Suspended sediment load in northwestern South America (Colombia): A new view on variability and fluxes into the Caribbean Sea

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Abstract

Monthly averaged suspended sediment load data from seven rivers in northern Colombia (Caribbean alluvial plain) draining into the Caribbean Sea were analyzed to quantify magnitudes, estimate long-term trends, and evaluate variability patterns of suspended sediment load. Collectively these rivers deliver an average of around 146.3 × 106 t yr−1 of suspended sediments to the Colombian Caribbean coast. The largest sediment supply is provided by the Magdalena River, with a mean suspended sediment load of 142.6 × 106 t yr−1, or 38% of the total fluvial discharge estimated for the whole Caribbean littoral zone. Between 2000 and 2010, the annual suspended sediment load of these rivers increased by as much as 36%. Wavelet spectral analyses identified periods of intense variability between 1987-1990 and 1994–2002, where major oscillation processes appeared simultaneously. The semi-annual, annual and quasi-decadal bands are the main factors controlling suspended sediment load variability in fluvial systems, whereas the quasi-biennial and interannual bands constitute second-order sources of variability. The climatic and oceanographic drivers of the oscillations identified through wavelet spectral analyses define a signal of medium-long-term variability for the suspended sediment load, while the physiographic and environmental characteristics of the basins determine their ability to magnify, attenuate or modify this signal.

Keywords

Suspended Sediment Load, Caribbean Sea, Hydrologic Variability, Wavelet Spectral Analyses