Formation of the Gulf of Corinth rift, Greece

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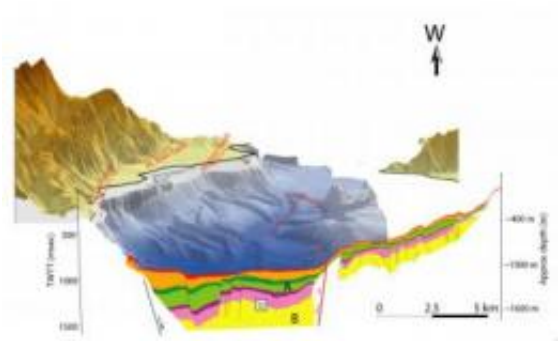

This is the view to the west along the Gulf of Corinth active rift showing the bathymetry of the seafloor within the active offshore rift and a cross section beneath the seafloor interpreted from a seismic reflection profile. Red dashed lines on the seafloor and on the coast to the south are the major normal faults which control the region's morphology and the opening of the rift. Colored layers within the cross section represent layers of sediment deposited and deformed as the rift subsides. Credit: NOCS

A study of the structure and evolution of the Gulf of Corinth rift in central Greece will increase scientific understanding of rifted margin development and the tectonic mechanisms underlying seafloor spreading and deformation of the Earth's crust.

"The Gulf of Corinth rift is an ideal natural laboratory for studying early rift history," said Dr Lisa McNeill of the University of Southampton's School of Ocean and Earth Science (SOES) at the National Oceanography Centre, Southampton (NOCS): "The rift is less than five million years old and is relatively easy to interpret as its structure has not been significantly complicated by geological events over a long period of time. The rifting process is also the source of hazardous earthquakes in the region"

Using available marine and terrestrial data, including high-resolution seismic reflection profiles from a research cruise aboard the MV Vasilios in 2003, the researchers analysed fault evolution across the entire rift system, producing a fault framework for the rift and revealing patterns of basin subsidence through rift history. They also estimated when faults became active and the rates at which they slip.

"Our analysis shows how the system of faults associated with the Corinth rift has evolved over time, which can now be compared with other rifts worldwide and with computer models of rift development," said Dr Rebecca Bell, former SOES PhD student at the National Oceanography Centre, now working at GNS Science, New Zealand and lead author of the research.

The Corinth rift is about 100 kilometres long and 30 kilometers wide. It is under high strain, its north and south sides separating due to tectonic forces by up to ~15 milimetres per year.

The researchers find that the rift has undergone major changes in fault activity and the shape of the rift basin during its short history. The currently active Gulf of Corinth Basin is thought to have formed only 1-2 million years ago.

Before around 400,000 years ago, two separate areas of sediment deposition or basins (20-50 kilometres long) were created, controlled by north- and south-dipping faults. Since this time, these basins have coalesced into one (80 kilometres long) controlled by multiple connected faults.

The researchers conclude that isolated but nearby faults can persist for around a million years and form major basins before becoming linked deep below the Earth's surface: "Basin subsidence and the eventual transition to seafloor spreading are controlled by the development and interaction of fault systems established in the early stages of continental rifting."

More information: Bell, R. E., McNeill, L. C., Bull, J. M. Henstock, T. J., Collier, R. E. L. & Leeder, M. R. Fault architecture, basin structure and evolution of the Gulf of Corinth Rift, central Greece. Basin

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