Workshop IODP-Italia "Lo stato delle proposte di perforazione nell'area mediterranea"
Scientific Drilling in the Mediterranean Sea
Roma, 15-16 gennaio 2018

Abstract
Perforazioni Mission Specific Platform in corso

Expedition 381 Corinth Active Rift Development: MSP October-December 2017

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Abstract

The aim of IODP Expedition 381 was to sample sediments deposited in the Corinth basin formed by the earliest stage of continental rifting. In the Corinth rift, this tectonic process has only been active for a short time - less than approximately five million. Details of the Corinth basin's changing environment from glacial to interglacial times are poorly known and the precise timing of transition from lacustrine to partly marine conditions is unconfirmed as well as the relationship to the interacting controls of basin subsidence, sill elevation and eustatic sea level.

Between 23 October and 18 December, the expedition was operating on the drillship Fugro Synergy, in the Gulf of Corinth in Central Greece. The expedition successfully cored 1.905 metres of section and recovered 1.645 metres at the three planned sites and collected a suite of logging data at two sites. The three sites targeted both the temporal and spatial variation of the rift processes within the Gulf. Site M0078, located on a fault horst block, cored sediments related to both the most recent and the previous phase of rifting. Site M0079 cored an expanded section of the recent rift phase to sample the stratigraphy at high resolution. Finally, Site M0080 in the Alkyonides Gulf at the eastern end of the rift was drilled in order to test along-strike variation in rift history and paleoenvironment, with evidence of early rift history at the base of the hole. Cores were not split offshore, but physical properties were measured on each section and samples were taken for preliminary paleontology, sedimentology and pore water geochemistry. Preliminary on-board analyses revealed new details on the changing environment as sea level fluctuates and tectonics drives uplift and subsidence. The paleontological data coupled with depositional environments of the sediment relative to sea level will allow the science party to better resolve how the rift has subsided and extended with time and how individual rift faults have slipped during rift history.

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The proposed research on Leg 381 ostracodes involves scientists from Italy and the US. and will be coordinated with shipboard micropaleontologists and co-chief scientists. It will focus on 3 main objectives: 1) to determine the rifting history of the Corinth Rift through various biostratigraphic, magnetostratigraphic and orbital tuning studies. Because there is a large literature on Cenozoic ostracode biostratigraphy in the Mediterranean, the ostracode work might contribute to biostratigraphy of new cores carried out in conjunction with shipboard foraminiferal and nannofossil experts. 2) For undisturbed hemipelagic sections for which benthic and/or planktic O18 isotope stratigraphy [or other orbital tuning methods] is available, ostracode faunal and shell geochemical (Mg/Ca ratios) analyses can be used to reconstruct bottom water temperature and ocean circulation during glacial and interglacial cycles. It is likely that such orbitally-driven changes will involve large sea level oscillations, which ostracodes are especially useful for reconstructing, especially along marine margins. 3) Some core sites might contain sediments transported downslope during faulting and tectonic activity. Due to the strong, modern depth-related faunal gradients in ostracode assemblages, and species' sensitivity to changes with depth in temperature, dissolve oxygen and other factors, ostracodes have been used in many regions to identify allochthonous [downslope transported] sediments. Often sediments on continental slopes contain mixed assemblages of in situ bathyal species and transported species from shelf, coastal, or even non-marine environments.

The full science party will convene at the MARUM - Center for Marine Environmental Sciences at the University of Bremen, Germany, in February 2018 to split the cores and perform full analysis and sampling. The science party is tackling a range of subjects including rates and styles of evolution of an early rift, climate and surface processes in eroding and supplying sediment to a rift basin, regional paleoenvironment and paleoclimate, and geohazards related to active rift faults and earthquakes.