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Nd and Sr Isotope Systematics of Sediments from the Amazon River and its Tributaries

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Sm-Nd "crustal residence" (Tcr) ages of major river sediments fall within the restricted range of 1.70 +/- 0.35 Ga. We have analyzed Nd and Sr isotopes in sediments in the Amazon River and tributaries to investigate the scale of isotopic variability of sediment sources in a major river system.

Source ages of sediments in the main river are slightly younger at the Brazil-Peru-Colombia border (ε=-7.1, Tcr=1.4 Ga.) than at the mouth (ε=-9.2, Tcr= 1.5 Ga.). Tributaries fall conveniently into three groups: (1) those which drain the Andes, two of which, 1800 km apart, have sediments with Tcr=1.8 Ga.; (2) those which drain Phanerozoic sediments of the S. Am. Platform, with Tcr ages from 1.3 to 1.5 Ga.; (3) those which drain Precambrian shield, whose sediments have higher Tcr ages, up to 2.1 Ga. $^{87}Sr/^{86}Sr$ ratios range from 0.71 in the main river and Platform tributaries to 0.77 in the Guyana Shield.

The radiometric ages of source areas in the Amazon basin cover a larger range than is reflected by Tcr ages in the river sediments at the scale investigated. The Andean derived sediments lack a clear input of material with Phanerozoic Tcr ages. Neither is there an unambiguous Archean signal in the Guyana Shield rivers. Sm-Nd Tcr ages are two to three times higher than Rb-Sr model ages, reflecting more recent fractionation of Rb-Sr.

The Amazonian portion of the Guyana Shield lies within regions which yield Proterozoic radiometric ages. The results show that the Trans-Amazonian orogeny at 1.8-2.1 Ga. was probably a period of major crustal addition in this region, in contrast to the Hudsonian-Wopmay events in the Canadian Shield.