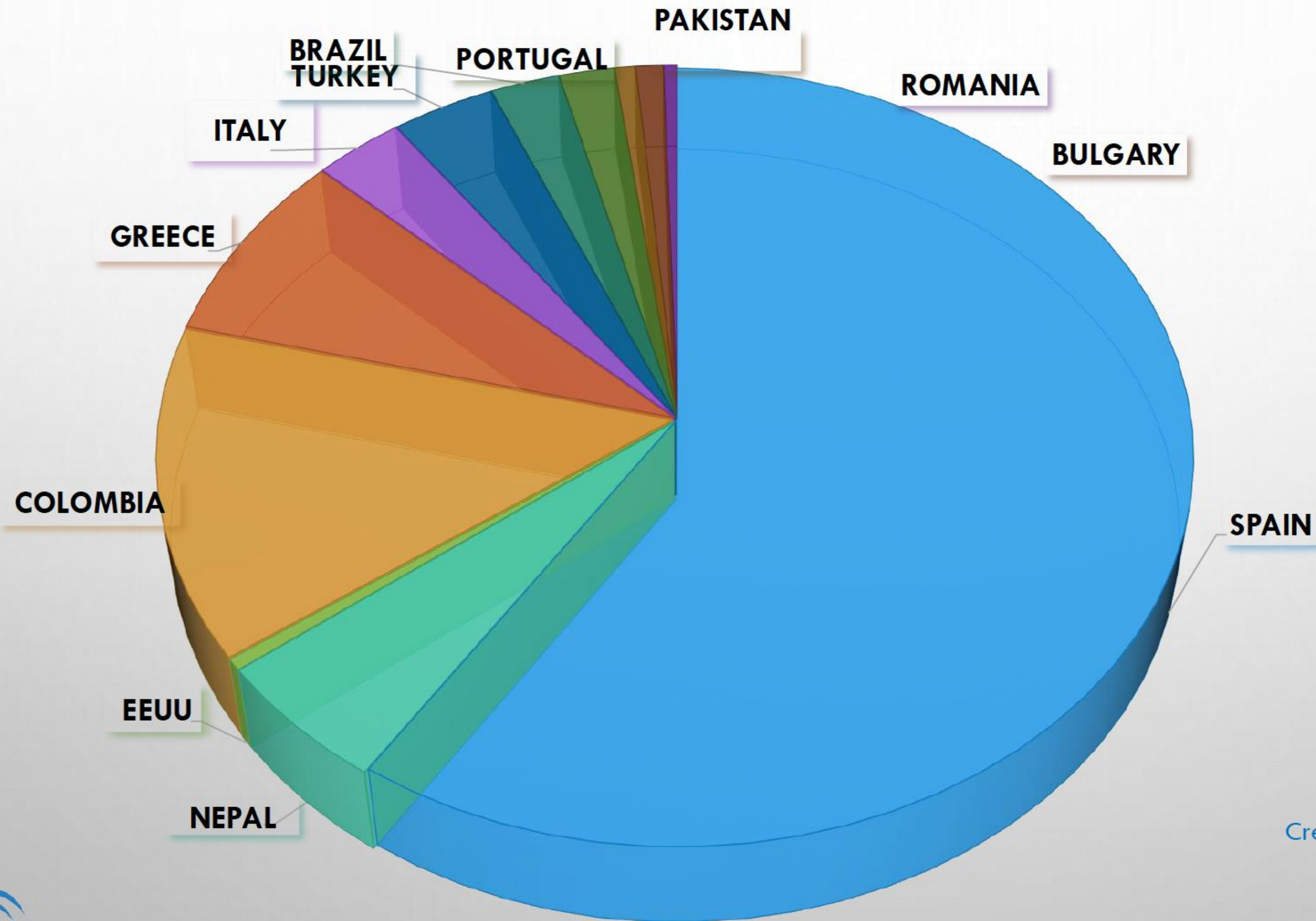
Fase 3

Fase 4

Fase 5

Porcentaje de estudiantes que hicieron una SSE on-line (por país)

Año Escolar 2020-2021



More than 1000
students and
90 teachers in
two years!

Credit: CESAR



M31

The Andromeda Galaxy, M31, is located about 2.5 million light-years away in the constellation Andromeda. Being approximately 220 000 light years across, it is the largest galaxy of the Local Group, which includes the Milky Way, the Triangulum Galaxy and about 44 other smaller galaxies.

Target List ?

CESAR Galaxies

M87

NGC 4565

NGC 1132

IC 5152

NGC 1300

M60

NGC 4449

M31

Image Opacity

Thank you!

<https://cesar.esa.int/>

