

**Tracing mantle sources in a regional back-arc basin by independent component analysis of basalt isotopic compositions**

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Independent component analysis (ICA), a type of multivariate statistical analysis, which had been used to extract independent geochemical features in multi-dimensional isotopic space of oceanic basalts and promote understanding of the global geochemical structure and mantle dynamics (e.g., Iwamori et al., 2010; Iwamori and Nakamura, 2012, 2015). Here we present our application of ICA to investigate the contributions of the different mantle sources in a regional back-arc basin in SW Pacific, based on a compiled geochemical dataset from the Lau back-arc basin, Pacific and Indian Ocean ridges, and Samoan islands. We identified three independent components (ICs) in the five-dimensional space of Sr-Nd-Pb isotopic ratios, which can account for 96.5% of the isotopic variance. The correlations between the ICs and incompatible trace elements ratios were further used to examine the origin of these ICs. Our results suggest that the complex geochemical signatures of northern Lau back-arc basin basalts can be explained by the addition of Samoan mantle plume materials (IC1), subduction component (hydrous fluid: IC2) and recycled sediment (melt: IC3) to the Lau back-arc mantle.

References:

Iwamori et al. (2010), *EPSL*, 299, 339-351;  
Iwamori and Nakamura (2012), *Geochem J*, 46, e39-e46;  
Iwamori and Nakamura (2015), *Gondwana Res*, 27, 1131-1152.