ECCSEL NatLab-Italy: A new infrastructure for CO2 storage researches in the Panarea natural laboratory, Tyrrhenian Sea

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European Carbon Dioxide Capture and Storage Laboratory Infrastructure

The ECCSEL consortium teams selected **Centres of Excellence on Carbon Capture and Storage** research (CCS) from 10 countries across Europe.

ECCSEL Preparatory Phase 2 (PP2) is aimed at establishing and operating **a new world class CCS distributed research infrastructure** (RI) in Europe.

This RI is planned to be in operation by **2015** and is foreseen to contribute significantly to the development of European research and innovation capacities.

The main objectives of the ECCSEL initiative are to:

- **Establish and manage access to a world class Carbon Capture and Storage (CCS) distributed research infrastructure (RI) in Europe (cooperating closely with the owners of the individual research facilities)**
- **Integrate and decide on upgrading existing laboratories across Europe and supplement with new ones**
- **Enhance European science, technology development, innovation and education in the field of CCS.**

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Is the Italian component of ECCSEL

- In the Preparatory Phase of ECCSEL, OGS proposed to contribute to the whole infrastructure, developing and managing the two natural laboratories of **Panarea** (Aeolian Islands) and **Latera** (Viterbo province), where to conduct experimental monitoring and assessment of **potential impact on ecosystems**, due to possible **leakages of CO_2** from storage sites.

- The final goal will be to make these laboratories **accessible to the community of researchers** from Europe and from countries outside Europe

- We start with the **Panarea** natural laboratory (year 1)

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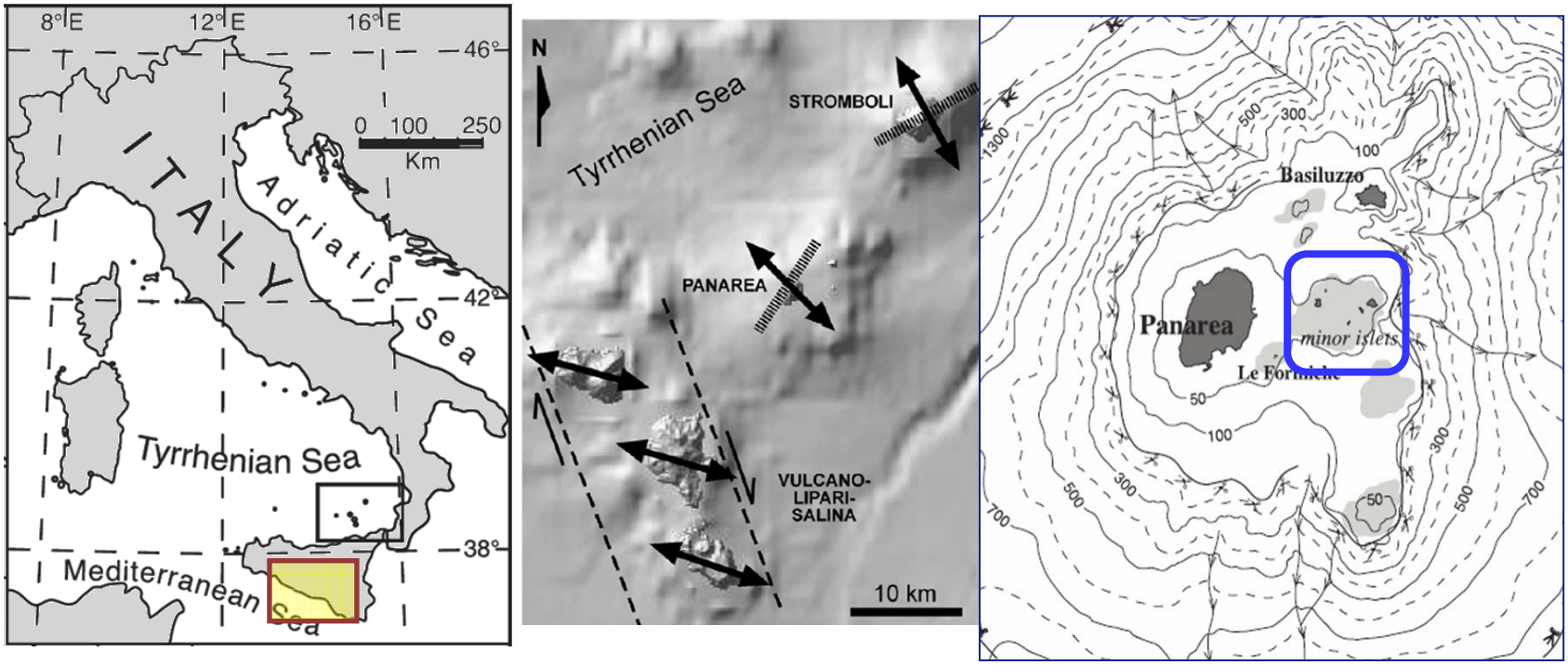
- The Italian Ministry of University and Research (**MIUR**) financed the project "***ECCSEL NatLab Italy***" with the aim:

  - To develop an excellent laboratory that could act as a **hub** of the **ECCSEL RI**
  - To **improve the potentiality** of the two important Italian natural laboratories (creation of a **permanent laboratory**, installation of **new and innovative equipment**)
  - To promote the **joint collaboration** between research centres, already carried out in the past ten years, in **national** and **international contexts**
  - To **attract excellent researchers** in the international panorama
  - To encourage public and private **stakeholders** to invest in the laboratory improvement

Panarea site description

Lucchi et al., 2007



- Panarea is located North of the Island of Sicily, is one of the **Aeolian Islands**, a series of volcanic islands and seamounts that also includes Stromboli and Vulcano
- It is located along NE-SW trending **extensional faults**
- It is the emergent part of a **submarine volcano** that is 1200 m high and 20 km wide
- Although **gas leakage** occurs in many locations, the most studied are to the east of the island near a series of islets (e.g. Bottaro Island)

Panarea test site

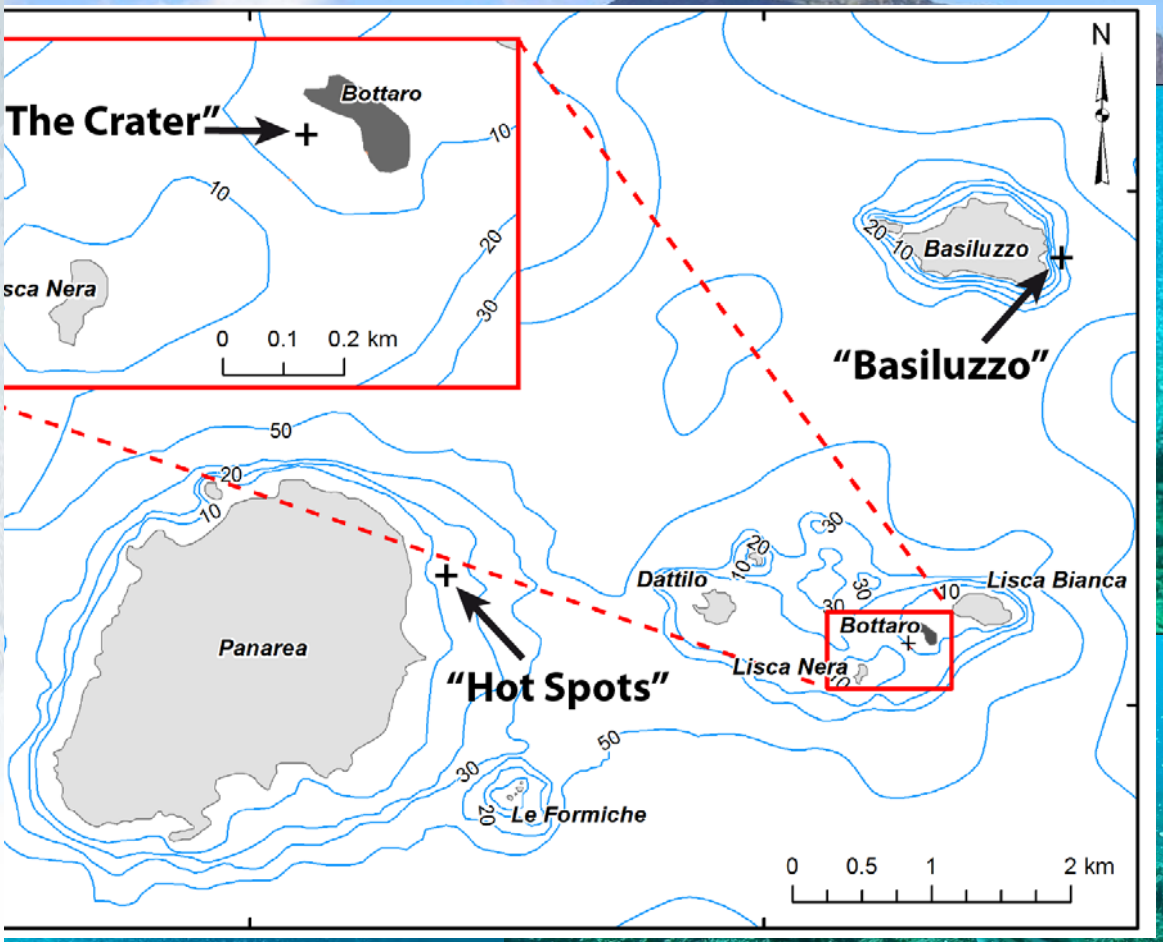
2004-2009

2010-2013

Eurofleets

PaCO2 (2011)

2011-2015



Courtesy of UniROMA

Eurofleets

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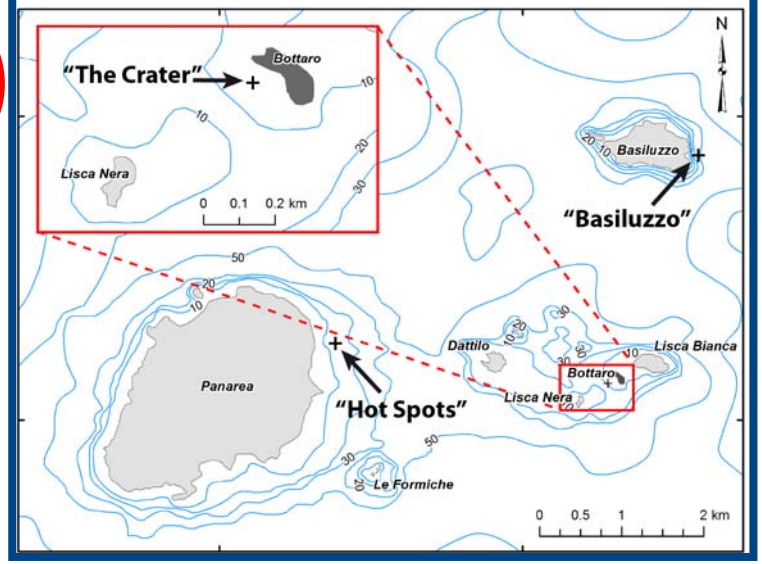
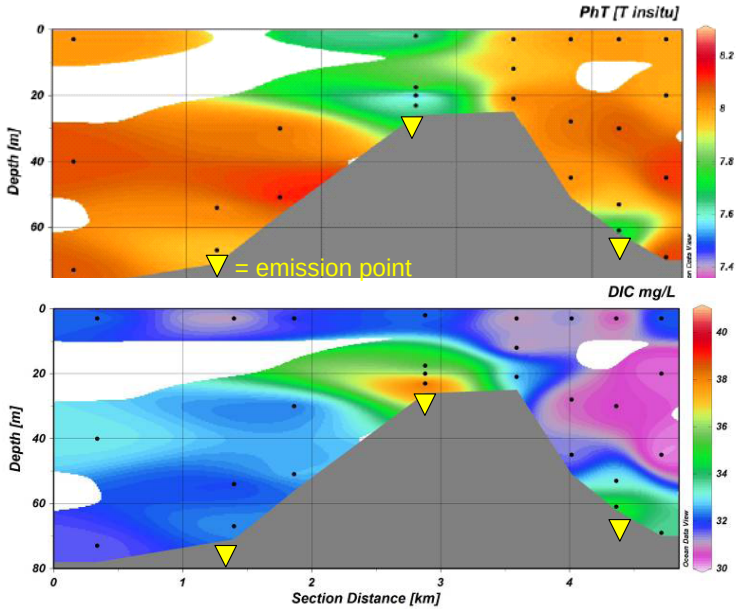
ECO2 Sub-seabed CO_2 Storage: Impact on Marine Ecosystems

RISCS CO_2

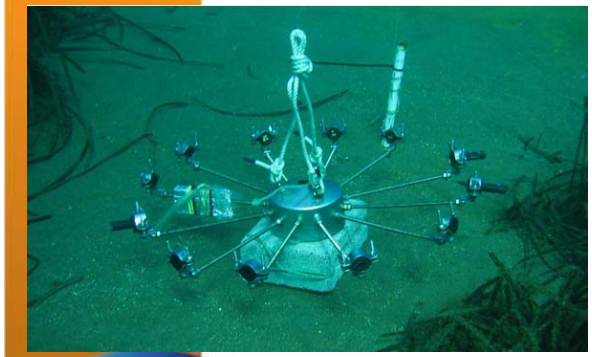
Panarea Test Site

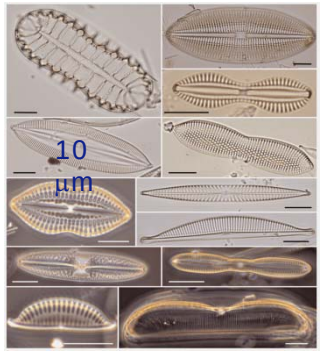


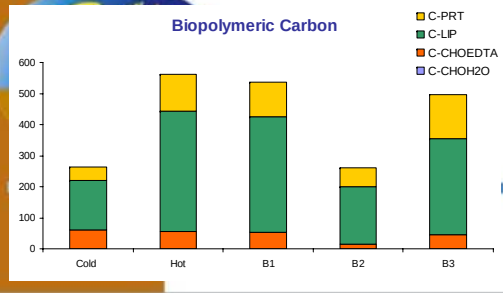
Water column

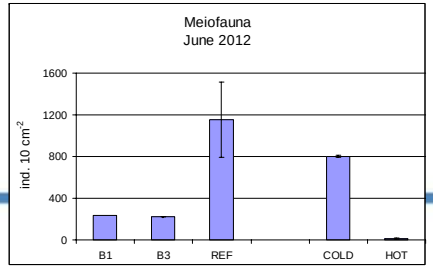


Sediments



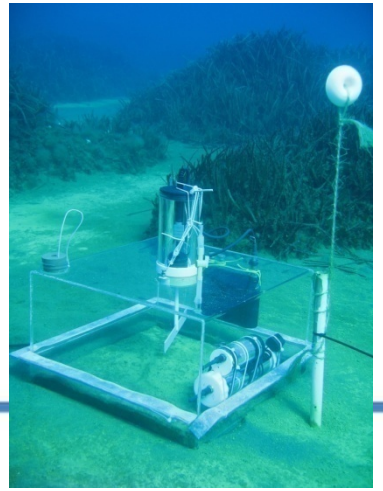






CO_2 fluxes

Courtesy of UniROMA



Work performed

- Research conducted during 4 field campaigns, one for each season
- Sampling conducted from small boat, and by scientific diver
- The same 700m long transect was measured each campaign for a large number of chemical and biological parameters. It consists of 7 stations, 3 points each, and crosses a number of known leakage areas.
- 2 ADCP current meters were deployed for the duration of each campaign
- benthic chambers were sampled by a diver to look at water fluxes
- A pCO_2 monitoring station, developed by the University of Rome, was deployed at the site for 2 months to monitor temporal and spatial variability of dissolved CO_2

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Panarea site peculiarities

- The Panarea site, where large volumes of **natural CO_2 are** leaking to the water column, allows to study **spatial** and **temporal variability**, potential **chemical** and **biological impacts** of CO_2 and their relationship, and test various **monitoring techniques**

- The Panarea test site has been investigated for more than 10 years. Multidisciplinary scientific studies led to the creation of a huge and valid **database**, that could be **accessible to the ECCSEL scientific community** performing researches In the study area

- At the same time, the ECCSEL community will help improve the **long term** verification of the scientific model through the **comparison** with **new data** acquired

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Work status

- Actually the **permanent laboratory in Panarea** (Aeolian Islands) is under development and it is partially equipped with the **instrumentation** of UniRoma.

- A **permanent office** is also under preparation, in order to guarantee a valid **logistical base**, fundamental for the scientific activities and the scientific community

- **Joint field campaigns** are currently being performed by OGS and UniRoma, providing new and interesting results to the scientific community

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Future developments

- Complete accessibility to the **ECCSEL community**
- Promotion of the **international cooperation**
- Improvement of **the permanent laboratory** and **permanent office**
- Development of the natural laboratory of **Latera**

THANK YOU FOR YOUR ATTENTION