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Sediment and carbon sequestration on global river delta plains

Jaap Nienhuis[1] and Derrick Vaughn[2]
[1]Physical Geography, Utrecht University, Utrecht, Netherlands (j.h.nienhuis@uu.nl)
[2]Department of Earth, Oceanographic, and Atmospheric Sciences, Florida State University, Tallahassee, USA (dvaughn2@fsu.edu)

Delta plains trap some of the sediments and carbon that are carried down rivers. Trapping keeps deltas above sea level, prevents carbon oxidation, and makes their soils fertile. Quantifying the fraction that is trapped (or retained) is tricky because it is a ratio of two uncertain numbers: delta plain accumulation and fluvial supply. Here we present our work that aims to overcome this issue by estimating trapping on large space and time scales. We quantified sediment and particulate organic carbon (POC) trapping for many coastal delta plains (n=4700), from the time or their inception 7000 years ago to the present, using modern global DEMs, estimates of lowstand channel profiles, and model-derived long-term fluvial fluxes. Our preliminary calculations suggest that modern delta plains, on average, have trapped 25% of the supplied sediment and now contain 30,400 Pg (~$1.9.10^4$ km^3). They trapped 19% of the supplied POC, totalling 119 Pg C. It seems that sediment trapping has increased with time, as delta plain grew larger and gained more space to accumulate sediment. POC trapping might have decreased with time. Deltas grew out of their protective incised valleys and exposed POC to marine processes on continental shelves. Trapping will likely change in the future, but our long-term averages provide a useful baseline against which the additional effects of humans, sea-level rise, and other changes can be assessed.