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Sr and Nd isotopes of suspended sediments from rivers of the Amazon basin

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The Rb-Sr and Sm-Nd isotopic systems are important tools to constrain the provenance of sediment load in river systems. This study presents the isotopic composition of Sr and Nd isotopes and major and minor elements in suspended sediments from the Marañón-Solimões, Amazonas and Beni-Madeira rivers. The data were used to constrain the source region of the sediments and to better understand the main seasonal and spatial transport processes within the basin based on the variations of the chemical and isotopic signals. They also allow establishing a relationship between sediment concentrations and flow rate values.
The study presents data collected during a hydrological year between 2009 and 2010. The Marañón-Solimões River presents low Sr isotopic values (0.7090–0.7186), broad EpslonNd(0) range (-15.17 to -8.09) and Nd model (TDM) ages varying from 0.99 to 1.81 Ga. Sources of sediments to the Marañón-Solimões River include recent volcanic rocks in northern Peru and Ecuador, as well as rocks with long crustal residence time and carbonates from the Marañón Basin, Peru.
The Beni-Madeira River has more radiogenic Sr isotope values (0.7255–0.7403), more negative EpslonNd(0) values (-20.46 to -10.47), and older Nd isotope model ages (from 1.40 to 2.35 Ga) when compared to the Marañón-Solimões River. These isotope data were related to the erosion of Paleozoic and Cenozoic foreland basins that are filled with Precambrian sediments derived from the Amazonian Craton. These basins are located in Bolivian Subandina Zone.
The Amazon River presents intermediate isotopic values when compared to those found in the Marañón-Solimões and Beni-Madeira rivers. Its Sr isotope ratios range between 0.7193 and 0.7290, and its EpslonNd(0) values varies between -11.09 and -9.51. The Nd isotope model ages of the suspended sediments vary between 1.28 and 1.77 Ga. Concentrations of soluble and insoluble elements indicate a more intense weathering activity in sediments of the Beni-Madeira River. This river has a larger difference in the Sr isotopic composition between the diluted and solid phases, which has been assigned to the high level of weathering of its sediment source area. In the Beni-Madeira River sub-basin dominates weathering of silicate rocks, while in the Marañón-Solimões River sub-basin there also weathering of carbonate and evaporitic rocks.