

Subduction zone influence in the Izu rear-arc

JOHN O EDGAR^{1,2}, ABIGAIL K BARKER^{2,3}, CEDRIC HAMELIN⁴, CHRIS HARRIS⁵ AND MARTIN JUTZELER⁶

¹Newcastle University

²Uppsala University

³Centre for Natural Hazards and Disaster Sciences

⁴Independent Scholar

⁵University of Cape Town

⁶University of Tasmania

Presenting Author: abigail.barker@geo.uu.se

Volcanism in the Izu rear arc between 3 and 17 Ma formed chains of seamounts oblique to the strike of the volcanic arc. IODP Site U1437 was drilled South of the Manzi seamount chain. Tuff, lapilli-tuff and lapillistone erupted during volcanism at approximately 4 Ma in the Izu rear arc are found in cores recovered from 682 to 728 mbsf (Unit II at Site U1437). Sedimentary structures and erosional contacts suggest proximal eruption and emplacement by pyroclastic flows. We use plagioclase mineral chemistry, $^{87}\text{Sr}/^{86}\text{Sr}$ and d^{18}O of plagioclase to investigate the subduction zone flux to 4 Ma volcanic rocks in the Izu rear arc. There is a bimodal distribution of plagioclase with a group of high An of 75 to 95% (30%) and another group of low An 30 to 60% (55%). The plagioclase crystals show $^{87}\text{Sr}/^{86}\text{Sr}$ of 0.703096 to 0.703380 and samples containing high An plagioclase have $\text{d}^{18}\text{O}(\text{plagioclase})$ of 6.0 to 6.4‰. Temporally, $^{87}\text{Sr}/^{86}\text{Sr}$ increases stratigraphically upwards in Unit II at ca. 4 Ma, exceeding the proximal rear arc $^{87}\text{Sr}/^{86}\text{Sr}$ ratios for units IV and V from 6 to 9 Ma and approaching the highest values for the Rear-arc seamount chain [1]. Across arc variations for the Izu arc, show a general decrease in $^{87}\text{Sr}/^{86}\text{Sr}$ [2], consistent with our results from the Izu rear arc showing lower values than the volcanic front (Fig. 1). However, d^{18}O in the Izu arc show similarly elevated values for the fore arc, volcanic front and the rear arc. Plagioclase in Unit II of the Izu rear-arc has $^{87}\text{Sr}/^{86}\text{Sr}$ that is similar to the regional Rear-arc seamount chain compositions. The d^{18}O values are also elevated compared to mantle values. Together $^{87}\text{Sr}/^{86}\text{Sr}$ and d^{18}O compositions indicate a depleted mantle wedge composition with enrichment from a subduction zone component (Fig. 1).

References:

[1] Miyazaki et al. (2020) The First 10 Million Years of Rear-Arc Magmas Following Backarc Basin Formation Behind the Izu Arc. *Geochemistry, Geophysics, Geosystems*, e2020GC009114.

[2] Hochstaedter et al. (2001), Across-arc geochemical trends in the Izu-Bonin arc: Contributions from the subducting slab, *Geochem. Geophys. Geosyst.*, 2, 1019, doi:10.1029/2000GC000105.

