Distribution of Conservative and Reactive Trace Metals in Different Size Fractions in the Amazon River-Seawater Mixing Continuum

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During the Amazon–GEOTRACES cruise M147 the distribution and behavior of dissolved Mo, V, U, Ti and Ni in different size fractions (filtered at 0.20 and 0.015 μm and ultrafiltered) in the surface waters of estuarine mixing zones were investigated. Water samples were collected using a Fish sampler along the salinity gradients from the Amazon River - seawater and from Rio Pará - seawater transects.

ICP-MS data of Mo, V and U along the Amazon transect show some deviation from the expected conservative behavior. A slight depletion of Mo and U was observed in the low salinity range (0-8) and increased in the mid salinity region (10-20). Distribution of V was similar except more variable concentrations in low-salinity samples. The concentrations of the elements in the different size fractions from the river stations were similar, but differences were observed for samples of mid to high salinity. In contrast, Mo and U along the Rio Pará transect exhibited a near conservative behavior, and V showed a potential source at the river end member and removal in the mid salinity region. The mixed behavior of the Mo, V and U in the Amazon and Rio Pará transects maybe influenced by the hydrological conditions in the two sites and their interaction with suspended materials from the tributaries and sediments in the estuarine zones. A voltammetric approach using cupferron and mandelic acid as strongly complexing agents allowed the identification of Mo and V as relative labile complexes bound to the organic matter. These data confirmed a largely conservative behavior and the deviations from conservative mixing. Ni determined by voltammetry using dimethylglyoxime displayed a non-conservative pattern during the mixing of freshwater to seawater, indicating strong interactions with particles. Voltammetric analyses of Ti using cupferron showed high Ti river endmembers and both adsorption and desorption in the mid-salinity range.

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