Distribution of the dissolved load of transition metals and their isotopes in the Amaon River

B. N. REVELS[1], J. D. RICKLI[1], C. A. V. MOURA[2], D. VANCE[1]

[1] ETH Zurich, Institute of Geochemistry and Petrology, Department of Earth Sciences, ETH Zürich, Switzerland. e-mail: brandi.revels@erdw.ethz.ch.

[2]Universidade Federal do Pará, Centro de Geociência, Belém- PA, Brazil.

The Amazon Basin accounts for 15-20% of the global freshwater discharge and hosts tributaries that cover a wide range of physiochemical conditions. Here we present results from a detailed study of multiple transition metals and their isotopes for the dissolved pool of the Amazon River system, including different fractions of that pool: dissolved (<0.45um), colloidal (<0.45µm, >1kDa), and "truly dissolved" (<1kDa). Major physiochemical features such as pH, alkalinity, suspended sediment load, TOC, cation and anion concnetraions allow us to distinguish between the three main river classifications: "black water," "white water," and "clear water," in common with previous studies. [e.g. 1].

Molybdenum concentrations vary from 0.92 – 4.07nM while isotope values are homogeneous among tributaries, size fractions, and seasons with δ^{98}Mo at +0.96 ± 0.29‰, in agreement with earlier findings that the dissolved riverine δ^{98}Mo is heavier than continental rocks, and that δ^{98}Mo is inversely correlated with concentrations. Copper concentrations and isotopic signatures are heterogeneous between tributary, season, and size fraction, with concentrations ranging from 3.8 to 25.4nM and δ^{65}Cu from +0.36 to +1.62‰. However, despite this variation, all δ^{65}Cu values are heavy relative to continental crust, as found previously for world rivers [3]. Iron concentrations from all tributaries and seasons are significantly higher in the colloidal fraction, consistent with previous studies [4]. δ^{56}Fe values range from -0.59 to +0.83‰, with heavier values associated with the colloidal fraction.

Understanding the fate of these elements in various physiochemical environments has important implications for terrestrial inputs to the oceans, and thus the global oceanic mass balance of the transition metals and their isotopes.

[1] Gibbs, R.J. (1972) *Geochim. Cosmochim. Acta* 36, 1061-1066. [2] Archer, C. and Vance, D. (2008) *Nature Geoscience* 1, 597-600. [3] Vance, D. et al. (2008) *EPSL*, 274, 204-213. [4] Mulholland, D. et al. (2015), *Geochim. Cosmochim. Acta* 150, 142-159.