# Molybdenum isotopic compositions of subducting sediment and associated arc lavas, Banda Arc, eastern Indonesia

MARTIN WILLE[1], OLIVER NEBEL[2], PIETER VROON[3] AND RONNY SCHOENBERG[1]

[1]Department of Geosciences, University of Tuebingen, Germany
[2]Research School of Earth Sciences, Australian National University, Australia
[3]Faculty of Earth and Life Sciences, VU University Amsterdam, Netherlands

The stable isotope distribution of the transition metal molybdenum (Mo) has been successfully applied to paleo-redox reconstructions of the atmosphere-ocean system. Changes in Earth surface redox conditions are coupled with changing oceanic Mo abundances, which, upon authigenic incorporation in oceanic sediments, results in large Mo isotopic variability among the different oceanic sedimentary reservoirs. Igneous rocks, in comparison, display only small variations in Mo isotopic compositions, mainly as a consequence of the high temperatures at which they are formed. These differences in Mo isotopic spread bear great potential for studying sediment recycling at convergent margins, the dominant geotectonic setting for continetal formation.

Here we present Mo isotopic data in sediments and volcanic rocks along the Banda Arc in Indonesia. Sediments show molybdenum isotopic variations depending on the water depth they were deposited at. We ascribe these variations to changes in the diagenetic redox conditions related to the decrease of free soluble oxygen with increasing water depth. Light and heavy Mo isotopic end members reflect deep water pelagic clays and carbonate-rich shelf sediments, respectively, with a total Mo isotopic range of 1.71 ‰ $\delta^{98/95}$Mo.

Radiogenic Sr-Nd-Hf vs. Mo and stable Mo-O isotopic co-variations within Banda Arc volcanic rocks cannot be explained by fractional crystallisation from a single magmatic source alone. Instead, after taking crystal fractionation into account, we regard a sediment contribution with isotopically light Mo and heavy O isotopic values, similar to those of Banda Arc deep sea pelagic sediments, of up to 8% to the source melt as the cause for the observed Mo-O isotopic trend.

From this we conclude that Mo isotopes in convergent margin rocks are a valuable tracer for subducted sediments in arc lavas.