



Final Project Meeting CNR, Rome 26 March 2026

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
(D.D. n. 130/2022 - CUP B53C22002150006) Funded by EU - Next Generation EU PNRR-
Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



Final Project Meeting - AGENDA

- 09:30 > 10:30 Accoglienza e registrazione dei partecipanti
- 10:30 > 10:50 Saluti istituzionali
- 10:50 > 11:15 Il progetto ITINERIS: risultati conseguiti e impatti generati
- 11:15 > 11:40 ITINERIS HUB: un punto unico di accesso alle IR ambientali italiane
- 11:40 > 13:10 Tavolo tematico - Gestori del territorio e policy makers
- 13:10 > 14:10 Pausa pranzo e networking
- 14:10 > 15:30 Tavolo tematico - Imprese e innovazione
- 15:30 > 16:00 Pausa caffè
- 16:00 > 17:30 Tavolo tematico - Organizzazioni e iniziative internazionali
- 17:30 > 18:00 Conclusioni e prospettive future



The ITINERIS project main results and impact

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Why an ENV RI thematic network?

Environmental research is aimed at understanding the functioning of the Earth system at various spatial and temporal scales.

Environmental research requires comprehensive observations integrated with relevant experimental and modeling approaches that are essential for understanding and predicting the mechanisms and evolution of the Earth's environmental system.

Environmental Research Infrastructures are key to providing systematic and coherent datasets needed for research that addresses major issues but also societal challenges such as climate, natural resources, health, food security, biodiversity and sustainable use of the sea, fresh water and soil.

Italy participates in all major research infrastructures of pan-European interest in the environmental field (PNIR, ESFRI).

The full exploitation of the synergies among the environmental research infrastructures is strategic for the country. It means **building the integrated platform for the observation and study of phenomena in the various sectors of interest ranging from marine sciences, to solid earth, to the atmosphere, to biodiversity and ecosystems, to support the country in dealing with large environmental challenges, also in line with the European priorities.**

ITINERIS - Italian Integrated Environmental Research Infrastructures System



➤ **7 Partners**



➤ **22 RIs:**

The participating RIs are the Italian nodes of the **ESFRI Landmarks** ACTRIS, EMSO, Euro-Argo, ICOS and LIFEWATCH, from the ENV domain and ANAEE from the H&F domain and closely linked to the ENV domain; the Italian nodes of the **ESFRI projects** DANUBIUS, DISSCO, e-LTER, from the ENV domain, and EMPHASIS and EU-IBISBA from the H&F domain and also relevant for ENV; the **EU RIs** ECORD, EUFAR, Eurofleets, JERICO and SIOS, all from the ENV domain; and the national RIs ATLaS, CeTrA, N/V Laura Bassi, and SMINO, from the ENV domain, and Geosciences and LNS, both from the PSE domain, that in ITINERIS support services in the marine domain.

➤ **Total budget: 155,2 ML Euro**

➤ **1 November 2022 - 30 April 2026 + at least 10 years operation**

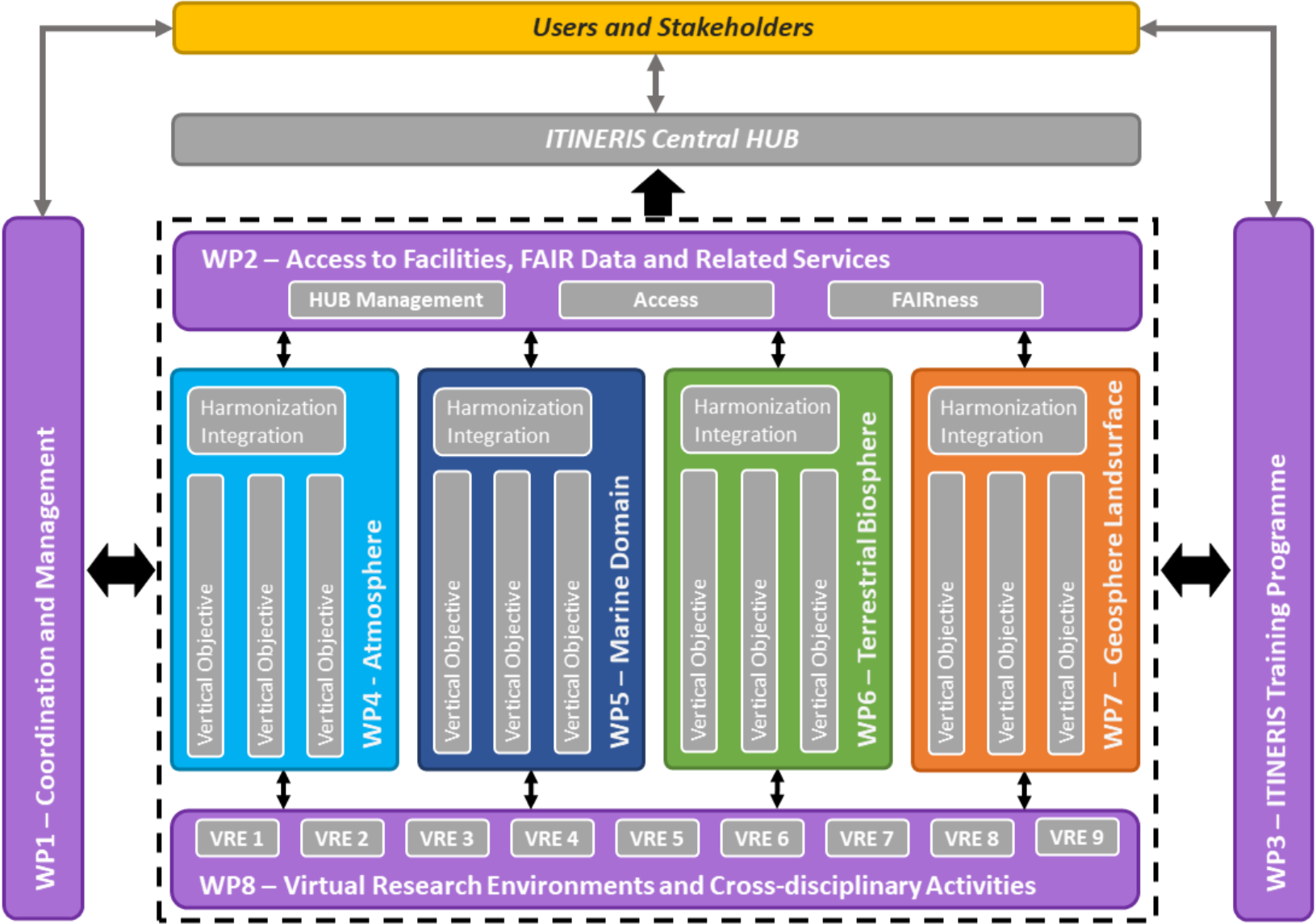
Main Objective

ITINERIS will build the Italian Hub of Research Infrastructures in the environmental scientific domain for the observation and study of environmental processes in the atmosphere, marine domain, terrestrial biosphere, and geosphere, providing access to data and services and supporting the Country to address current and expected environmental challenges.

The main goal is to develop cross-disciplinary research in environmental sciences through the use and re-use of existing (or pre-operational) data and services and new observations, to address scientifically and societally relevant issues such as sustainable use of natural resources, implementation of Nature-Based Solutions, Green and Blue Economy, pollution reduction, critical zone and ecosystem management and restoration, carbon cycle, mitigation of the downstream effects of climate and environmental change.

This broad-scale vision of environmental research, sustained by the main Italian environmental scientists involved in European RIs, **is truly innovative and it will support our Country in taking a leading role in European environmental research, designing the framework for the next decades.**

ITINERIS Project structure



ITINERIS main expected impacts



ITINERIS will establish the Italian national system of Research Infrastructures (RI) in the environmental domain, creating a coherent and harmonized flow of data, information and knowledge across all the participating RIs. Such novel, integrated system will offer new opportunities to the scientific community and to a wider applied stakeholder group to obtain the required information and answer specific questions in the marine, atmospheric, terrestrial biosphere and geosphere subdomains. This integrated RI system represents a significant advancement over existing facilities and it will attract new researchers from other countries, both those involved in European RIs and from outside Europe.

The ITINERIS project will produce new knowledge on environmental processes across subdomains, adopting a whole-system view and considering in particular the interactions and links among the different components, something that is often overlooked in individual RIs.

Link with other domains to promote cross disciplinarity

Expected wider scientific, economic, and societal effects of the project: (a) promotion of scientific excellence and creation of knowledge and innovation; (b) attraction of new researchers from other territories; (c) attraction of capital and investments in the territory; (d) impact on the competitiveness of enterprises, and more generally in terms of spin-off effect on the territory.

Project results and achievements

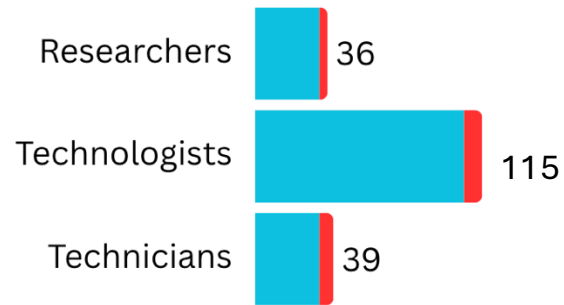
- 🌐 N. 226 Deliverables (18 pending release in last month)
- 🌐 N. 190 Hired personnel
- 🌐 N. 44 PhD
- 🌐 Accesses provided to 172 users
- 🌐 N. 413 Publications + Conferences etc.
- 🌐 N. 280 new dataset
- 🌐 ITINERIS as an example at EU and International level (ESFRI Landscape Analysis 2024; HE presentation)

Procedures

RECRUITMENT OF FIXED-TERM PERSONNEL

165 recruitment procedures

190 fixed-term personnel hired (*119 active now*)



FUNDING OF DOCTORAL PROGRAMS

44 PhD funded at 15 Universities



>400 permanent staff involved in the project activities

>60,000 documents collected (for CNR) through the SharePoint project intranet

PROCUREMENT OF GOODS, SERVICES AND WORKS

882 purchasing procedures

98% budget awarded

The ITINERIS–ACTRIS Access Pilot Call



61 Total access requests received



157 Total users involved



34 Italian users accessing facilities abroad



Users accessing facilities in Italy (from both Italy and abroad):

- **61** Italian users in Italy
- **62** Foreign users in Italy

- Tested innovative operational, legal, financial and strategic mechanisms through the first access programme co-funded by a national project.
- Provided insights to harmonise new access perspectives and to support the design of a national access programme
- New Italian facilities involved for the first time in access provision (30% out of the total)

Training Courses

From October 2024 to December 2025



70

training courses



close to

1,000

participants

Participants' Evaluation

4.3



Course Goals and Overall Evaluation

4.5



Teaching Quality

4.3



Teaching Materials and Resources

4.4



Organizational Aspects

3.6

36

Current RIs staff and user communities

3.7

24

Future RIs research staff

3.8

10

RIs staff on communication and engagement



6

thematic areas

Atmosphere— Outcome and Highlights

- 🌐 Reinforcing the observational capability and data collection and provision at atmospheric RI locations and beyond
- 🌐 Addressing the 3 Pilots activities (BL characterization, Aerosol types and sources; Fires emissions)



Linked to show cases reported in the Round tables




- 🌐 Scientific campaigns held at different sites, tran-RIs and trans- domain



Overall Outcome: increasing the international relevance of atmospheric scientific National community strengthening cooperation and collaboration

Atmosphere - Carbon isotope Italian Network

In ITINERIS 4 sites in Italy have been equipped with Picarro G2201-I for isotopic measurements of $\delta^{13}\text{C}-\text{CH}_4$ and $\delta^{13}\text{C}-\text{CO}_2$:

-  Cimone
-  Potenza
-  Lamezia
-  Lampedusa

Measurements extra RIs

ITINERIS TNA useful for gathering **expertise** on the topic for researchers and PhD students

An unprecedented network over Europe for such measurements which are of interest for emission sources identification: **Italy** is in a **leading position** in this study field

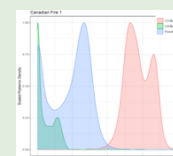
The Role of Isotopic Analysis in Atmospheric Research



Identifying Emission Sources



Studying Carbon Exchange between Atmosphere, Biosphere and Oceans



Improving Climate Models for Source Apportionment and Greenhouse Gas Inventories

Advancing Data Accessibility



 ITINERIS boosted the Cetra data FAIRness and provision



Before ITINERIS the Italian RI CeTrA did not have a data center

Thanks to ITINERIS, CeTrA is now equipped with:

- 1) data repository and data management organization compliant with the international standards and FAIR principles;
- 2) access portal, catalogue of services and scientific resources harmonized with the ITINERIS HUB



Data are mapped in the ITINERIS HUB

A screenshot of the ITINERIS metaDATA HUB web interface. The header includes the ITINERIS logo, the text "ITINERIS metaDATA HUB", a search icon, and a map icon. The main content area displays the title "Atmospheric Particulate Matter data from the Col Margherita High-Altitude Observatory (2023-2024)". Below this, the section "Data identification" is shown, containing the following details:

- Identifier**: doi:10.71731/DATA_UNIVE/J8DAJV
- Publisher**:  Datarepository Unive

Marine Domain - Outcome and Highlights

Overall Outcome: the Italian Integrated Ocean Observing System (IT-IOOS) contributing to European and International effort on ocean observations (GOOS & EOOS).

- 🌐 **Expanded the Italian monitoring capacity** by improving the temporal and spatial coverage of Essential Ocean Variables, Essential Biodiversity Variables, and Essential Climate Variables
- 🌐 **Gaps in biological and ecosystem observations filled**
- 🌐 **NRT ship-based ocean observations** available from Italian vessels

Case Studies

- 🌐 **ITINERIS' EYES:** an interdisciplinary research cruise, designed to investigate the health and predictability of Mediterranean planktonic ecosystems through multi-platform observations.
- 🌐 IT-IOOS Pilot services to tackle overarching marine issues: **extremes, environmental monitoring, search & rescue, satellite CAL/VAL, model data assimilation, data-driven reconstruction of the ocean state**

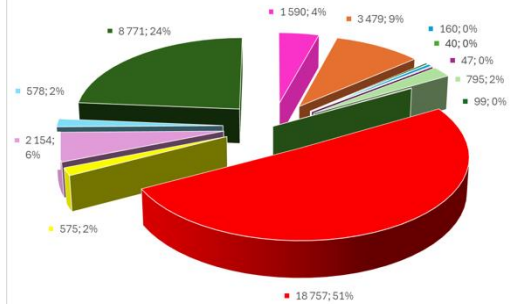


IT-IOOS: Expanded the Italian monitoring capacity

Coordinate investment strategy among Ris to support autonomous operation, telemetry, remote management, and end-to-end NRT data workflows

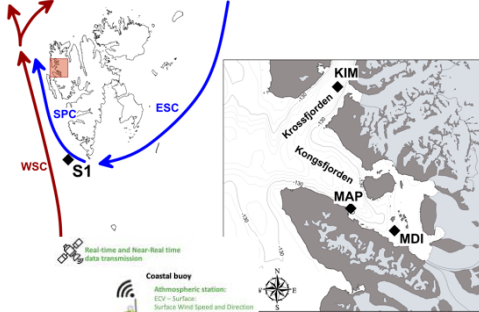
Gaps in biological and ecosystem observations filled

COSTS of equipment (KEuros)

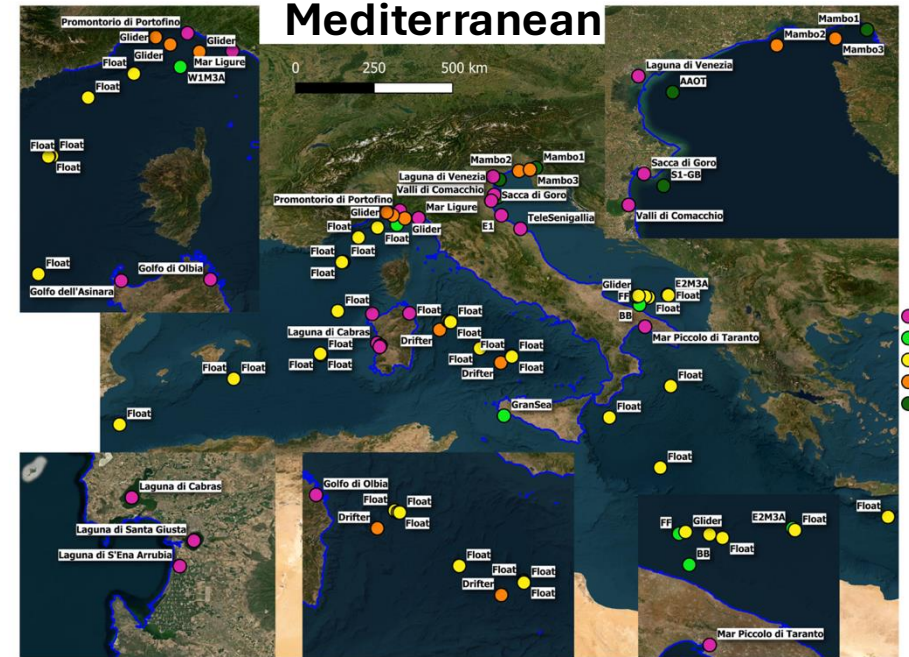
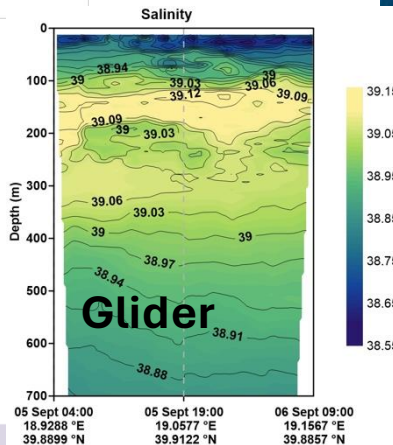


- AUTOMATION AND DIGITALIZATION
- HW for DATA CENTER INFRASTRUCTURE & COMPUTING
- DATA ACQUISITION AND TRANSMISSION SYSTEMS
- INSTRUMENTATION INSTALLATION SERVICES
- OTHERS
- REMOTE VESSEL MONITORING AND CONTROL
- SAMPLE/DATA ANALYSIS SERVICES
- SCIENTIFIC INSTRUMENTATION
- SOFTWARE AND IT SERVICES
- SUPPORTING INSTRUMENTATION
- UPGRADING WORKS
- WIRING CABLE

Arctic region

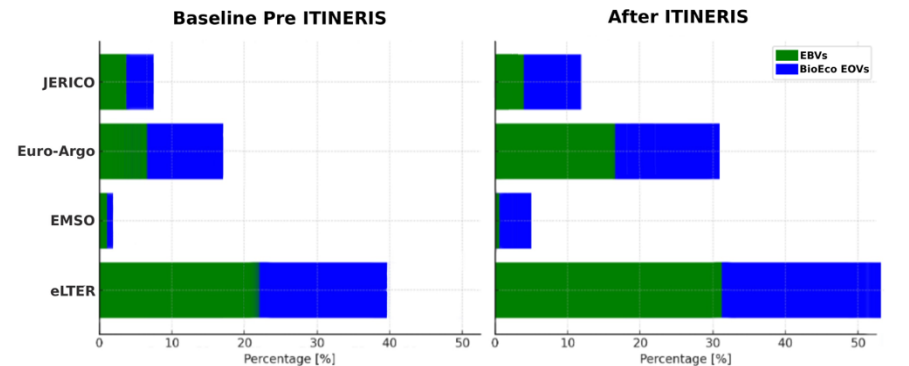
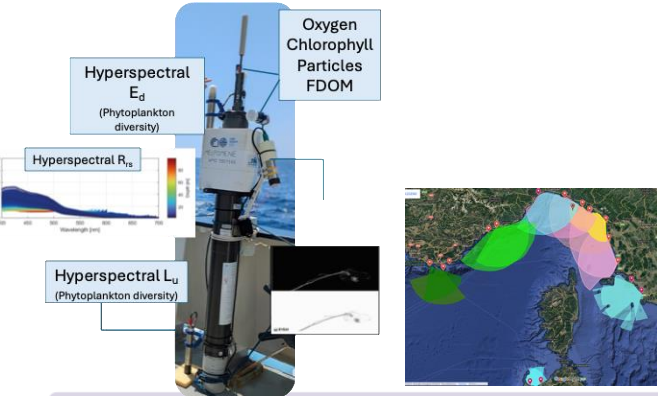


- Eco_Triglet - 1m**
- EDV - Biology and Ecosystems
 - Phytoplankton Biomass and Diversity
 - EDV - Biogeochemistry
 - Particulate Matter
 - EDV - Ocean Colour
 - Supporting variable C300M
- Hydrophone**
- EDV - Gross Dissipatory
 - Ocean Sound



- eLTER
- EMSO
- Euro-Argo
- JERICO
- eLTER

Innovative sensors for biodiversity:
Hyperspectral radiometry and UnderWater Vision Profiler



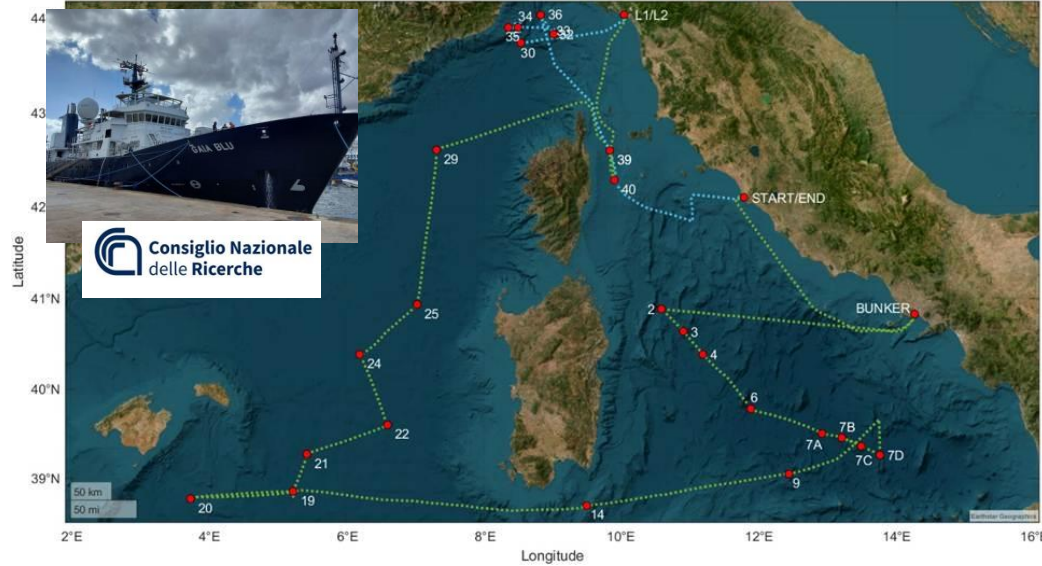
ITINERIS' EYES is an inter-disciplinary research cruise

R/V Gaia Blu, 8-30 July 2025

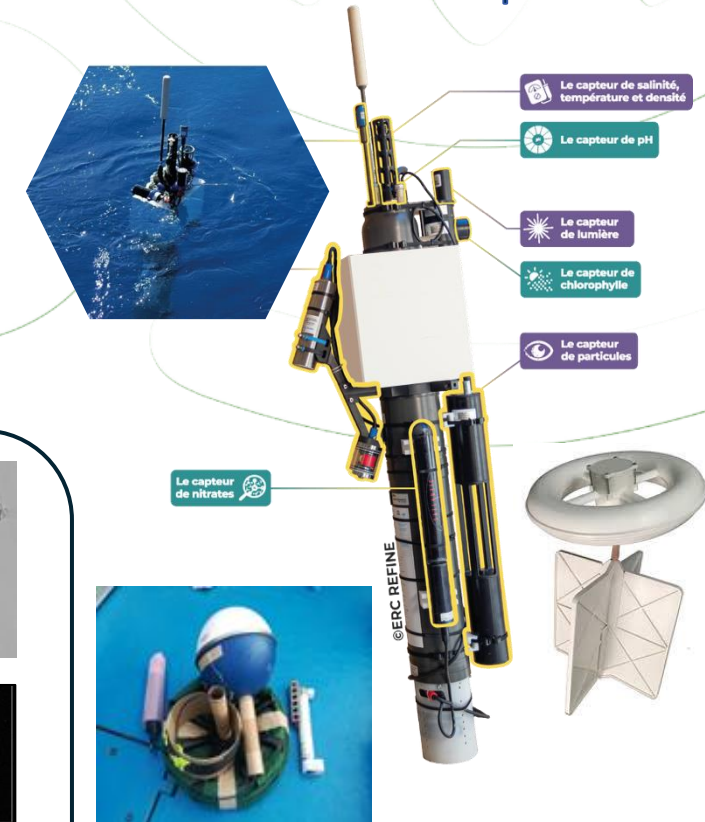


11 European RIs involved

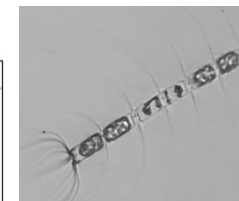
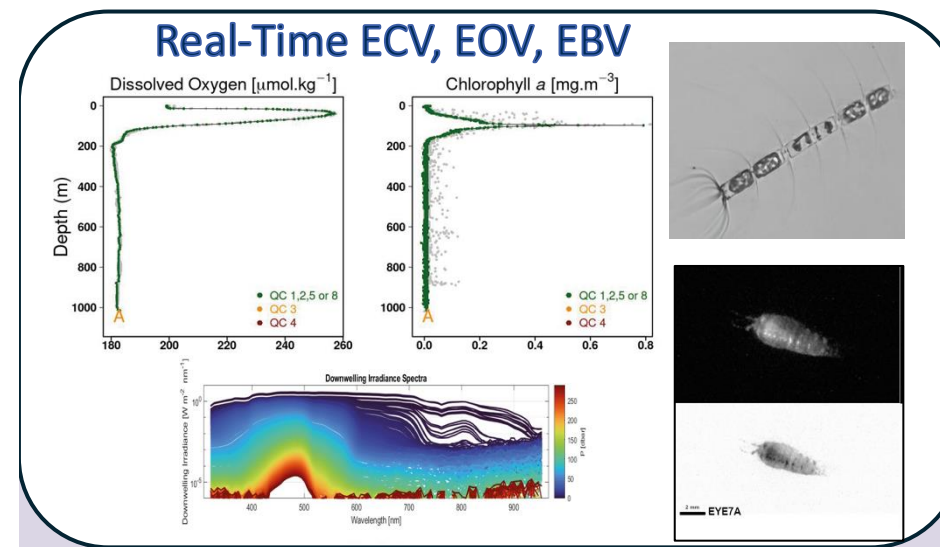
Oceanographic campaign ITINERIS' EYES on R/V "Gaia Blu"
Sampling stations and route - 8 to 24 and 25 to 29 July 2025



Continuous & discrete sampling integrated with 80 Autonomous platforms



- ITINERIS' EYES addresses the interplay between ocean circulation, biodiversity and climate (from surface to bottom)
- ITINERIS' EYES enhances 4D marine ecosystem predictability
- ITINERIS' EYES assesses the technological interoperability of the diversity of sensors across the RI environment
- ITINERIS' EYES increases capacity building of ITINERIS RIs and Society awareness of ocean health



Terrestrial Biosphere – Outcome and Highlights

- Established links among very heterogeneous RIs operating at different scales and with different level of maturity



Overall Outcome: collaborations, common practices, joint developments, sharing of tools and instruments – an example for the EU level collaboration

Common Vocabularies

Example of the sensor vocabulary to ensure full interoperability of metadata on sensors used for field measurements. More than 300 sensors censused and described.

Unique persistent ID

ICOS Instruments Vocabulary (ICOS_INST) SKOS No license

Last submission date April 7, 2025

Summary Concepts Properties Schemes Collections Notes Mappings Widgets Sparql English

Jump to Filter

- radiometer
 - Rain Gauges
- soil heat flux sensor
- soil moisture sensor
- sonic anemometer
- temperature sensor
- water pressure sensors
 - Baumer ED752 pressure transmitter**
 - BD Sensors LMP 305 pressure transmitter

Details Visualization Notes (0) Mappings (0)

ID https://kos.lifewatch.eu/thesauri/icos_instruments/c_a6cf9ffe

Preferred name Baumer ED752 pressure transmitter

Definitions For ICOS-BADM users the shortname is WTD-Baumer ED752, for Standard BADM users the shortname is WTD-Press

Member of [WTD-Baumer ED752](#) [WTD-Press](#)

In schemes [ICOS_INST](#)



**Names used
(for mapping)**

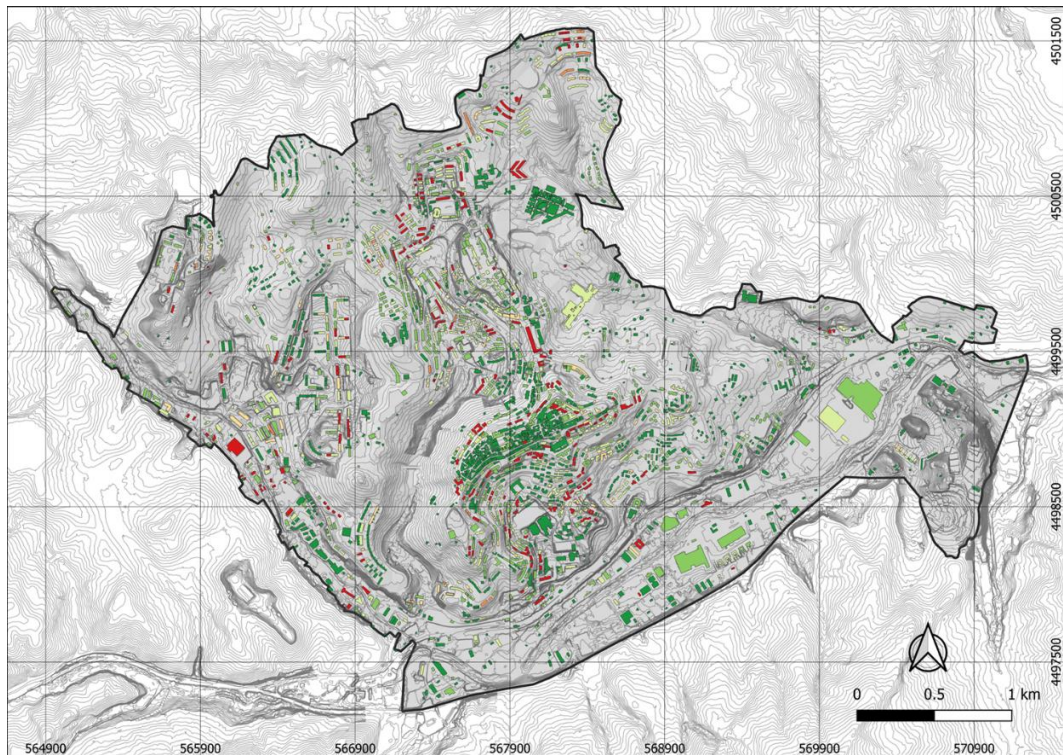
Environmental observations on Geosphere and Landsurface – Outcome and Highlights

- 🌐 Integrating key Research Infrastructure capabilities & related datasets including: SMINO, ATLaS, ECORD-ICDP, & EUFAR
- 🌐 Testing cutting-edge technologies in three pilot sites: the Friuli Venezia Giulia region, Tito and Potenza in the Basilicata region
- 🌐 Interaction with other WPs [WP2, WP3, WP8 (VRE Downstream)]
- 🌐 -> Outcome: the **strengthening of the community of geophysicists and geologists in natural risks monitoring and scientific drilling data analysis**

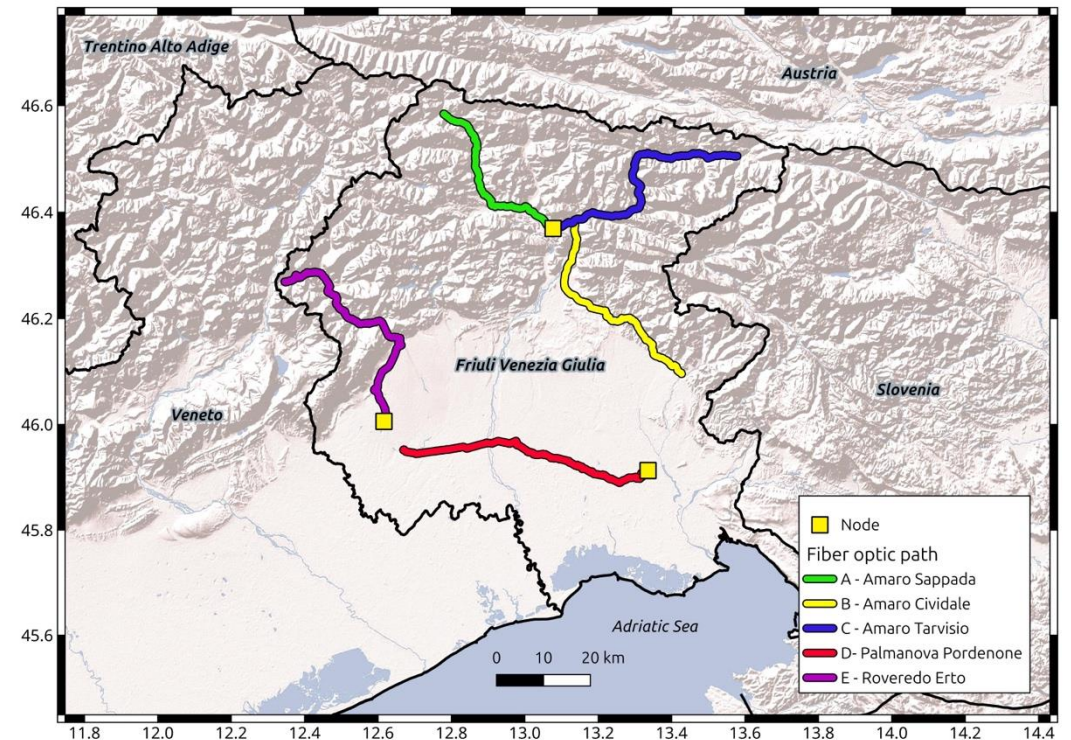


Creation and further implementation of three important pilot sites of multi-sensor, multi-resolution and multiscale sensors for the monitoring of natural risks, namely Tito and Potenza (Basilicata) and the Friuli Venezia Giulia region, where SMINO operates.

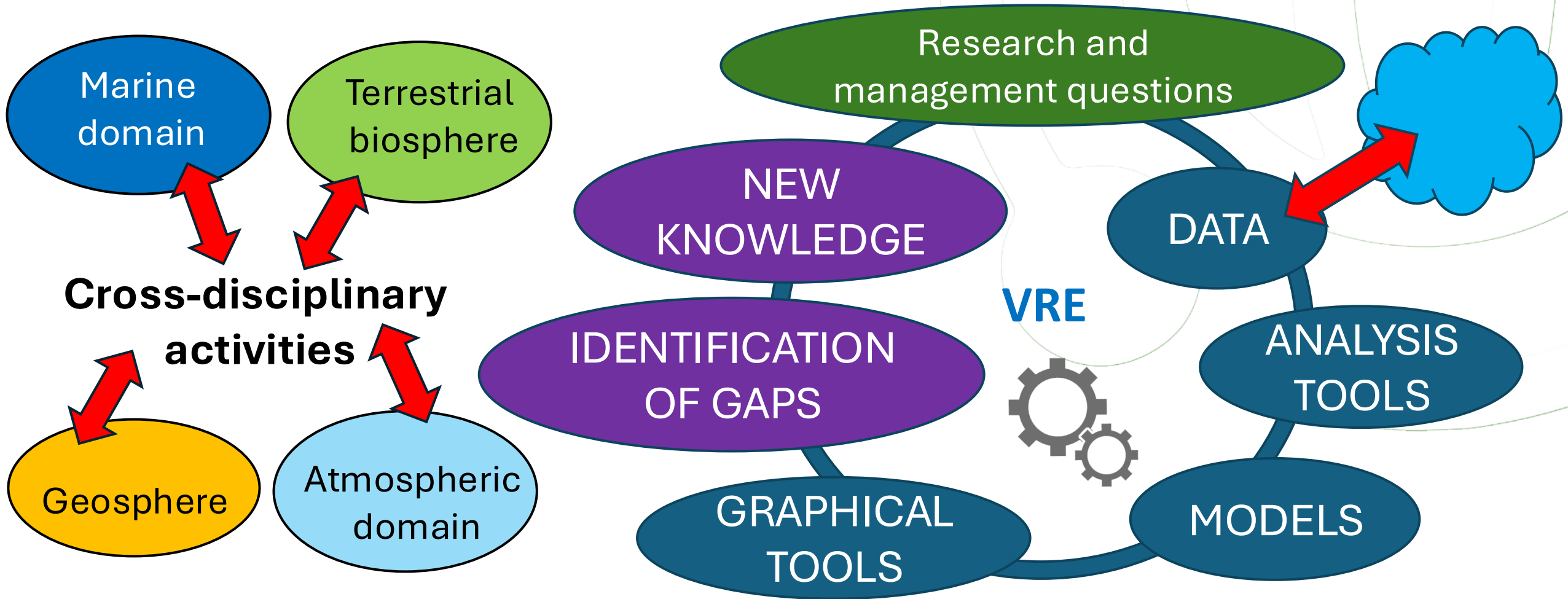
Map of Soil-Building Resonance



The optical fiber new lines of SMINO



Virtual Research Environments (VRE) – Outcome and Highlights



Overall Outcome: Availability of Virtual Research Environments linked to European Research Infrastructures, to address scientific and applied questions

- 1. Critical Zone VRE – quantify the response of the continuum soil-vegetation-water-atmosphere to climate and land-use change*
- 2. Biomass VRE – quantify the response of organisms to environmental change*
- 3. Crops, Plants and Pests VRE – quantify agroecosystem changes*
- 4. Essential Variables VRE – determine the variables needed to quantify ecosystem health and changes*
- 5. Aerosol VRE – quantify atmospheric aerosol dynamics and impacts*
- 6. Carbon VRE – quantify the environmental carbon balance*
- 7. Climate VRE – quantify climate change impacts using environmental indicators*
- 8. Downstream VRE – determine the impact of land-use and climate changes on the Earth's surface*
- 9. Isotope VRE – facilitate the use of isotope methods in environmental studies*

What next?

- 🌐 ITINERIS will continue and even improve the operations after the end of the project
- 🌐 Long- term sustainability 10 years and more
- 🌐 Improve visibility and impact
- 🌐 Strengthen the participation in the main EU programmes: HE, COPERNICUS, EOSC, Space agencies etc.
- 🌐 Connections with main stakeholders



THANKS!

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Tavolo tematico - Gestori del territorio e policy makers



ITINERIS Research Infrastructures to support of territorial management, regulatory authorities, and evidence-based policy-making

Tavolo tematico - Imprese e innovazione

ITINERIS Research Infrastructures to bridge research excellence and market innovation and support business growth

Tavolo tematico - Organizzazioni e iniziative internazionali

ITINERIS Research Infrastructures in the European and global research landscape