

International ocean drilling expedition obtains unique record of plate tectonic rifting and changing climate in Greece

March 9 2018



IODP Expedition 381 collected 1.6 kilometers of sediment core from the Corinth Rift in Greece. Credit: University of Southampton

Core samples taken during an international ocean drilling expedition are yielding the most high-resolution, extended record of continental rifting ever obtained.

A team of researchers from around the world, working as part of the Corinth Active Rift Development expedition, collected 1.6 kilometers (one mile) of sediment core and data from boreholes at three different

locations in the Gulf of Corinth in Central Greece. The samples provide a continuous, high resolution record of complex changes in past environment and rift-faulting rates over at least the last one million years.

The Corinth Rift is one of the most seismically active areas in Europe where one of the Earth's tectonic plates is being ripped apart causing geological hazards including earthquakes, tsunamis and landslides. This rifting process is the focus of the International Ocean Discovery Program (IODP) Expedition 381 led by Co-Chief Scientists Professor Lisa McNeill from the University of Southampton and Professor Donna Shillington of the Lamont-Doherty Earth Observatory of Columbia University in the USA.

The Expedition team collected the [core samples](#) whilst aboard the drilling vessel Fugro Synergy between October and December 2017. The cores were then opened, analysed and sampled by the scientific team in February 2018 during a month of intensive work at the University of Bremen in Germany.

Analysis of the cores recovered from deep below the seafloor reveals a series of very complex changes in the chemical and biological conditions within the waters of the [basin](#) over the last approximately 0.5 million years. These changes are driven by the global growth and shrinkage of the Earth's ice sheets, which in turn control the height of global [sea level](#).

Fluctuations in sea level cause the Gulf of Corinth basin to switch between a normal marine environment, when the Gulf was connected to the world's oceans, and a wide range of more complex conditions when sea level is low. The rift's sediments show that an unusual range of organisms lived within the basin under these complex conditions.

The data collected will be used to calculate how quickly the active

earthquake-generating faults are slipping within the rift. This can be used to assess the earthquake hazard potential of the region, which has a populated coastal zone around the Gulf and the city of Athens nearby that can be impacted by future earthquakes.

"The new cores are revealing exactly what we hoped: The potential to accurately calculate the activity of important faults that regularly generate earthquakes with magnitudes 6 to 7 in the area," said Professor McNeill. "Researchers have been working in the Corinth Rift region for many decades, examining sediments and active fault traces exposed on land and using marine geophysics to image the basin and its structure below the seafloor. The missing piece of the jigsaw puzzle has been the age of the basin sediments that record the history of rifting. We know now that the core samples will enable us to complete this piece of the puzzle. This in turn can be used to calculate fault earthquake potential, and, on a longer timescale, unravel the sequence of events as the rift has evolved."

Professor Shillington added: "The new discoveries resulting from this expedition will help us to understand other active and ancient rift zones around the world, including others with high hazard potential. The complex story from the microfossils preserved in the sediments and their implications for the living conditions in the basin was unexpected and will significantly widen the impact of the project. Analysis of these results will take many months and we are excited to see what they reveal."

Continental rifting is fundamental for the formation of new ocean basins, and active rift zones are dynamic regions of high hazard potential. The Corinth Rift is one such location and serves as a unique laboratory in an area of Europe with some of the highest levels of earthquake activity. Geologically the Corinth Rift is very young (only a few million years old) and provides a unique chance to study the very

first stages of the splitting apart of a continent and changing climate in the eastern Mediterranean. Young rift basins fill with eroded sediments that are also sensitive recorders of past changes in climate and sea level and of the chemical and biological conditions of the rift basin.

Provided by University of Southampton

Citation: International ocean drilling expedition obtains unique record of plate tectonic rifting and changing climate in Greece (2018, March 9) retrieved 20 March 2024 from <https://phys.org/news/2018-03-international-ocean-drilling-unique-plate.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--