

## Expedition Co-Chief Scientists

### Professor Lisa McNeill

Lisa is Professor of Tectonics in the University of Southampton's Ocean and Earth Science department, based at the National Oceanography Centre Southampton, UK. Her research focuses on deformation processes within active tectonic regions, particularly subduction zones and active continental rifts, their tectonic evolution, the development and properties of active faults, the interaction of tectonic, sedimentary and climatic processes, and natural hazards. Her work on active rifting has focused on the natural laboratory of the Corinth Rift in the Eastern Mediterranean, and she has worked here since 2000 with colleagues throughout Europe and the USA. Lisa has participated in 16 research cruises worldwide including 4 ocean drilling expeditions, as Co-chief Scientist for Expedition 319 drilling the Nankai subduction zone and for Expedition 362 drilling the Sumatra subduction zone.



### Associate Research Professor Donna Shillington

Donna Shillington is a Lamont Associate Research Professor in the Marine Geology & Geophysics division at Lamont-Doherty Earth Observatory. Her research focuses on deformation, magmatism and sedimentary processes at ancient and active plate tectonic boundaries, which she studies by combining geophysical imaging with complementary constraints from geology, geochemistry and other fields. Her other current projects are focused in the Alaska subduction zone, the Malawi Rift in the East Africa Rift System, and the Atlantic rifted margins off the US and Spain. She has sailed on 14 research cruises around the world, including Ocean Drilling Program Leg 210 on the Newfoundland rifted margin.



## Expedition Operator

Mission-specific platform operations are conducted for IODP by the European Consortium for Ocean Research Drilling (ECORD), which represents the ocean-drilling efforts of 15 European countries and Canada. Operations are undertaken by the ECORD Science Operator comprising the British Geological Survey (BGS), the University of Bremen and the European Petrophysics Consortium comprising the universities of Leicester, UK, Montpellier, France, and Aachen, Germany.



During the expedition regular updates are posted on the expedition webpage at:

<http://www.ecord.org/expedition381>

## International Ocean Discovery Program

The International Ocean Discovery Program (IODP) is an international marine research programme supported by 23 countries, which explores Earth's history and structure recorded in seafloor sediments and rocks, and monitors sub-seafloor environments. Through multiple platforms - a feature unique to IODP - scientists sample the deep biosphere and sub-seafloor ocean, environmental change, processes and effects, and solid earth cycles and dynamics.

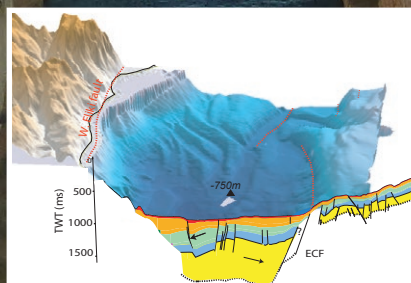
IODP is funded by a number of entities acting as international partners: three of the IODP members are platform providers, the U.S. National Science Foundation (NSF), Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT), and ECORD. Additional funding is provided by the Australia-New Zealand IODP Consortium (ANZIC), India's Ministry of Earth Sciences (MoES), the People's Republic of China Ministry of Science and Technology (MOST), the South Korea Institute of Geoscience and Mineral Resources (KIGAM) and Brazil's Coordination for Improvement of Higher Education Personnel (CAPES) programme.

**Credits:** front cover, the Corinth Canal; insets from top, westward perspective view of the structure of the rift of Corinth (credit Rebecca Bell), eastward view of the landscape of the Gulf of Corinth. Inside, map and logo: ECORD Science Operator (ESO), drillship (GIBFRAN46, marinetraffic.com).



**IODP**  
INTERNATIONAL OCEAN  
DISCOVERY PROGRAM

# The Corinth Active Rift Development Expedition



*Faulting, landscape  
evolution and past climate  
in a seismically active rift*

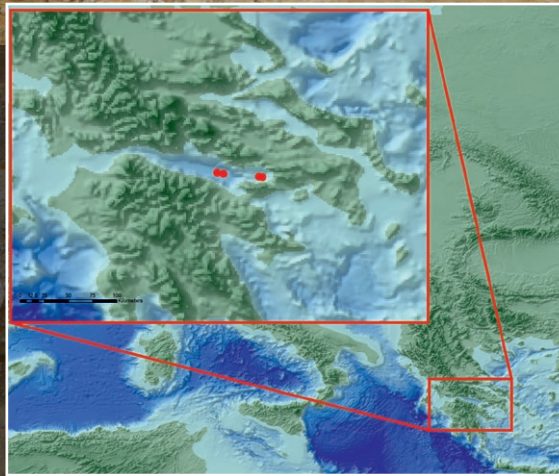
## IODP Expedition 381



[www.iodp.org](http://www.iodp.org)  
[www.ecord.org](http://www.ecord.org)

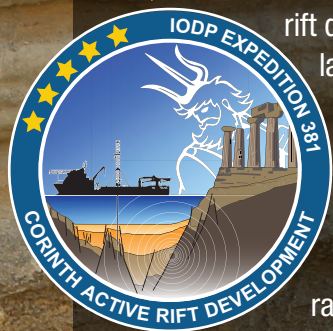


Continental rifting is fundamental for the formation of ocean basins, and active rift zones are dynamic regions of high geohazard potential. The Corinth Rift, Greece is a unique laboratory situated in one of the most seismically active areas in Europe. Geologically the Corinth Rift is a young rift, forming in the last 5 million years. The main rift today is situated across a marine basin, which with its closed drainage system and high sedimentation rates, makes it an ideal location to examine early rift development and how the landscape responds to tectonic and climate forcing factors.



implications for earthquake activity in a developing rift?

- **Paleoclimate reconstruction** - What was the climate and paleoenvironment in the Eastern Mediterranean like in the past? Can we provide high-resolution records for past environments and climates from the sediments deposited within the rift?



What is exciting about this project is that with high strain rates across the rift, extension rates up to 10-15 mm/yr, and

high sedimentation rates, it may be possible to gain an insight into the rifting process with unprecedented resolution in both space (1-10's kms) and time (20-50 kyr).

The team will also be able to look at the fluctuations between the rift being a marine basin and an isolated lake. It is hypothesised that this environmental fluctuation relates to 100,000 yr climate cycles, making the basin a lake when sea levels are low in glacial times. However, the only way to address this and obtain dates for these cyclic sediment packages is by coring.

The scientific team will core in three different locations, up to a depth of 750 m below the seabed, with the aim to address questions on four main themes:

- **Structural Evolution** - How does the rift actually evolve and grow and over what timescale? How does the activity on faults change with time?
- **Surface Processes** - How does the development of the rift and movement on the faults modify the drainage of sediments into the rift? How does the landscape respond to tectonic and climatic changes?
- **Natural Hazards** - As one of the most seismically active areas in Europe, what are the

The offshore coring phase will last for 47 to 56 days and involve coring deep beneath the seafloor from a specialised geotechnical vessel. Approximately 30 scientists, including two Greek participants and the two Co-chief Scientists, will participate in the expedition Science Party, which is planned and conducted by the European Consortium for Ocean Research Drilling (ECORD) as part of the International Ocean Discovery Program (IODP).

Due to the limited facilities available offshore, only a minimum number of measurements will be made on the vessel. For this reason, not all members of the Science Party will participate offshore. The entire team will meet for an onshore phase (the "Onshore Science Party")



held at the IODP Bremen Core Repository and MARUM laboratories in Germany, planned for early 2018. Here, the core will be split into a working and an archive half. The working half will be described, analysed and sampled by the scientists. The core materials will be preserved at the IODP Bremen Core Repository for future research needs by the global scientific community. The initial results from the expedition will be published in peer-reviewed journals, the IODP Proceedings, and in the IODP-IODP Journal "*Scientific Drilling*". One year from the end of the onshore phase, the cores and all shipboard data acquired during the expedition become available for use by any scientist who wishes to study them.