# Title: Physical properties of Messinian evaporite deposits within Tyrrhenian Basin: environmental and tectonic implications.

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# Proposal

The focus of the research project here proposed is to characterize in detail the evaporite deposits present in the southern Tyrrhenian basin deposited during the Messinian salinity crisis (MSC). This analysis will be carried out, at the basin scale, from different points of view (petrophysical, structural, lithological and seismo-stratigraphic) using high penetration seismic data (CROP, CS, MS, SITHERE and MEDOC) and high-resolution Sparker data (acquired in the ‘80 - '90) available at the Institute of Marine Sciences of the CNR. The geophysical data will be integrated with the data acquired during the recent IODP Exp. 402 campaign, curried out in the central Mediterranean, and with the data acquired during the previous ODP Leg 107 expedition carried out in the Tyrrhenian basin. During the first phase, the project involves the definition of the seismic facies present in the basin and their characterization from a petrophysical and lithological point of view at the drilling sites. Afterwards, it is planned to carry out a revisit the main structural and depositional environment of the Messinian Units across the southern Tyrrhenian Sea; it is also planned to carry out the analysis of salt tectonics implications and the depositional paleo-environment. Finally, in the interpretative phase, comparative analysis will be carried out with similar basins to the Mediterranean one that have recorded the MSC, such as the Levantine basin.

# Research Program

# The PhD candidate will have access to the ISMAR seismic dataset, the IODP-42 collaboration petrophysical and core data . The first year the student will spend time to revisit the seismic dataset and the petrophysical data from the IODP dataset; the second year reprocess the data to create a seismic facies model and reconstruct a depositional and structural model of the main salt unit. Third year a comparison with the surrounding basin (Levantine to north Tyrrhenian sea) to explore the depositional context who controlled the Messinian deposits

# Considering that all data that will be used are owned by ISMAR-CNR, the project envisages that a large part of the seismic and petrophysical data analysis activities will be carried out at the ISMAR laboratories based in Bologna. To carry out this work, a project will be built that combines all available data (geophysical, geological, petrophysical and geochemical, such as XRF data), synthetic data will be integrated with real data, and a detailed correlation between geophysical and geological data will be produced. Furthermore, a first interpretation of the seismo-stratigraphic facies throughout the basin will be made. Part of the correlation activities between seismic and petrophysical data and interpretation of the different evaporitic facies at the basin scale will be carried out at the Earth Sciences Department of Naples. Access to the rock and sediment samples that are stored in the Bremen repository can be done through the IODP projects already active at the ISMAR headquarters or a new project focused on specific cores of interest can be proposed. Another part of data analysis could be carried out abroad under the supervision of researchers who participated in Exp. 402. In this case, a period could be spent at the University of Nebraska (Prof. Irina Filina) or at the Sorbonne University (Prof. Christian Gorini) in order to carry out part of the correlation work between petrophysical and geophysical or geological data.