

FUTURE
EO



Independent Science Review: Towards a new ESA EO Science Strategy

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Chair, Independent Science Review

Independent Science Review (ISR)

- Independent Science Review of Earth Observation Envelope Programme / FutureEO conducted in Sept-Dec 2021 by Panel of independent scientific experts
- 19 recommendations published ([https://esamultimedia.esa.int/docs/EarthObservation/Independent Science Review Report 2021 issued.pdf](https://esamultimedia.esa.int/docs/EarthObservation/Independent_Science_Review_Report_2021_issued.pdf)) and presented to ESA Member States in the 22-23 March Programme Review
- Past Review Recommendations have led to strategic adaptations of the Programme and tuning of the Strategy
- Several recommendations of specific interest for the orientation of a new EO Science Strategy



ISR Panel Members

- Prof. Johnny A. Johannessen (Chair)
- Sandra Cauffman (NASA)
- Prof. Jörg Ebbing
- Prof. Christine Gommenginger
- Prof. Nazzareno Pierdicca
- Dr. Catherine Prigent
- Prof. Markus Rapp
- Prof. John Remedios
- Dr. Linda See
- Dr. Piet Stammes (ACEO Representative)
- Sindy Sterckx (ESSC Representative)



The European Space Agency
Earth Observation Envelope Programme /
FutureEO Programme

Independent Science Review
Report 2021

Assessment of the Scientific Benefits of the
EOEP-5 / FutureEO-1 Segment 1 Programmes

Response to previous ISR Recommendations

2015 Independent Science Review:

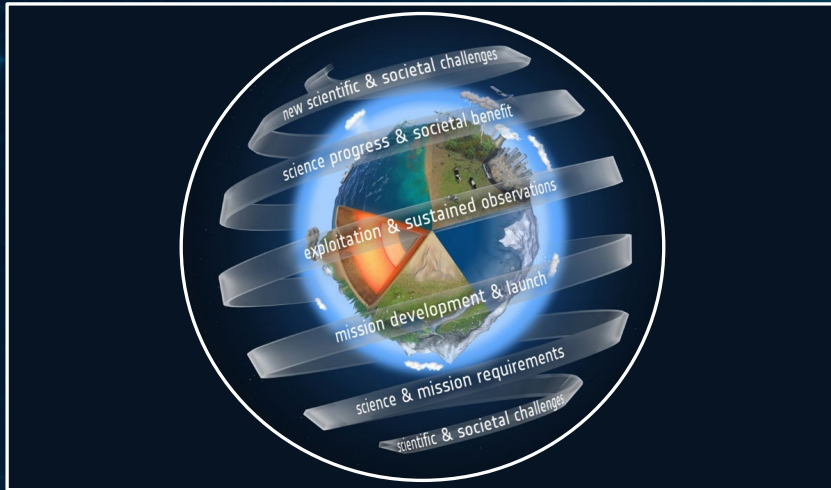
“The Panel recommends ESA should strive to return to a higher frequency of Calls, and timely implementation of Earth Explorer Missions without sacrificing scientific ambition and mission quality”

In the period since the last 2015 Review:

- Call for Earth Explorer (EE) 9 Mission Proposals (to enter Ph A) → FORUM Selected as EE9
- Call for EE10 Mission Ideas (to enter Ph 0)
- SmallSat Challenge Issued (Scout missions) - leading to selection of two Scout Missions CubeMAP and HydroGNSS
- More opportunities for the scientific community to propose scientific missions



ESA EO Programme is structured around four blocks



Foundations and Concepts



Research Missions

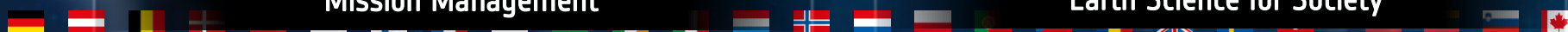


Mission Management



Earth Science for Society

Earth Science,
Preparation of EO
future and World-
class EO Research
Missions



19 new recommendations are provided:

- ❑ **Rec. 1 - 4** are related to the overall scope of EOEP-5 / FutureEO-1 Segment-1 programme
 - 3 Recs. covered by ongoing or approved future activities
- ❑ **Rec. 5 - 7** are connected with Block 1: Future Missions/Foundations and Concepts
 - Rec.5 is covered by ongoing activities or approved future activities
- ❑ **Rec. 8 - 10** are connected with Block 2: Research Missions
- ❑ **Rec. 11 - 13** are connected with Block 3: Mission Management
- ❑ **Rec. 14 - 19** are connected with Block 4: Science for Society

Some Key Recommendations

- Sustain established level of excellence (science and technology) - in view of the increased number of EO missions
- Strengthen engagement of scientific user community participation in early phases of mission development
- Ensure FutureEO programme retains flexibility and scope to sustain science driven small, medium and large Research Missions and enable development of new Earth observing capabilities
- Place emphasis on scientific impacts of Research missions
- Ensure scientific excellence, innovation, impact and benefits of Missions of Opportunity through close involvement of the science community and thorough ACEO evaluation
- Ensure continuity in critical timeseries e.g. through Missions of Opportunity in cooperation with other space agencies or with operational Programmes (Copernicus, Earth Watch, Meteo)



Community Engagement & Capacity Building

- Strengthen engagement of scientific community during mission development to enable faster uptake of new mission data
- Broaden scope of Open Calls for innovative science projects— to stimulate wider scientific engagement and innovation
- Reinforce Living Planet Fellowships and Research Traineeships to develop future generation of EO scientific research talent
- Communicate past successes and future ambitions and continue to raise awareness beyond the traditional Earth Observation (EO) community

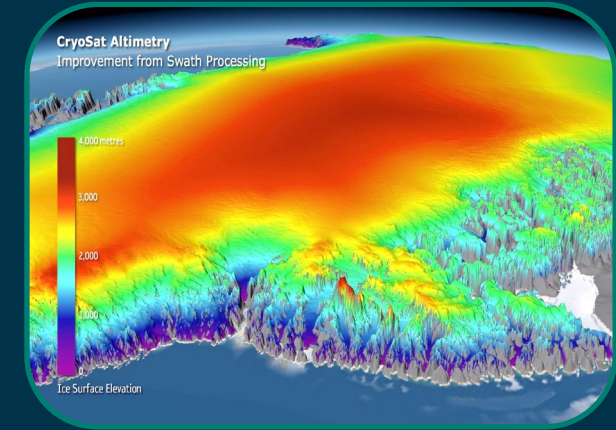
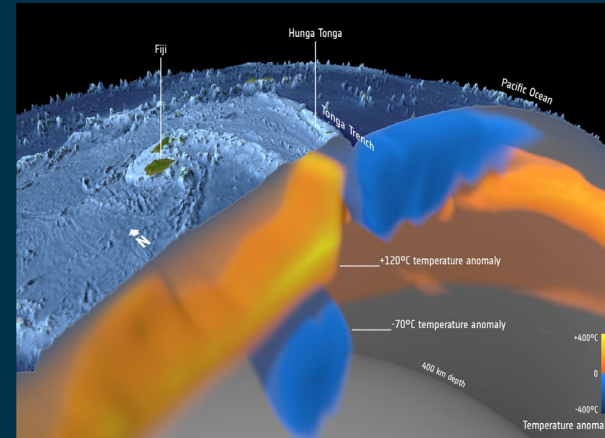


- Continue to develop the culture / implementation of open science approach
- Maximise attractiveness and benefits of ESA Scientific Open Tenders – by: simplifying tender process, establishing clear science goals; maximising flexibility in the scientific approach; and minimising management overhead
- Establish long-term strategic ESA science clusters with links to other programmes (Copernicus, CCI), support to the SDGs and other international programmes (e.g. Horizon Europe)
- Strengthen partnerships with other space agencies to optimise resources and contributions to enable implementation of larger scientific studies, for instance focusing on the major challenges for societal benefits (e.g., water-, energy-, and carbon-cycle).

Goal: Scientific exploitation of Earth observation data for societal benefits

Scientific support activities:

- Grand Science Challenges;
- EO solutions for a resilient society;
- Artificial Intelligence (AI4EO);
- Regional initiatives;
- EO Open Call;
- EO Africa;
- Sustainable development initiatives.



Feedback between Main Programme Components

- Interconnection and mutual feedback between Programme blocks essential
- Knowledge/lessons transfer from one block to another to maximise benefits



- EO achievements, progress and opportunities of the science-driven FutureEO Programme preserve its attractiveness to the scientific community
- Living Planet Strategy and EOEP Programme built the scientific foundation for today's Copernicus Sentinel and Meteorological Mission success
- ISR recommends preparing a new, updated EO Science Strategy with scientific challenges updated at 5-6 year intervals in consultation with the scientific community
- New Strategy to promote balance and feedbacks between FutureEO Programme elements (Mission Identification and Preparation, Mission Implementation, Mission Management and Operations, and Mission Exploitation/Science for Society)
- Stimulate interaction and mutual connection between EO Programmes for increased Earth science discovery, improved scientific knowledge and societal benefits.
- New Science Strategy ensures EO Programmes remain relevant and fit for the future