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# Legacy of subduction past: dormant, DupAl mantle as sampled by low-Ca boninites

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Many island arc lavas (IAL) in the western Pacific carry a distinct DupAl- or Indian-type mantle signature in radiogenic Pb isotopes. This isotope anomaly, consequent to elevated, time-integrated Th/U in the mantle, is considered a result of eastward mantle flow from the mantle domain underlying and feeding Indian Ocean ridges. Boninites, a distinct type of IAL named after lavas at Bonin Island, are melts with high $SiO_2$ and MgO contents that are commonly associated with high-degree, fluxed mantle melting in fore-arc regions. It is now clear, however, that boninitic melts elsewhere cover a chemical spectrum that demands a diversity of sources and genetic processes [1]. Cape Vogel (Papua New Guinea) IAL cover a range in Si-Mg-Ca content that identify a trichotomy of tholeiitic (low-Fe) basalts, mildly depleted (high-Ca, HCB) and highly depleted (low-Ca, LCB) boninitic lavas. HCB appear to be probes of a moderately depleted lherzolite with MORB-like Fe isotope signatures. LCB display higher Mg than HCB, a selective enrichment in incompatible trace elements, and light Fe isotopes that point to an harzburgite source likely overprinted by an Fe-poor subduction component. Whilst all Cape Vogel rocks are of DupAl- or Indian-type mantle characteristics in Pb isotope space [2], an extreme thorogenic Pb isotope signature is intrinsic to LCB only. This component appears to occur in many subduction-related rocks bordering the entire SW Pacific Woodlark basin. It is proposed that mantle metasomatism, as sampled by Cape Vogel LCB, is a remnant geochemical component of past subduction, which remains dormant in the mantle even after subduction ceased. With time, this component evolves towards DupAl/Indian-type mantle signatures. Whilst some boninites are important for our geodynamic understanding of incipient subduction [3], their relation to past subduction needs to be further explored and thereby may reveal the origin of DupAl/Indian-type mantle.

[1] Benard et al. CMP 2018 [2] Koenig et al., GCA 2010 [3] Arculus, et al. Oceanography 2019