



Expedition 381 Corinth Active Rift Development ends the offshore phase



IODP Expedition 381 was operating on the drillship, *Fugro Synergy*, in the Gulf of Corinth in Central Greece between 23 October and 18 December. The aim of the expedition was to sample sediments deposited in a 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 years - and therefore the details of how the process starts and evolves can be captured. The science party are tackling a range of subjects including rates and styles of evolution of an early rift, the relative roles of tectonics, 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.

The expedition was extremely successful, coring 1905 metres of section and recovering 1645 metres at the three planned sites and successfully 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. A subset of the 32-member science party were onboard, with nine scientists in total from institutions in France, Greece, Norway, Spain, the UK and the US. ESO personnel on board managed operations, curation, database, petrophysics and downhole measurements, and geochemistry.

The Corinth basin is partially open to the Mediterranean Sea, and preliminary onboard analyses are already revealing new details on the changing environment as sea level fluctuates and tectonics drives uplift and subsidence. A wide range of paleoenvironments were evident from the onboard paleontological analyses but will need significant additional research to fully resolve. Different depositional environments are indicated by the sediment lithologies across the sites, from deep



Left: ESO Curator Patrizia Gepreags and Drilling Coordinator Apos Tsiligiannis sectioning core (photo credit: E. Le Ber, ECORD/IODP). Right: Drillship *Fugro Synergy* in the Gulf of Corinth during Expedition 381 (photo credit: J. Everest, ECORD/IODP).

to shallow basin to terrestrial. 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.

Geochemical analyses of the pore waters have yielded intriguing downhole profiles of alkalinity, salinity and ammonium and are both unexpected and variable between the three sites. Downhole measurements collected during the expedition included wireline logging data (magnetic susceptibility, spectral gamma ray, sonic and resistivity) and *in-situ* temperature and friction/shear strength measurements.

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. "At that time, we will see the full splendour of the core contents and be able to work as a larger group for the first time!" says Prof. Lisa McNeill, Co-Chief of the expedition. The new results on how the earliest phase of rifting takes place and impacts the paleoenvironment are expected to make significant advances that can be

used to understand other active and ancient rifts around the world.

A number of education and outreach activities have already taken place as a part of the offshore expedition and more are planned for the onshore science party in Bremen. A press event at the start of the expedition generated significant attention from media in Greece including a news slot on a popular national TV station and coverage in multiple newspapers. Ship to shore calls to a school in Germany, the ECORD School of Rock and to the University of Athens Department of Geology and Geoenvironment proved popular, as well as the opportunity for a ship to ship call between Expedition 381 and Expedition 372 on the *JOIDES Resolution*. An active blog - <https://esoexp381corinthactiveriftdevelopment.wordpress.com> - includes contributions about science, drilling and life at sea. Outreach to schools, universities and the media is planned for Bremen.

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Expedition web page:
<http://www.ecord.org/expedition381/>



The offshore Expedition 381 team: science party members, drill crew and ESO team onboard the Fugro Synergy (photo credit: J. Everest, ECORD/IODP).

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