Comprehensive sediment transport by rivers in Costa Rica driven by human impact and climate change

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The reliability of the estimations of suspended sediment concentration in rivers still remains under question, mainly within geographical area with agriculture on steep slopes, with large elevation range on short distance between the mountain crest and the coastal zones, and moreover with an important rainfall amount (above 3000 mm/yr) and a large variability of rainfall intensities. Costa Rica is a country with such characteristics. Based on a literature review, we propose a documented discussion on spatio-temporal scaling issue from the mono-vegetation and agro-silvopastoral plots to the large basins and from the storm event to the annual climatic scale. For example, the annual erosion measured under coffee plots is highly variable, from 0.2 to 60 T/ha/yr, under dependency of gully erosion mechanism risky emphasized by the climate change. However the scaling up to large region would indicate a low sediment yield around 1 T/ha/yr, without any consideration of the landslide process, which rises to erratically high sediment production point. At last, the river management with numerous dams, the large road networks, the dense stream channels play a dramatic role on the sediment yield capacities to the coastal areas, with opposite difference between Atlantic and Pacific borders due to the climate and orographic characteristics. This historical assessment given the increase in rainfall intensity highlights the understanding of future erosion processes due to similar trend expected under future climate change scenarios.