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Source area and seasonal variation of dissolved Sr isotope composition in rivers of the Amazon basin

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We present dissolved Sr isotope data collected over 8 years from three main river systems from the Amazon Basin: Beni-Madeira, Solimões, Amazon, and Negro. The data show large 87Sr/86Sr ratio variations that were correlated with the water discharge and geology of the source areas of the suspended sediments.
The Beni-Madeira system displays a high average 87Sr/86Sr ratio and large 87Sr/86Sr fluctuations during the hydrological cycle. This large average value and fluctuations were related to the presence of Precambrian rocks and Ordovician sediments in the source area of the suspended sediment of the river. In contrast, the Solimões system displays a narrow range of Sr isotope ratio variations and an average value close to 0.709. This river drains mostly Phanerozoic rocks of northern Peru and Ecuador that are characterized by low Sr isotope ratios. Despite draining areas underlain by Precambrian rocks and having high 87Sr/86Sr ratios, such rivers as the Negro and Tapajós play a minor role in the total Sr budget of the Amazon Basin.
The isotopic fluctuations in the Beni-Madeira River were observed to propagate downstream at least as far as Óbidos, in the Amazon River. This signal is characterized by an inverse relationship between the concentration of elemental Sr and its isotopic ratios. During the raining season there is an increase in Sr isotopic ratio accompanied by a decrease in elemental Sr concentration. During the dry season, the Sr isotopic ration decreases and the elemental Sr concentration increases.