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# Geochemically fingerprinting plume mechanisms in rejuvenated lavas

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Rejuvenated volcanism represents a resurgence in volcanic activity that postdates mantle plume magmatism. Aitutaki Island in the central Pacific represents an exceptional case in which rejuvenated volcanism caused the resurfacing of the submerged ocean island after ~8 Myr of erosion [1]. The island's rejuvenated alkaline basaltic lavas are characterized by frequent lithospheric xenoliths, embedded in a high-Mg suite of silica undersaturated to saturated melts. Whole-rock data shows a bimodality in the geochemistry of these melts, yielding two populations each featuring a unique radiogenic isotope and major-trace element distribution. The low-Si group of melts is consistent with a carbonated source interpreted to have formed in the presence of high-pressure majoritic garnet including a modal apatite component. We suggest that during plume ascent, penetration and disturbance of a $CO_2$-rich and crustally hybridised mantle transition zone contributed melts that rose in tandem with the plume [2,3]. Sub-lithospheric storage may explain small volume post-plume rejuvenated volcanism and is consistent with a widespread partial-melt boundary layer [4,5]. This process may be common to most, if not all plumes, evidenced through similar isotope and trace-element patterns in other Pacific Ocean islands.

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