

High precision $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology of large igneous provinces: The Tasmanian dolerites of the Ferrar LIP

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The Ferrar large igneous province is exposed over 3000 km along the Transantarctic Mountains in Antarctica, terminating in the Australian state of Tasmania and in New Zealand. The Tasmanian magmatism consists of one layered mafic intrusion, doleritic sills and dykes, basalt and rare dacite flows. The geochemical correlations between the Tasmanian dolerites and the Ferrar dolerites of Antarctica are remarkable and have been well established [1]. The great exposure of dykes and sills at differing stratigraphic levels throughout the island allow for an ideal laboratory for an intensive study of the Ferrar province that has yet to be utilized for geochronology.

A new high-precision $^{40}\text{Ar}/^{39}\text{Ar}$ plateau age of 182.17 ± 0.37 Ma was obtained on plagioclase separates extracted from a doleritic sill from Tasmania. This age was generated using an ARGUS VI multicollector mass spectrometer and is unprecedented in precision for plagioclase dating. As a comparison, analyses on (larger) aliquots of plagioclase with a similar Ca/K ratio of ~ 30 , usually returns a precision of ± 1.5 to ± 2 Ma when analyzed using a single collector machine. This contrast in uncertainty illustrates the advantage of the ARGUS VI instrument. This gain of precision will be particularly useful for dating volcanic flows which, although constituting the bulk of large igneous provinces, are naturally devoid of zircon and were inaccessible to high precision geochronology ... until now. This project will present more high precision $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology for the Tasmanian dolerites. This preliminary age, however, already shows that the activity of the easternmost Ferrar magmatism is similar to the few high precision zircon and baddeleyite U-Pb Ferrar ages previously published from Antarctica, $182.7 \pm 0.4 - 183.9 \pm 0.3$ Ma [2] [3]. Furthermore, these Antarctica-Tasmanian ages are synchronous to the peak of activity of the Karoo magmatism (~ 183 Ma; [4]).

[1] Hergt, Chappell, McCulloch, McDougall, and Chivas (1989), *Journal of Petrology* **30**, 841-883. [2] Encarnación, Fleming, Elliot, & Eales (1996), *Geology* **24**, 535-538. [3] Minor & Mukasa (1997), *Geochimica et Cosmochimica Acta* **61**, 2497-2504. [4] Jourdan, Féraud, Bertrand, Watkeys, & Renne (2008), *G³* **9**, 20 p.