# ENVRIPLUS

# EXPLORING THE INTEGRATION CAPACITY OF ENVIRONMENTAL OBSERVATION SITES FOR MULTIDISCIPLINARY RESEARCH

Sabine Philippin, CNRS (France)

**ENVRIPLUS FINAL DISSEMINATION EVENT**
**7 JUNE 2019 – BRUSSELS, BELGIUM**

Supporting environmental research
with integrated solutions
**- the Earth is our lab**

# MOTIVATION



Natural disasters and extreme weather events may cause major environmental, economic, and societal hazards.

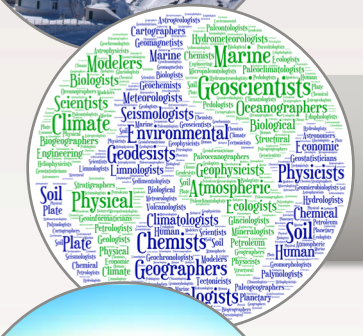
Climate change, air pollution, water supplies, food security, human health… The environmental challenges are interlinked.

Increased knowledge and understanding the complexity of the Earth's dynamics requires a **multi-disciplinary approach.**

# ENVRIPLUS MULTIDISCIPLINARY PILOT ACCESS PROGRAMME

- Multi-disciplinary observation platforms
- Implementation, access process and scope
- Some examples of research projects at the interface of environmental domains
- Benefits and added value
- Summary and conclusions

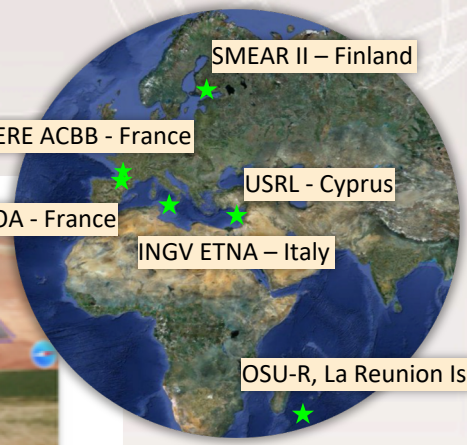
Exploring innovative research opportunities




At the frontier of environmental disciplines

Multi-disciplinary access

# EXPLORING AND PROMOTING SYNERGIES OF JOINT OBSERVATION SITES




SMEAR II - Finland

OSUR La Réunion - France

USRL - Cyprus

SOERE ACBB - France

P2OA-Drones - France

ETNA INGV - Italy

# MULTI-DISCIPLINARY ACCESS PROCESS – IMPLEMENTATION AND SCOPE

## Coordinated and harmonized process

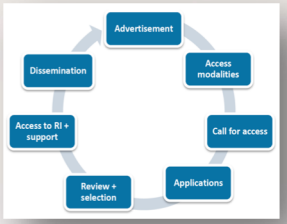
Central access management

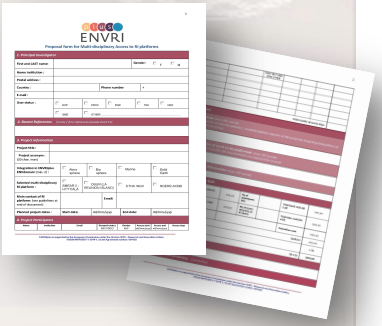
**Appointment of access provider** – coordinating the multidisciplinary on-site activities and user support

**Designing and preparation of multidisciplinary access process and modalities** – advertisement, application, evaluation, selection

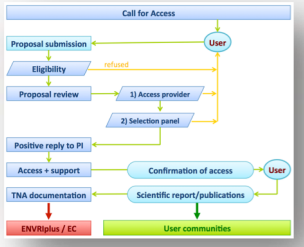
**2-Stage review process** – optimal planning and high-quality proposal selection

**Support to access and post-access reporting** – availability of results: publications and access to multi-disciplinary data.



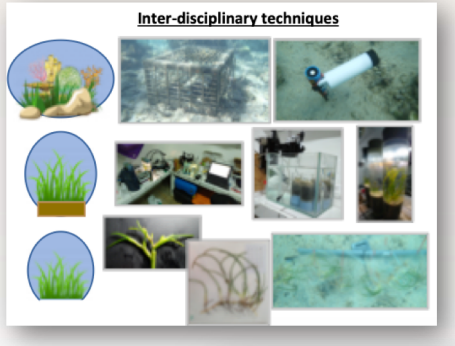

| Review panel member | ENV domain | Affiliation | Member |
|---|---|---|---|
| Abad Chabbi | ECO-BIO | INRA, France | internal |
| Markus Steffens | ECO-BIO | Technical University Munich, Germany | external |
| Michaela Dippold | ECO-BIO | University of Göttingen, Germany | external |
| Karine Sellegri | ATMO | CNRS, France | internal |
| Ulrich Bundke | ATMO | FJZ / IAGOS, Germany | internal |
| Kostas Tsigaridis | ATMO/ MULTI-DOM | Columbia University, USA | external |
| Jon Borre Orbaek | MULTI-DOM | Research Council of Norway | (external) |
| Jean-Pierre Vilotte | SOLID EARTH | IPGP Paris, Seismology, Italy | internal |
| Antonello Provenzale | SOLID EARTH | CNR Geoscience and Georesources Inst., Italy | internal |
| Sylvie Pichereau | MARINE | IFREMER, France | internal |
| Stefania Sparnocchia | MARINE | CNR-ISMAR, Italy | internal |
| *Sabine Philippin* | | *CNRS, France – Access programme coordination* | |



# MULTI-DISCIPLINARITY CALLS FOR ACCESS


- Open and free access for users including travel support for multi-disciplinary research teams for conducting experimental research.
- Scientific excellence base with strong focus on multi-/ cross- /inter-disciplinarity

- **Selection of high-quality user projects with ENVRIplus-added value in different aspects:**
  - Overall scientific motivation and relevance
  - Choice / role of participants and expertise
  - Method & experimental setup / instrumentation
  - Adequate of infrastructure /efficient use / on-site support (S&T, RH)




# MULTIDISCIPLINARY PROJECTS SUPPORTED BY ENVRIPLUS ACCESS

1. Influence of Biosphere-Atmosphere Interactions on the Reactive Nitrogen Budget
2. Constraining gross carbon fluxes using ecosystem flux and atmospheric concentration measurements of carbonyl sulfide (COS) and CO2
3. Seismic and Infrasound Monitoring of Cyclones in the Indian Ocean
4. Volcano Acoustic Monitoring from near and far-field Observations
5. Radioactive Aerosols and other source parameters for better atmospheric Dispersion and Impact estimatiOns
6. Ash fragmentation at Mount Etna and implications of different particle shape on ash dispersal in the atmosphere
7. Aerosol nucleation in the ETNA passive plume
8. Impact of land-use changes on soil health and greenhouse gases emissions
9. Ecosystem level methane fluxes: disentangling sources and sinks from transport using true eddy accumulation, eddy covariance, gradient and chamber flux methods
10. Radioactivity and electric field monitoring campaign at Hyytiälä
11. Etna Plume Imaging and Chemical Composition
12. Productivity, Blue carbon, and nutrient cycling of marine macrophytes in Reunion Island
13. Natural Impact of passive and active volcanic CO2 degassing activity on the atmosphere
14. Critical Zone in Tropical Montane Cloud Forest of a Volcanic Island: Specific constraints and forcings
15. Carbon stable isotopes measurement of the transitory carbon pool as an early indicator of land use induced soil carbon sequestration
16. Nitrous oxide (N2O) and methane (CH4) fluxes from stems of different tropical tree species in Mare Longue Nature Reserve
17. Emission in atmosphere of Natural gases and TEmporal variations Related to volcanic activity
18. Radon Analyses in Volcanic Emissions from Etna volcano: a tool to shed light on magmatic processes and environmental issues
19. Design of a light multi-parameters station based of the GEOCUBE+ architecture
20. Volcanic Airborne Gas Monitoring using the miniGas and miniature Mass Spectrometer UAV based Systems
21. Measuring Forest Carbon and Oxygen Exchange in Hyytiälä
22. The Influence of Land cover changes On Atmospheric Boundary Layer and Regional Climate Characteristics

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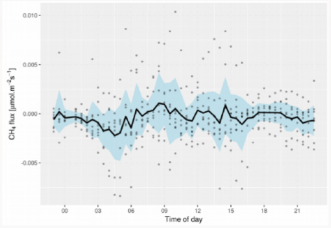
# EXAMPLES OF MULTIDISCIPLINARY PROJECTS

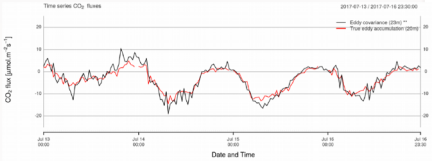
**MACRORE:** **Assess the ecological condition and anthropogenic pressure on seagrass meadows on Reunion Island: productivity, blue carbon, nutrients**

- MD team and complementary expertise and techniques: biogeochemistry, oceanography, chemistry, marine ecology, biology

**METHANE-FLUX:** **Ecosystem methane fluxes – disentangling sources and sinks from transport using true eddy accumulation**

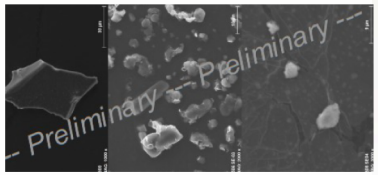
- Quantifying CH4 and CO2 fluxes using micrometeorological methods combined with flux estimates from soil, trunk and leaf chamber techniques and biophysiological process modelling.



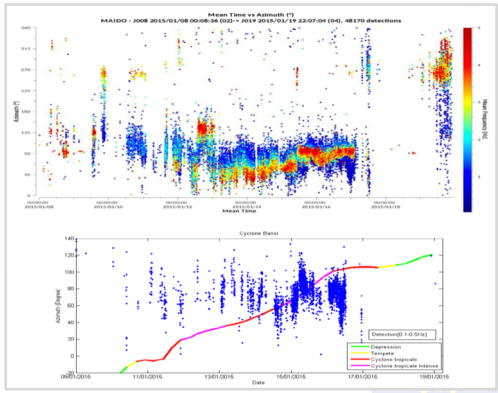

**ETNAPLUMELAB:** **Estimating Mt Etna emission using multi-domain information**

- Analysing the properties of volcanic gases and aerosols through combination of Atmo-Solid Earth observation methodologies for characterization the volcanic plume and inner degassing dynamics.




**SIMCIO:** **Seismic and infrasound monitoring of cyclones in the Indian Ocean**

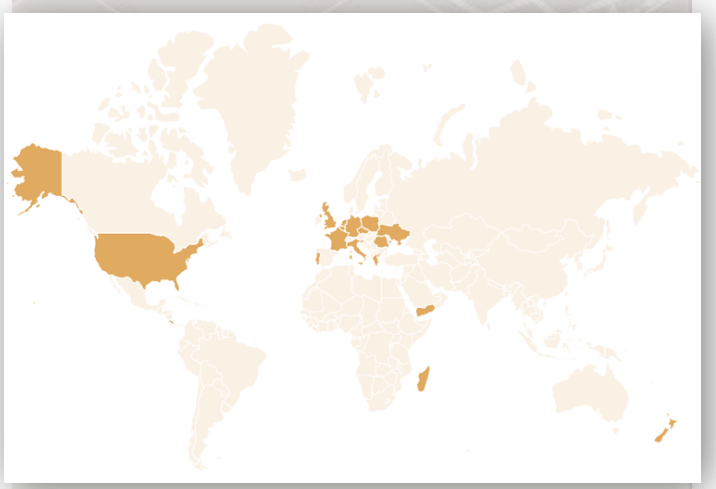
- Atmosph tracking of cyclones in the SW Indian ocean using seismic and infrasound information from volcanic observations



# SUMMARY OF ENVRI ACCESS IN NUMBERS

## 6 Stations

Opportunities for multidisciplinary access to **six joint observation platforms** in cross-cutting areas in Europe: ATMOSPHERE, BIO-ECOSPHERE, HYDRO-MARINE, SOLID EARTH domain.



## 22 Projects

**3 calls for access** resulting in support to 22 high-quality projects out of 39 proposals received, with often multi-domain and multi-national research teams, representing **more than 1080 research-working-days**.

## 77 Users

Almost **80 researchers** (expert + early career scientists), engineers, and technicians from 19 different countries worldwide to access four of the observation sites.

## 19 Publications

Almost 20 peer-reviewed publications (more to come). Presentations at international conferences. Scientific activity reports are available of all projects.

# USER FEEDBACK

"TNA project has been an excellent opportunity to gather a research team that has never worked together before and **start an interdisciplinary collaboration**."

"TNA project offered participant researchers a **rare opportunity** to work collaboratively with other team members from different scientific environments. Moreover, it stimulated those involved to **think and organize the research using multidisciplinary approaches** and in so doing broaden, the impact and findings of the project..."

"The TNA and the ensuing scientific interaction with the Ions group at Helsinki university allowed to **broaden the interdisciplinary nature of my research activity** ."

"The participation to a TNA project confirmed our impression that **interdisciplinary approach is today fundamental for making science in a successful way**. In addition, it gives the opportunity to start transnational collaborations that improved my and other Team colleagues expertise."

# BENEFITS OF MULTIDISCIPLINARY ACCESS TO ENVRI




- Novel concept allows integrating, sharing, and exploiting the resources, tools, and services of joint environmental observation sites at the disposal of users.
- High benefit for platforms (visibility, local and international cooperation, efficient use).
- Triggering cross-disciplinary, cutting-edge research projects, new scientific insights at the interface of different ENV domains.
- Encourage and promote mobility of multi-national and multi-disciplinary research teams from within and outside EU.
- Unique opportunity for new collaborations to gather research teams that have never worked together before and set ground for potential collaborations in the future

# CURRENT LIMITATION OF MULTIDISCIPLINARY ACCESS TO ENV RI

- Intradisciplinary research vs multidisciplinary research
- Multi- and interdisciplinary research requires explicit coordinated efforts and support – across RI and scientific communities – to support and encourage user-driven access.
  - Strategies for coordinating RI operation on national level
  - Combining expertise from different domains
  - Efficient use of available equipment and use
  - Overcome different procedures and methodologies
  - Clear communication strategy
  - Financial support
- Exploitation of results from multi-disciplinary access is lacking

# CONCLUSIONS

- ✓ Successful implementation of a multidisciplinary pilot access programme
- ✓ Synergistic approach is beneficial: advancing integration of research activities across domain and optimized use of multi-RI facilities + promoting multidisciplinary collaboration among user communities world-wide.
- ✓ To promote interdisciplinarity, coordinated research and access programmes are required.
- ✓ Financial support is key to trigger high-quality research and outcomes.
- ✓ Multidisciplinary access is a first step to study complex Earth system processes and interlinkages and address societal challenges.

➔ **NEED FOR A FUTURE CROSS-DISCIPLINARY ACCESS FRAMEWORK**