

## Deep mantle heterogeneity recorded in the OJ Nui plume head

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Previous Os isotopic investigations of lavas from the Ontong Java Plateau<sup>1,2</sup> observed that geographically widely dispersed samples of differing chemistries preserved an isochron of 123±8 Ma with an initial  $^{187}\text{Os}/^{188}\text{Os} = 0.1289 \pm 0.0095$ . Samples from the Manihiki Plateau, itself a portion of the greater Ontong Java Nui (OJN) magmatic event, preserve a far greater range in Os isotopic signatures than previously reported for the OJP alone.

In contrast to the OJP data which points towards a near-chondritic, primitive mantle source for both Kroenke and Kwambaita lavas, the low Ti Manihiki samples preserve  $^{187}\text{Os}/^{188}\text{Os}_{(i)}$  ranging from 0.1056-0.1714. High Ti Manihiki samples preserve  $^{187}\text{Os}/^{188}\text{Os}_{(i)} = 0.1094-0.1288$ . Such strongly subchondritic signatures require some component of recycled material in the mantle source, possibly SCLM ( $T_{\text{RD}}$  low Ti samples ~3.1Ga; and ~2.3-2.6Ga for the high Ti samples). Higher initial Os isotope ratios could indicate the presence of metasomatised lithosphere and/or lower crust.

The low Ti samples from Manihiki have been interpreted as the result of a two stage melting process, analogous to boninites<sup>2</sup>, the depleted source of which has itself been metasomatised by a HIMU component entrained within the plume head.

Despite similar total degrees of partial melting between Ontong Java and Manihiki, a two stage process in Manihiki has allowed preservation and sampling of a broader range of compositions than observed in the OJP. Collectively the Ontong Java and Manihiki samples could conceivably contain mantle sourced from both an undifferentiated, near-chondritic source, as well as ancient, unradiogenic recycled sources. Thus the greater OJN province samples a heterogeneous source containing both primitive and recycled components. It is probable that a single high degree partial melting event beneath Ontong Java (beyond sulphide out) homogenised these heterogeneities, whereas more complex, multi stage melting processes near the plume margin at Manihiki allowed sampling of the inherent heterogeneities within the plume head.

1: Parkinson et al., 2002, GCA 66(15A) A580.

2: Tekada et al. EPSL 2013, 377-378, p. 84-96

3: Golowin et al., in prep.