

ENGLISH

Topic/Title

Plio-Quaternary volcanoclastic sedimentation in core successions of the Tyrrhenian Basin, IODP Leg 402: chronostratigraphic and volcanological implications

Proposer (Tutor)

Prof. Paola Petrosino

Research proposal

This proposal is addressed to the study of volcanoclastic deposits interbedded with marine and epicontinental sediments found along the successions drilled during the IODP Leg 402 (Tyrrhenian Continent-Ocean Transition) along a transect in the Central Tyrrhenian and crossing the Vavilov Basin. About 400 samples are already available for the shore-based scientific team including the co-proponent. The main objectives of this research can be summarized as follows:

- Building a tephrostratigraphic framework of the area to provide a chronology of the Plio-Quaternary sedimentary pile covering the basement. This is mandatory within Objective 1 of the proposal: “To determine the kinematics and geometry of the extensional deformation in space and time in the basin”. This activity will focus on the record located close to the Campania margin and characterized by long and well preserved stratigraphic succession.
- Defining an “event stratigraphy” and mapping large volume volcanoclastic bodies (*megabeds*) in the area (with or not interim storage) integrating petrophysical and seismic data already available or to be acquired during future oceanographic cruises. The achievement of this goal implies a properly discrimination between primary and secondary volcanoclastic deposits and the understanding of transport and depositional mechanisms

from the source area (source to sink approach), which are, up to date, one of the main key points for volcanoclastic sedimentology and hazard assessment.

- Reconstructing the Italian explosive volcanic history from the marine record, possibly older than the Pleistocene and including the activity occurred at Sardinia region. The achievement of this objective is favoured by the availability of long (ca 300 m) and well preserved sedimentary sequences and of tephra samples (probably of Pliocene age) from a drilling site located close to the eastern Sardinia margin.
- Developing new emerging analytical methods on ancient tephra to discriminate between volcanic sources related to different geodynamic settings.

Research Plan

Research plans can be organized as follows:

I Year

The first year will be dedicated essentially to the preliminary selection and tephrostratigraphic characterization of:

- samples selected along the most continuous and best preserved drilled record, which should ensure a preliminary chronological framework for the sedimentary sequence covering the Miocene basement;
- samples from volcanoclastic units characterized by large volume and correlated throughout sequences in the Vavilov Basin (*megabed*). A detailed information will be provided in terms of morphoscopy and lithology.

Data produced during this phase will be integrated with those obtained by other disciplines (micropaleontology, petrophysics and seismics). Where lacking, seismic data could be acquired onboard of the CNR R/V Gaia Blu. Attending meetings with the IODP onboard scientific party are also planned.

II Year

- During the **Second year** the number of analysed samples will be intensified. This will be done according to selected time windows of particular stratigraphic interest and to occurrences of good potential isochrones from other sites.
- In case of need, extra samples will be available at the IODP core repository in Bremen. For key topics, the submission of papers is planned according to IODP data policy.

III Year

- The **Third year** will focus on the elaboration of results, submission of papers and dissemination. The last six months, in particular, will be dedicated to the writing of the PhD thesis.

Additional notes:

Type of data on volcanoclastics (glasses and minerals), techniques and collaborations :

Morphology and Major-elements content: SEM-EDS at DiSTAR, WDS at an external lab to be defined.

Minor and trace-element content: LA-ICP-MS at CNR-IGG (dott. Alberto Zanetti)

Isotope Composition (Pb, Sr-Nd) : MC-ICP-MS at Distar (Prof. Massimo D'Antonio)

Petrophysical properties: CNR-ISMAR

XRF: Walter Menapace, MARUM-Bremen University

