Multi-collector mass spectrometry: a new age for $^{40}Ar/^{39}Ar$ geochronology

D. PHILLIPS[1]*

[1]School of Earth Sciences, The Univerity of Melbourne, Parkville, VIC, 3010, Australia (*correspondence: dphillip@unimelb.edu.au)

Recent years have seen the advent of a new generation of multi-collector mass spectrometers for noble gas geochronology and geochemistry (e.g., Noblesse, ARGUSVI, HELIX). In this presentation, I will document results from selected $^{40}Ar/^{39}Ar$ dating standards and samples, using an ARGUSVI instrument. Standards analysed to date include Fish Canyon Tuff sanidine (FTCs) [1], Alder Creek Rhyolite sanidine (ACRs) [1], A1 Tephra sanidine and Mt Dromedary biotite (MD-2; =GA1550). Samples studied include young basalt samples, <300 kyr in age [2].

ARGUSVI $^{40}Ar/^{39}Ar$ analyses exhibit significantly enhanced precision levels (generally >10x), compared to previous mass spectrometer systems. This capability has permitted resolution of distinct age gradients in step-heating spectra for the sanidine standards [e.g., 1]. In contrast, other standards (e.g., MD-2 biotite) and samples show flat age spectra. The new results clearly complicate assignment of accurate ages to sanidine standards and associated unknowns.

Uncertainties in standard ages are less significant when dating young basalt samples and the ARGUSVI system is particularly well suited to high precision $^{40}Ar/^{39}Ar$ dating of young (<100 kyr) basalts. For example, the Tyrendarra basalt in SE Australia gives a mean age of 37.6 ± 0.3 ka (0.8%, 2σ).

The significant improvement in analytical precision from new multi-collector instrumentation presents new challenges, but also heralds new insights into the $^{40}Ar/^{39}Ar$ dating method.

[1] Phillips & Matchan. (2013) *Geochim Cosmochim Acta* **121**, 229-239. [2] Matchan & Phillips (2014) *Quat Geochron* (accepted).