

## **Geochemistry of mafic magmatism in the Bowen Basin, Australia: A re-evaluation of lava-fields and central volcanoes**

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In the southern Bowen Basin region of eastern Australia, two types of Cenozoic volcanism that have previously been attributed to mantle plumes (central volcanoes) and rifting (lava-fields) co-exist in space and time [1]. The linking of lava-fields to rifting [2] has gone largely unchallenged. However, rifting in the Tasman Sea ceased by the mid-Paleogene [3], making its relation to lava-field formation from the Miocene onwards dubious. The composition of volcanism in this region thus provides a potential opportunity to examine the interaction of rifts and plumes, and, more generally, geochemical distinctions between central volcanoes and lava-fields. This study employs major-element, trace-element, and radiogenic isotope data from a transect of volcanic rocks in the southern Bowen Basin region to define the possible sources of Cenozoic east Australian magmatism. Trace element data suggest that (1) there is little difference between the lava-fields and central volcanoes in the southern Bowen Basin region; (2) both originated from melting in the garnet stability field; and (3) both lava-fields and central volcanoes incorporate OIB-like REE patterns. Radiogenic isotope data from both the lava-fields and central volcanoes along the transect indicate a similar source, with mixing between primitive helium enriched mantle (PHEM) and high- $\mu$  (HIMU). It is likely, therefore, that all magmatism in the southern Bowen Basin region was ultimately related to the passage of the east Australian hotspot, rather than rift-related upwelling from the sub-continental lithospheric mantle. These findings raise into question the widespread classification of lava-fields, and the distinction between the lava-fields and central volcanoes.

[1] Wellman and McDougall (1974) *Tectonophysics* **23**, 49-65. [2] O'Reilly and Zhang (1995) *Contributions to Mineralogy and Petrology* **121**, 148-170. [3] Müller, Gaina & Clark (2000) In: Veevers J. J. ed. *Billion-year Earth history of Australia and neighbours in Gondwanaland*, 18-28