

AFR-02 Cenozoic volcanism and evolution of the African lithosphere

New light on volcanic sources in Central and North Madagascar

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A suite of Cenozoic, alkaline, volcanic and intrusive igneous rocks occurs across North and Central Madagascar. To date, this volcanic province has been the subject of limited study, and published modern geochemical data are restricted to a few of the more accessible igneous centres. It has been proposed that these volcanics lie on the track of a mantle plume, but this has been questioned due to the lack of a clear age progression along the purported track. An alternative theory attributes volcanism to the melting of lithospheric mantle, with magmatism focused along deep-seated fracture zones.

The Cenozoic volcanic rocks in Madagascar were emplaced through a range of crustal terranes, including the Archaean to Palaeoproterozoic Antananarivo Block and the Neoproterozoic Bemarivo Belt, as well as into a Mesozoic basin. They also overlap spatially with a suite of Cretaceous volcanic rocks that formed when Madagascar split from India. These are typically considered to relate to the Marion hotspot, although lithospheric mantle has also been invoked in their petrogenesis.

Over the last three years, the BGS and USGS, together with Madagascan collaborators, have mapped large areas of north and central Madagascar, and as a result have been able to gather field data and samples from across the volcanic province. The association of two suites of fresh volcanic rocks, both of which are considered to have been at least partly sourced in the lithospheric mantle, has offered excellent opportunities for study of mantle sources.

New geochemical data will be presented for both extrusive and intrusive rocks of the Cenozoic igneous suite, along with comparative data for the Cretaceous volcanic rocks. In general it is notable that both suites of igneous rocks show internal variation, but that the two suites can generally be clearly distinguished from one another. The comparison of our geochemical data with mapped basement features allows us to study different mantle sources beneath the different terranes. Spatial and temporal variations in magmatic sources will be discussed in detail in the presentation.