The geochemical signature of propylitic alteration in the Idaho batholith

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Meteoric-hydrothermal systems, driven by shallow granitic Eocene intrusions, have propylitically altered (the production of chlorite, illite, calcite, and albite) large volumes of the Cretaceous Idaho batholith. In many cases, the altered zones form annular rings around the Eocene plutons [1]. The oxygen isotope ratios of the rocks have been lowered by hydrothermal alteration to values near or less than zero per mil over broad areas. It has recently been suggested that these altered rocks serve as sources for the voluminous Miocene and younger low $\delta^{18}O$ rhyolite magmas in the Snake River Plain/Yellowstone (SRP/Y) volcanic province [2]. To test this hypothesis, a suite of samples have been collected across one of these altered areas in the Idaho batholith, the Sawtooth Ring Zone. The sample traverse comprises a 30km section across the alterred zone and went from fresh, through altered, and back into fresh rock. Major and trace element concentrations, oxygen isotope ratios, and Sr, Nd, and Pb isotope ratios have been measured on up to 10 samples.

Quartz-feldspar oxygen isotope fractionations increase with the amount of mineralogic alteration and can be used to moniter the degree of hydrothermal exchange. Loss on Ignition increases with alteration due to the development of hydrous minerals such as chlorite and illite, but major element concentrations do not change significantly. The major element ratios $K_2O/(K_2O+Na_2O)$, $CaO/(CaO+Na_2O)$, and MgO/(NgO+FeO) show no changes due to alteration. Sr, Nd, and Pb isotope ratios also show no variation as a function of alteration. Ba and Sr are slightly elevated in the altered rocks relative to the unaltered batholith, and are the only elements other than the O ratios and the increased hydration that show significant changes due to the hydrothermal water/rock exchange. The most pronounced geochemical signature in the altered rocks that correlates with the geochemistry of the SRP/Y rhyolites is the low $\delta^{18}O$ ratios.

[1] Criss & Taylor (1983) *Bull. Geol. Soc. Am.* **94**, 640–663.
[2] Boroughs *et al.* (2005) *Geology* **33**, 821–824.

An integrated survey on mercury pollution and its impacts in Guizhou Province, China

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With the high Hg emissions in China, there is an increasing requirement to take appropriate abatement action. Better knowledge regarding Hg pollution in China is needed, related to emissions, transport, deposition, accumulation in the environment and its impacts. A large, Sino-Norwegian cooperation project (SINOMER) addresses problems related to mercury pollution in Guizhou province in southwestern China in an integrated fashion, by considering Hg releases to the environment, environmental impacts and Hg contamination in food products, as well as assessing impacts on the society and potential policy and mitigation options.

In Guizhou Province there are several considerable sources of Hg to the environment. The releases are both as direct discharge to water from mine tailings and industrial contaminated sites and to the atmosphere from coal combustion, metals smelting and other sources.

Concentrations of Hg in the environment, focusing in water, agricultural soils, rice and important vegetables have been measured in four different regions of the province. The surveys reveal that high concentrations are found in some highly contaminated areas (especially in the Wanshan Hg mining area), but show that in general Hg concentrations in water, soil and agricultural products are low. Exposure to Hg to the population from fish consumption is very low, contrary to the well-known problems in Europe and North-America, due to different environmental conditions, short aquatic food chains as well as generally very low fish consumption. Rice, on the contrary is the major pathway for methylmercury exposure.