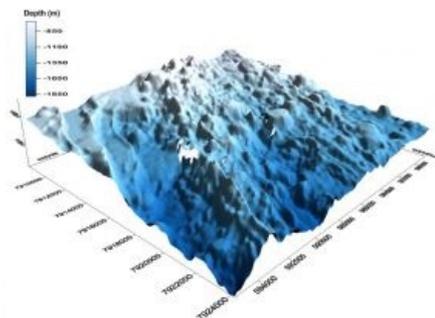


Evidence of Large Episodic Volcanic Events on the Seafloor



Scientists at the GEOMAR Helmholtz Centre for Ocean Research Kiel in Germany who are trying to understand how the Earth's surface was formed have used new technology to date lava flows at the North Kolbeinsey Ridge, located about 500 kilometres north of Iceland. They found evidence of large, deep-sea volcanic eruptions which probably formed almost half of the Earth's crust. The study will be published in the next issue of the international journal '*Earth and Planetary Science Letters*'.

The Icelandic volcanic eruptions of Eyjafallajokull and Bardabunga have produced impressive images of the volcanic activity on the island in recent years. As Iceland is part of the Mid-Atlantic Ridge these eruptions also strikingly demonstrate how new material for the Earth's crust is permanently produced at mid-ocean ridges. The scientists present

evidence that volcanic eruptions many times larger than those recently observed on Iceland are likely to have formed nearly half of the Earth's surface.

The study focuses on the world's mid-ocean ridges formed thousands of metres underwater by volcanic eruptions on divergent tectonic plate margins, where the Earth's tectonic plates are moving apart. Using a new method developed at GEOMAR the scientists have been able to simultaneously survey and date young lava flows on a segment of the Mid-Atlantic Ridge north of Iceland and show that large-volume, episodic eruptions must be occurring.

Acoustic Data and Samples

The method, developed using the autonomous underwater vehicle (AUV) ABYSS at GEOMAR utilises acoustic data of the seafloor collected by the robot alongside records from sediment cores collected in the vicinity. It allows any young seafloor surveyed to be dated without any destructive sampling.

Applied for the first time during research cruise POS436 aboard the German research vessel *Poseidon* to a section of the Mid-Atlantic Ridge north of Iceland called the North Kolbeinsey Ridge, the scientists were able to prove that there must have been repeated phases of volcanic eruption on a timescale of at least tens of thousands of years.

According to Dr Yeo, in the past the AUV was used predominantly for mapping the seabed, but now we can also use it to determine the age of young lava fields. The data obtained identified the position of the mid-ocean ridge in the area for the first time and revealed that despite there being 18 lava flows in the area in the last few thousand years, the volume of the eruptions was not enough to build the amount of new crust required by the plate separation.

Unmapped

Much of the mid-ocean ridge system is unmapped and very little has been studied in any detail, but this new method has big implications for future studies. An expedition, planned for July 2016, will return to the area to carry out further surveys. On this cruise researchers will be working with a new camera system developed by Dr. Tom Kwasnitchka at GEOMAR and the remotely operated vehicle *Phoca* to constrain the new dating method better and collecting samples to investigate the geochemistry of the lava flows that have been imaged.

More Information

Yeo, I.A., C. W. Devey, T. P. LeBas, N. Augustin, A. Steinführer (2016): Segment-scale volcanic episodicity: Evidence from the North Kolbeinsey Ridge, Atlantic. *Earth and Planetary Science Letters*, 439, 81–87, <http://dx.doi.org/10.1016/j.epsl.2016.01.029>