Fluid-mobile components in lavas from Eastern Manus Basin, Papua New Guinea: Implication for magma generation in subduction zone

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The east Manus Basin is a newly formed volcanic zone, where lacks well-defined magnetic anomalies and linear tectonic fabric [1]. So lavas there can be used for the study of magmatism during initial subduction. Forty-eight samples are obtained from four dredges in the study area, in which eight are basaltic andesite, twenty-four are andesite and sixteen are dacite. Fluid-mobile components, such as Ba (169-332 ppm), Cl (0.15-1.49 wt%), Pb (2.8-14.6 ppm), Li (1.8-14.2 ppm) and U (0.31-1.25 ppm), and H_2O contents (1.31-9.92 wt%) are enriched and largely variable. These samples have Ba/La ratios of 29-77, which is generally higher than that in other back-arc basin system.

The contents of fluid-mobile elements and H_2O are positively correlated. There are also positive correlation between Ba/La, U/Th, Pb/La, Cl/La, Li/La and H_2O/La, suggesting that the fluids are responsible for the enrichment of Ba, U, Pb, Li and Cl. Furtherly, these ratios are in a general negative relationship with Na_8, Ti_8. It seems that the addition of H_2O has increased the mantle melting degree and led to the enrichment of fluid-mobile components.

We calculated the average value of Ba/La, U/Th, Pb/La, Cl/La, H_2O/La, Na_8 and Ti_8 in each dredge, and found that the ratios of Ba/La, U/Th, Pb/La, Cl/La, H_2O/La decrease and Na_8 and Ti_8 increase with increasing distance from the New Britain Trench. Thus the melting degree and fluid-mobile components are dominated by the release of H_2O of subducting slab.

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Obtaining *in situ* kinetic and speciation information for trace metal complexes in freshwater

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The dynamic technique of DGT (diffusive gradients in thin-films) has been developed to measure speciation and fluxes of trace metals in natural environments. The measurements are sensitive to both the equilibrium state (speciation) and the dynamics of the system (diffusion and dissociation rate of complexes), and are potentially useful in increasing our physico-chemical understanding of natural waters. However, unravelling this information from the measurements can be very challenging. Manipulation of the physical properties of DGT and determination of diffusion coefficients of metals and their complexes in the different materials has enabled the simultaneous derivation of kinetic and speciation information for natural waters. Deployment of multiple DGT devices with a range of diffusion layer thicknesses can provide directly a visually informative kinetic signature for a range of metals, and with more sophisticated interpretation, information on the dissociation rates of complexes. Complementary information on the discrimination between species on the basis of molecular size, as related to their diffusion coefficients, can be obtained by co-deployment of devices with gel layers with different diffusion layer characteristics. With a single suite of measurements, an iterative procedure can be used to obtain both speciation and kinetic information. *In situ* measurements using this approach in a freshwater were consistent with other speciation techniques, while providing new information on the *in situ* rates of dissociation and diffusion coefficients of complexes.