



Comparative investigation of recent & paleontological, (semi-) aquatic ecosystems under volcanic-hydrothermal environmental conditions

Petrographic and volcanological characteristics of prevailing lithologies in Panarea Island, Italy

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Generals

Volcanoes, hydrothermal systems and connected ecosystems are common worldwide. Each system is causing variable but highly specific geological, ecological and physico-chemical parameters.

The CMAS Scientific Diving Center at TU Freiberg is conducting research at such a system in Panarea, Italy, since 2006. The system of Panarea was chosen due to its characteristics as a recent, active extreme-ecosystem in a shallow marine environment. It comprises nine different diving locations in various water depths (8 – 40 m) and geological settings (Fig. 1).

Generally, a prediction of volcanic activity by synthesis of different research projects (e.g. geology, water- / gas- chemistry, heat flux measurement, etc.) shall be attempted. Therefore, a broad span of interdisciplinary topics is in focus of our investigations. In 2017, the working-group "Geology" dealt with the detail-investigation and characterization of volcanic and sedimentary lithofacies. Their characteristics highly influence the system by determining any secondary / postsedimentary process. Fieldwork, sampling and documentation were carried to prepare further (laboratory-) investigation in Germany.

Objectives

Characteristic and representative lithofacies had to be identified and sampled using different appropriate methods. Type and tools for sampling

depended on the in-situ lithological properties of the rock. The results have to be combined with intensive detailed mapping and findings of neighboring disciplines.

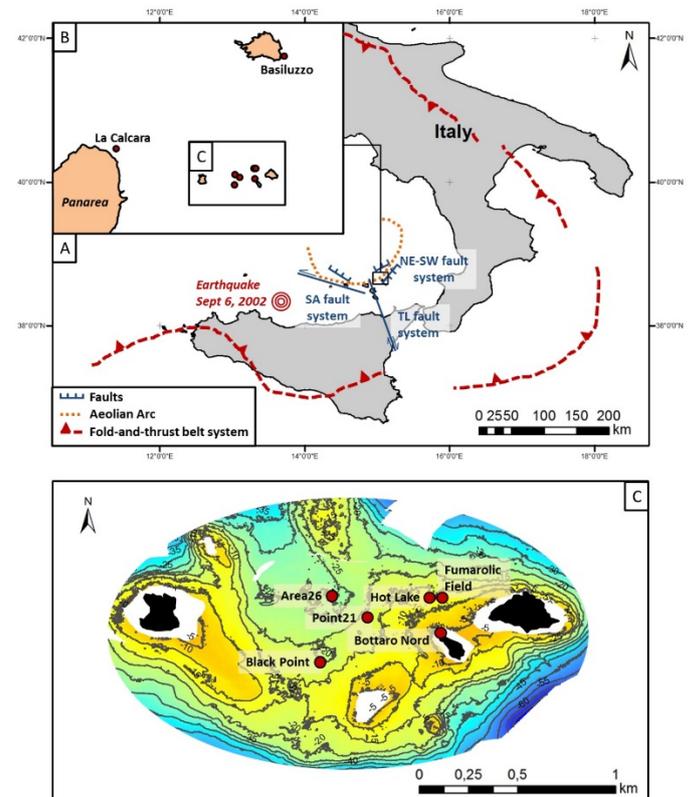


Fig. 1: Overview map on the area of investigation including the diving spots where samples were taken (Stanulla et al., 2017).



Methods

All geological work had to be carried out using methods of Scientific Diving. Due to the sediment cover of most of the points of interest, excavation work had to be carried out first (manual). Afterwards, the “cleaned” structures and rock surfaces were documented and samples were taken.



Fig. 2: Excavation of escape-structures at 26 m depth.

Preliminary Results

The accomplished fieldwork affords the collection of various samples, being characteristic for the prevailing volcanic-hydrothermal system. At all, around 50 samples of different facies types were taken (examples shown in Fig. 3). Their petrographic, mineralogical and volcanological properties prove the correctness of former hypothesis in the context of the development of fluid-discharge-structures and the geological situation in the working area.

In the following, they will be investigated in different laboratories (e.g. XRF) and prepared for further structural analysis (polished and thin sections).

The results will contribute to the clarification of detailed depositional processes and the genesis of the lithologies in the crater off Panarea.

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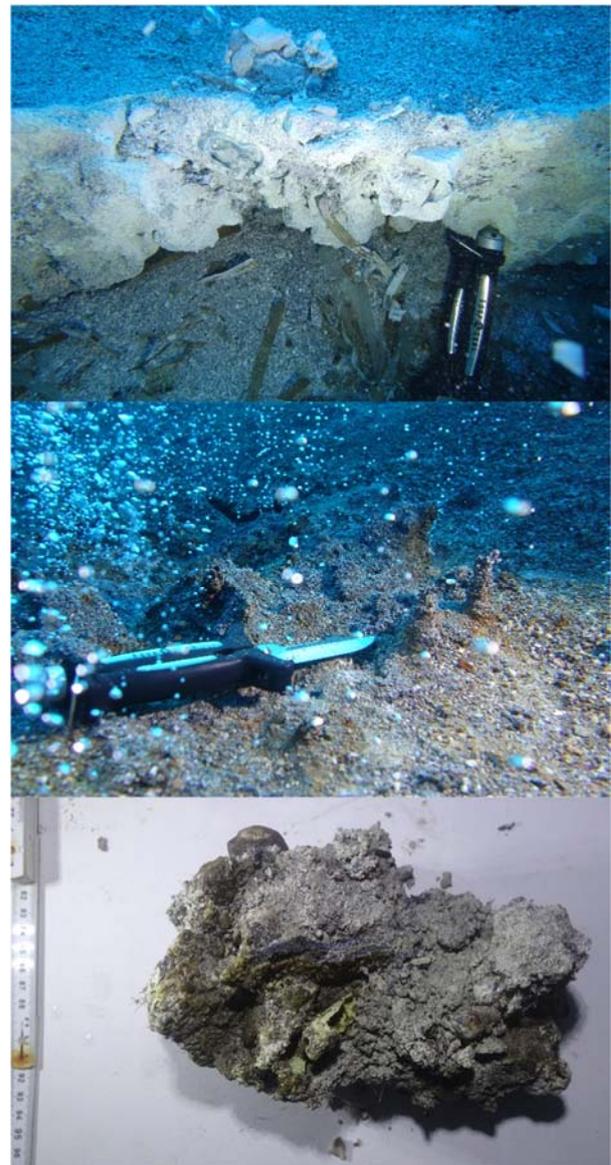


Fig. 3: TOP – Fluid discharge feature in conglomeratic facies at 26 m depth (Area 26). MIDDLE – Fluid discharge features in sandy facies cemented by massive sulphide ore mineralisation (?Marcasite) in La Calcara at 23 m depth. The minerals grew around active degassing structures. BOTTOM – Fluid discharge feature (tube, type TS) with sulfur-dominated mineral-precipitates from the location La Calcara (23 m depth).