

Particulate riverine inputs of metals and their isotopes to the oceans

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A sound constraint on global sources and sinks of trace metals (e.g., Fe, Cu, Zn, Mo, Ni) and their isotopes is of utmost importance in understanding the oceanic mass balance of these elements, and how they affect global biogeochemical cycling. Traditionally, research on the riverine source of transition metals has focused on the dissolved load, as this is the most obvious contribution to the dissolved load of the oceans. However, early and recent work has shown clearly that: (a) the particulate phase dominates the riverine load for most transition metals and; (b) for many of the transition metals a large fraction of this particulate load is chemically labile, enabling the particulate phase to interact with the dissolved phase as both a source and a sink. Here we document the application of sequential leaching methods to riverine particulates to further understanding of the potential influence of riverine particulate phases on seawater.

Initial results from Rhine River samples suggest that our methods are successful in leaching specific particulate fractions (exchangeable, organic, carbonate, FeMn and residual silicates) that are isotopically distinct and reproducible. In addition, isotopic analyses of Cu, Zn and Fe suggest that, for this river, the isotopic composition of the dissolved load is, to first order, closely related to the rocks in the source region and not modified by the weathering process (e.g. incongruent weathering) or extraction of distinct isotopic signatures into secondary phases during riverine transport.

We will present the results of leaching experiments on artificial sample composites to confirm the reliability of the leaching techniques.