Simulated suspended sediment flows in South America using hydrological-hydrodynamic modeling

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Suspended sediments (SS) have an important role in the maintenance of several ecosystems by supplying them with nutrients. On the other hand, erosion and sediment transport can carry pollutants and pesticides, contributing to the negative impacts on the aquatic biota. Besides that, sediment supply for the rivers is often a driver to geomorphologic changes occurring in the rivers. Erosion and sediment rates in South America are considerably high in comparison to northern continents in the world. In this study we modeled the natural (non affected by reservoirs) spatio-temporal dynamic of suspended sediments in South America, including deposition rates in floodplain areas, using the sediment continental model MGB-SED SA. The model performance was evaluated against 595 in-situ stations; 80 sites using results from regional studies; and 51 sites using results from a global sediment model. For most places, model performance analysis shows a better agreement between simulated and observed (in-situ) data than when results were compared to regional studies and a global model data. A better representation of sediment flow in rivers and floodplains was possible due to the use of hydrodynamic river routing. Based on MGB-SED SA estimates, South America delivers to the oceans $1.00 \times 10^9$ t/year of SS. The bigger suppliers are the Amazon ($4.36 \times 10^8$ t/year), Orinoco ($1.37 \times 10^8$ t/year), La Plata ($1.11 \times 10^8$ t/year), and Magdalena ($3.26 \times 10^7$) rivers. Around 12% ($2.40 \times 10^8$ t/year) of SS loads reaching the rivers are stored in the floodplains, showing the importance of these regions.