

U-Pb zircon geochronology of large-volume silicic eruptions from the Afro-Arabian volcanic province

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The Afro-Arabian volcanic province is distributed between the Yemen and Ethiopian conjugate rifted margins. The Northern Yemen section of the province is remarkable because there is excellent exposure and coherence of the volcanic stratigraphy, while the Ethiopian section has been extensively faulted from active rifting, and minimum eruptive volume estimates of some of the silicic units put them among the largest known silicic eruptions on Earth. Zircon from four units, three of which have eruptive volume estimates exceeding 1500 km³ dense rock equivalent (DRE), have recently been analyzed by *in situ* LA-ICP-MS and dated by CA-TIMS through the AGeS2 Program.

A total of 272 laser ablation spot analyses from three ignimbrite and one caldera-collapse breccia samples provide trace element and Ti-in-zircon thermometry data. These new data combined with existing thermometry indicate high crystallization temperatures for the three largest erupted magmas. New zircon U-Pb ages are consistent with recalibrated preexisting sanidine ⁴⁰Ar/³⁹Ar ages [1, 2]. These ages suggest that ~7000 km³ DRE of silicic material [3] was erupted within 64-260 kyr. Furthermore, trace element and radiogenic isotope data indicates that ~6700 km³ of this material is genetically related and has evolved through a combination of open-system processes. While the mechanisms and timing of the formation of voluminous silicic magmas remain contentious, the Afro-Arabian volcanic province can and should be another test bed to be considered in the debate.

The new U-Pb ages have further utility for the Geomagnetic Polarity Time Scale (GPTS). Three of the dated units are a set of normal to reversed polarity units that encompass the duration of the C11n.1.r Subchron. High-precision ages provide a tie-point for calibration of the GPTS by giving new minimum and maximum constraints on the duration of C11n.1.r.

[1] Riisager *et al.* (2005) *Earth Planet Sci Lett* **237**, 647-672.

[2] Ukstins *et al.* (2002) *Earth Planet Sci Lett* **198**, 289-306.

[3] Ukstins Peate *et al.* (2005) *Bull Volcanol* **68**, 135-156.