Press Release

44/2023

The geochemical fingerprints of hotspot volcanism

On-site work confirms numerical models for the formation of different expressions of volcanic chains

02.08.2023/Kiel. When material rises through the Earth's mantle to the surface, the decrease in pressure results in melting, which can form volcan

over the plume tail – or the stem of the mushroom – younging in the direction opposite to plate motion. The Tristan-Gough volcanic chain, however, is more than 400 kilometres wide at its younger end – which cannot be explained by the classical mantle plume model.

“The geochemical fingerprint shows a spatial zonation along almost the entire volcanic chain. Based on our geochemical and age data, combined with plate tectonic reconstructions, the Tristan-Gough plume seems to have split into at least two branches in the upper mantle shortly after the plume head stage, which can explain the unusual width of the volcanic chain” explains Dr. Stephan Homrighausen from GEOMAR, lead author of the current study.

Professor Dr. Kaj Hoernle, head of the Petrology and Geochemistry group in the Magmatic and Hydrothermal Systems research unit at GEOMAR adds: “Our on-site work was the first to corroborate numerical models of this splitting and to confirm that rising mantle plumes can have different shapes – which then leads to complex volcanic chains.”

“The temporal and spatial formation of these volcanic chains has considerable global significance, as on the one hand they can form poly-metallic deposits, and on the other hand, they can also influence the global climate by changing ocean circulation” adds Dr. Jörg Geldmacher from GEOMAR and co-author of the current study. “In particular, the large flood basalt provinces have been linked to global mass extinctions in Earth's history.”

Original publication:
Homrighausen, S., Hoernle, K., Hauff