

Seismic Survey Investigates Ancient Continental Breakup



An international group of scientists has embarked on a shipboard expedition to study how the Earth's crust was pulled apart in an area beneath the Atlantic Ocean off the coast of Spain. The group includes geophysicists from University of Southampton Ocean and Earth Science (SOES) based at the National Oceanography Centre in Southampton, UK.

From the research vessels RV *Poseidon* and RV *Marcus G. Langseth*, the team will use sound waves to create a three-dimensional picture of the rocks in the Deep Galicia Basin, located to the west of northern Spain. The new datasets will improve understanding of how continents stretch and break apart, creating new ocean basins in between.

The team will drop 78 seismic detectors (image) onto the seabed in cooperation with colleagues from GEOMAR Helmholtz Centre for Ocean Research Kiel, NOCS' German counterpart, led by Dr Dirk Klaeschen.

Led by Professor Dale Sawyer of Rice University, scientists aboard RV *Marcus G. Langseth* will then image the Earth's crust in three dimensions over a 64 x 22 kilometre region of the ocean floor.

More than 15km below sea floor

Seismologists use sound waves to image structures below the sea floor in much the same way that ultrasound techniques image organs in the human body. The seismic instruments aboard the US vessel RV *Marcus G. Langseth* will allow seismologists to build up a picture of the faults and continental blocks up to 15 kilometres below the sea floor. Pressure guns towed behind the ship produce sound waves that penetrate the rocks and bounce off fault planes and boundaries. The reflected sound waves are then recorded by the detectors on the sea floor as well as instruments called hydrophones that are towed behind the ship.

The scientists are particularly interested in a strongly reflective fault surface – known as the 'S reflector' – as well as the structures above and below it. This fault is thought to have formed when the crust was pulled apart. It is the boundary between the overlying crustal blocks and the underlying mantle rocks that have been penetrated by seawater. The scientists will also use the seismic images to work out how and in what order the different blocks moved as the crust was stretched.

About 250 million years ago, Spain and Newfoundland in Canada were connected as part of a larger continent. Then around 220-200 million years ago, the continental crust in between began to spread apart, exposing the mantle beneath and eventually forming new oceanic crust by volcanic activity.

You can follow the expedition and learn about life on the ships on the [scientists' blog](#).