

Research may explain controversies related to great magma eruptions

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Lava layers of the Karoo magma province are found at Antarctica. Credit: Arto Luttinen

The modern continents were formed when Pangea broke into pieces during the Mesozoic period. The splitting of Africa from Antarctica

started with great magma eruptions that flooded over an area millions of square kilometres wide.

Remnants of the ancient ocean of [lava](#), the so-called Karoo [magma](#) province, are still widespread in southern Africa and have been also discovered in Antarctica. Dr. Arto Luttinen from the Finnish Museum of Natural History, University of Helsinki, has studied the [lava formations](#) on both continents with his group.

"This kind of eruptions are culmination events of planetary evolution and have caused mass extinctions of life. Yet their origin remains an outstanding question of Earth history," Luttinen explains.

The scientists disagree, for example, whether an enormous ascending plume of hot material caused the generation of magmas from the core-mantle boundary.

"Previous geophysical research has indicated features suggestive of mantle plumes, whereas geochemical studies have concluded based on lava compositions that there was no plume and that the magmas formed when the temperature of the upper mantle gradually got higher under Pangea. The supercontinent acted like a kettle lid," Luttinen says.

The previous studies of magma sources have mainly focused on a certain part of the widespread lava formation, however. The study published on March 27 in the international journal *Scientific Reports* scrutinised compositions of lava samples across the whole region of ancient magma eruptions. Their chemical signatures indicate that lavas in different areas had a different origin.

"The magmas had in fact two contrasting sources. One of them was the [upper mantle](#), as suggested in previous research, whereas the other was most probably a deep [mantle](#) plume. Involvement of two different

magma sources explains previous contradictory results and presents an interesting new framework for future studies," concludes Luttinen.



Lava layers of the Karoo magma province are found at the Victoria Falls, Africa.
Credit: Arto Luttinen

More information: Arto V. Luttinen. Bilateral geochemical asymmetry in the Karoo large igneous province, *Scientific Reports* (2018). [DOI: 10.1038/s41598-018-23661-3](https://doi.org/10.1038/s41598-018-23661-3)

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