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Joint EC-ESA Earth System Science Initiative



ESA



FutureEO

ESA new Science and Innovation
Earth Observation Programme



EC-RTD

Horizon Europe

New EU Research and Innovation
Framework Programme



New ICT, Cloud Computing, AI, ...

Interdisciplinary & Open Science

Enhanced models and predictions

In-situ Networks/citizen data



Joint EC-ESA Earth System Science Initiative



- **Based on co-programming across select actions in ESA's FutureEO and EC's Horizon Europe**
- **Capitalising in the unique European space EO assets (Sentinel missions, Earth explores, meteorological missions, national assets);**
- **Scientific focus on major scientific challenges contributing to global and European Priorities: e.g., Green Deal**
- **A scientific contribution to the HE Missions such as Climate Adaptation, Ocean Health or Soils**
- **Science contribution to the evolution of major European programmes such as Copernicus and DestinE;**



Priority Themes



A new collaborative model based on 3 basic pillars...



**Coordinated set
of EC HE calls
and ESA ITTs**

*Coordinated
complementary
projects
focusing on
common high-
level goals*



**Fostering
collaborative
research and
partnerships**

*New
mechanisms to
ensure
collaboration
between ESA
and EC projects*



**Fostering
scientific
dialogue and
networking**

*Continuous
effort to
reinforce the
dialogue across
the community*



Flagship Action on Polar Regions



Understand and predict
 changes in Polar regions and
 their ecosystems



More in preparation for 2023!!
Networking event
 26th at 5:30 PM Room: H-2-19

- We...
- EU...
- First...
- between...
- First de...
- Preparin...

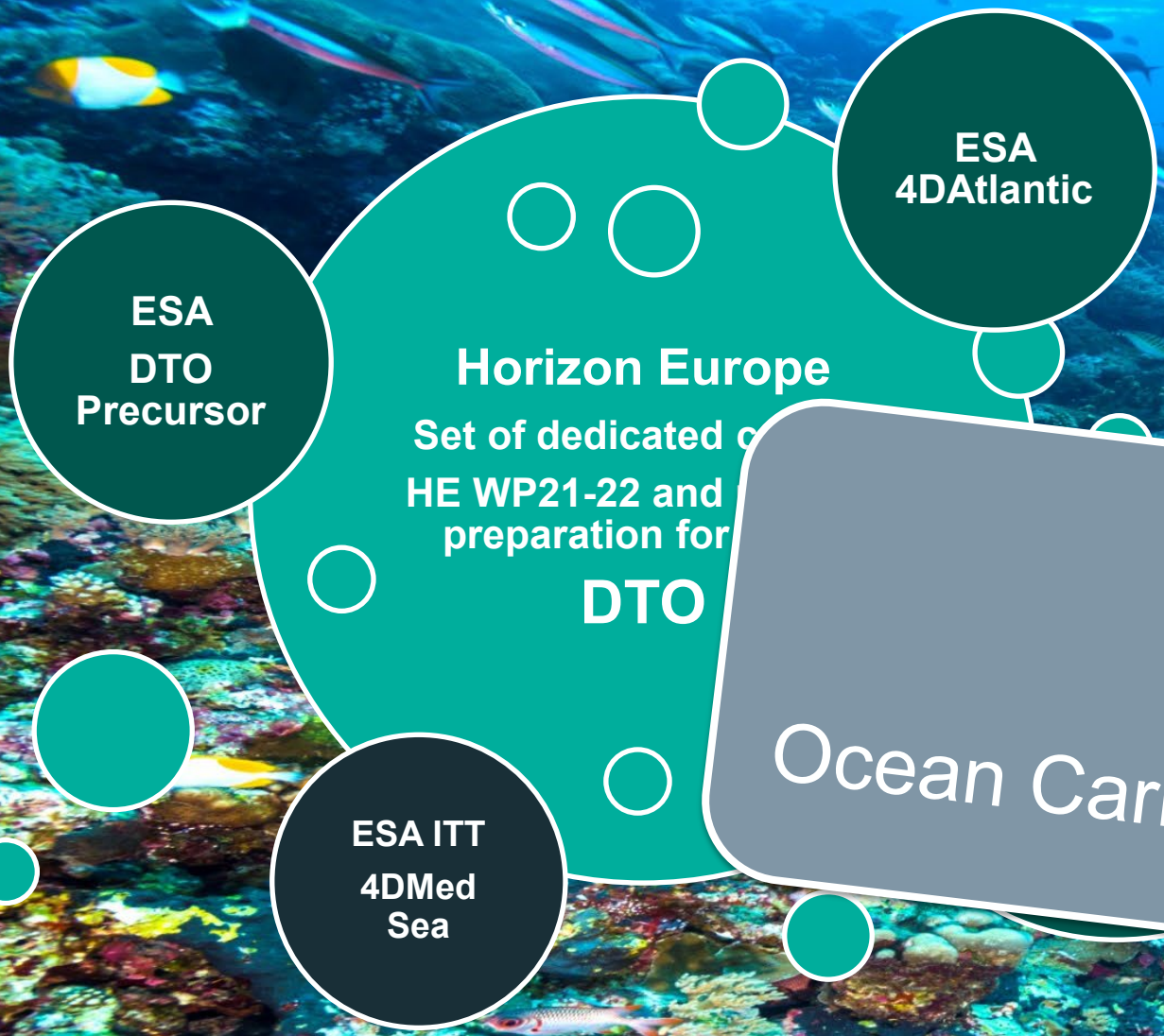
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EC-ESA European Polar Science week : 1000+ participants



Ocean Health: First calls launched



Direct response to the HE mission on Ocean Health

Common goal is to enhance our observation capacity and fundamental scientific understanding of the ocean's health

...in the Earth and climate

New ESA ITTs!!
4DSea (Q2 2022)
Ocean Carbon & Ocean Health (Q3 2022)





Contribute to EU Biodiversity Strategy for 2030

By fostering a quantum leap in our capacity to observe, understand and predict the complex process driven to biodiversity loss and develop novel science based solution to enhance the conservation and restoration of vulnerable ecosystems.

HORIZON-CL6-2021-GOVERNANCE-01-14: User-oriented solutions building on environmental observation to monitor critical ecosystems and biodiversity loss and vulnerability in the EU



ESA ITT Biodiversity+ precursors: Set of parallel preparatory activities



Climate Adaptation, Extremes and Natural Hazards



More in preparation for 2023!!
Dedicated EC-ESA session
Now in Room: D1-07-1

Flash floods and land slides in Northern Italy after 250mm of rain in 12 hours

- Direct response to **Horizon Europe Mission on Climate Adaptation**: Contributing prepare Europe to deal with climate disruptions
- Enhance our observation capacity and fundamental scientific understanding to deal with **climate disruptions, multi hazards, compound and cascade events** to better assess and tackle the resulting **risk and expected impacts** on society and ecosystems, specially on **vulnerable regions and coastal areas**
- **First set of ESA projects launched (e.g., Coastal Hazards);**
- **New ESA ITT on Multi-hazards to be issue in June 2022 (1Million Euro).**

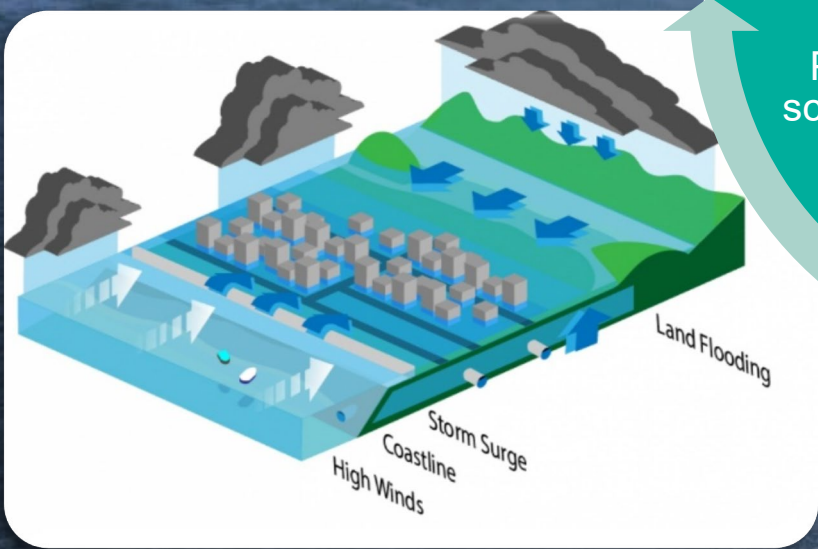
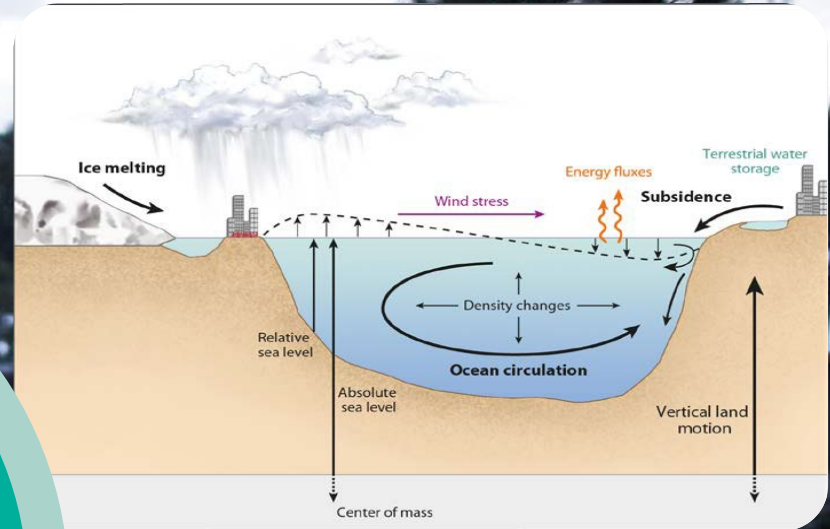


Approach: from science to novel solutions



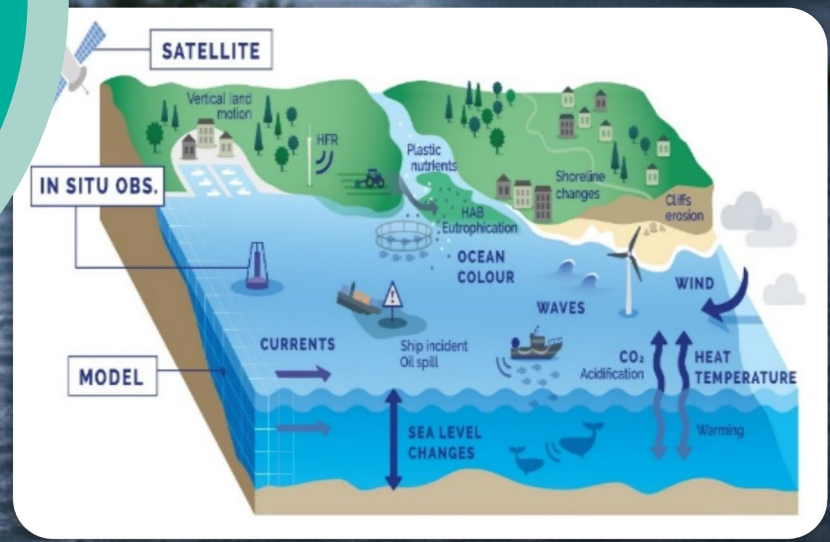
Major societal challenge

Scientific challenges, knowledge, gaps

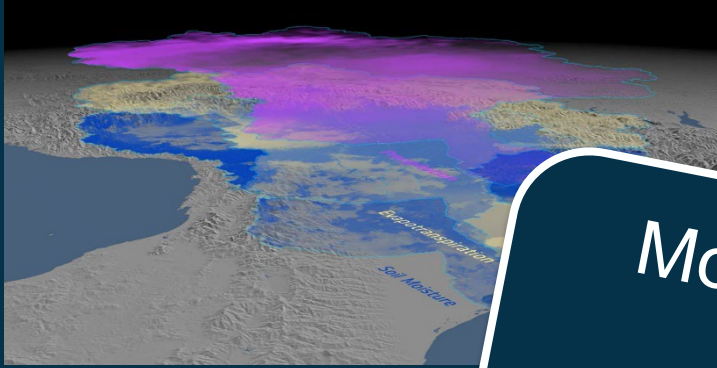


Prototyping science-based solutions

Novel observations, process understanding



Other Precursor Activities



HORIZON-CL6-2021-CLIMATE-01-01: Improved understanding, observation and monitoring of water resources availability.

Hydrology - New ESA ITT to be issue in



freshwater



More in preparation for 2023!!
Agriculture 23rd 11:15 - SAPIENSE
Carbon 25th 17:25 - GEMINI
Water 26th 8:30 - GEMINI

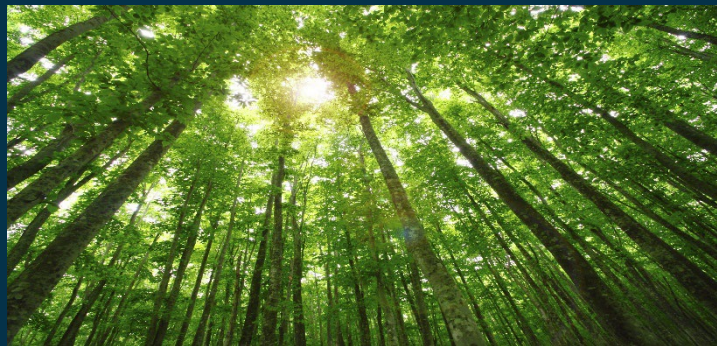
ITT to be

content;
multiple

- stressors;



food systems



ESA Carbon Science Cluster – Research opportunities call in June 2022.

- Terrestrial carbon constellation
- Multi-mission HR carbon cycle of agriculture and land use
- Opportunities for collaborative research



carbon cycle



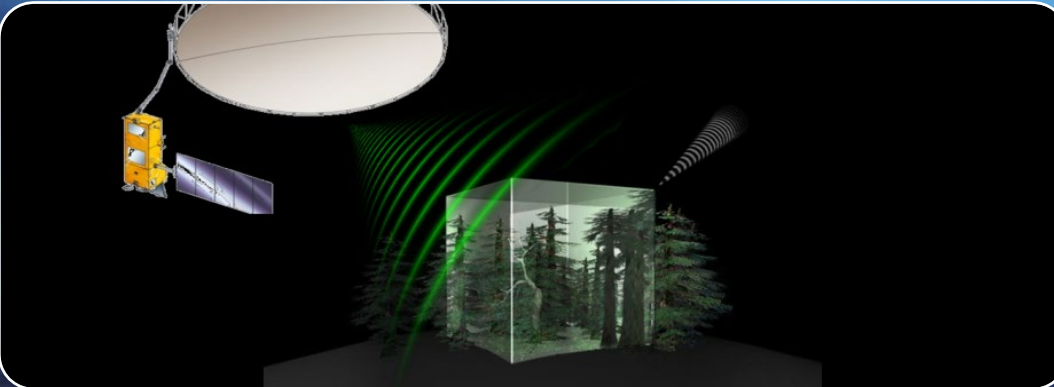
Upcoming Earth Explorers... New Opportunities



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EarthCARE

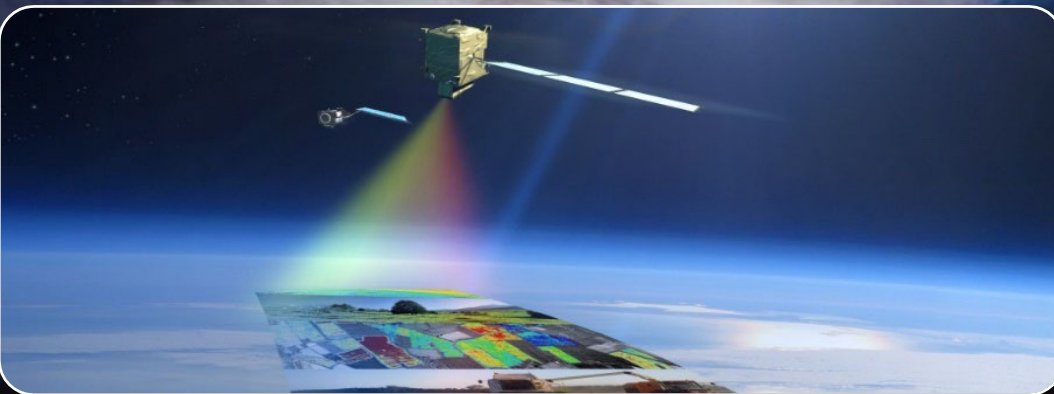
- Clouds, aerosols & radiation
- Partnership with JAXA
- Launch planned 2023



7

Biomass

- Biomass estimates
- First P-band SAR in space
- Launch planned 2023



8

FLEX

- Vegetation fluorescence,
- Photosynthesis, plant stress
- Launch planned 2024

EC Horizon Europe calls 2021-2022 linked to ESA



ocean health



biodiversity



polar science



freshwater

- **HORIZON-CL6-2021-BIODIV-01-03: Understanding and valuing marine biodiversity and ecosystems services**
- **HORIZON-CL6-2021-BIODIV-01-04: Assess and predict direct and indirect stressors on coastal and marine biodiversity**
- **HORIZON-CL6-2022-BIODIV-01-01: Observing and mapping marine biodiversity with particular focus on coastal and marine ecosystems**
- **HORIZON-CL6-2021-GOVERNANCE-01-14: User-oriented observation to monitor critical ecosystems and biodiversity**
- **HORIZON-CL6-2021-CLIMATE-01-01: Improved understanding of water resources availability.**
- **HORIZON-CL6-2021-CLIMATE-01-03: Key ocean observations to monitor global climate change**
- **HORIZON-CL6-2022-GOVERNANCE-01-07: Novel datasets to address climate change effects**





Major step forwards in the ESA RTD collaboration: development of a package of coordinated topics under the WP 23-24 of Horizon Europe.

Moving into a more structured approach: 10 topics of the WP 23-24 of Horizon Europe will be specifically coordinated with ESA counterpart actions.

The coordination with ESA will add value to projects that will be funded in bringing in EO based science and EO ESA actions.

10 topics across clusters 3,5,6. Broad areas of collaboration include:

- Climate sciences and responses for the transformation towards climate neutrality
- Understanding and addressing the main drivers of Biodiversity loss
- Land, ocean and water for climate action
- A disaster resilient society for Europe
- Digital and data technologies as key enablers
- Deploying and adding value to Environmental Observations

Preparing 2023

- The ESA-EC cooperation would enable supporting **complementary collaborative projects, funded on the EC side through Horizon Europe and on the ESA side through the FutureEO programme.**
- It will result in a group/cluster of complementary projects pursuing a common objective in the domain of Earth System Science (*e.g.*, in the domain of biodiversity, healthy ocean, polar science, climate adaptation, extreme events, water cycle science, and science for sustainable agriculture).
- The EC projects would support R&I actions eligible under Horizon Europe while ESA projects would support EO science and developments, advanced and novel space assets, EO based Earth science and research and open science.



- The complementary calls will be organised through two separate calls launched by EC and ESA via their own programmatic mechanisms respectively and running in parallel.
- Selected EC calls and ESA ITTs are developed jointly by ESA and the EC. The text explains the overall goal of the coordinated activities including dedicated provisions to foster collaborative research and coordination across teams.

Communication



**Visit *EC-ESA Earth System Science Initiative* at
eo4society.esa.int**



Launching an ambitious European scientific coordinate effort in 2023....



Kick-off of the
Full Implementation Phase
May 2023 (TDB)

**EC-ESA Earth System Science
Initiative Forum:
Science for Green and
Sustainable Society**

