The composition of altered oceanic crust (AOC) revisited

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Altered oceanic crust (AOC) is a key reservoir in the Earth's geochemical evolution, and a knowledge of its composition is critical for the interpretation of both subduction zone and intra-plate magmatic products. Although global compilations of mid-ocean-ridge basalt (MORB) and ocean island basalt (OIB) data have previously been assembled to investigate mantle phenomena, most studies on AOC are usually limited to individual drill sites or locations. A broader and more comprehensive multi-element/isotope study of AOC compositions at the global scale that would permit comparisons between multiple sites exhibiting variable alteration impacts has yet to be undertaken. To address this issue, we have conducted a global survey of AOC compositions by 1) obtaining new trace element and Sr-Nd-Hf-Pb isotope data for selected AOC samples from ten DSDP/ODP/IODP Sites, and 2) combining these data with a review and compilation of previously published information. These data should promote an increased understanding of the role that AOC plays in subduction zone and deep mantle recycling (OIB) processes.

A total of 112 new samples have been analysed in this project for trace elements, Sr, Nd, Pb, Hf isotopes, and these have been combined with (generally less comprehensive) data from 3,147 literature analyses. Preliminary results indicate that relatively immobile elements as well as Nd and Hf isotopes generally display consistency with regional MORB character, whereas the contents of mobile elements are highly variable between samples and Sites. Overall, the new results compare well to previous data, with geochemical variations mainly controlled by lithology, coupled with the extent and type of alteration. Furthermore, the extent of alteration appears to be predominantly linked with crustal spreading rates. Broad correlations are observed in Nd and Hf isotope systematics, which may be an indicative of mantle source evolution. Several different mean compositions of AOC, calculated by various approaches, will be compiled.