



Sediment and Particular Organic Carbon (POC) fluxes changes over the past decades in the Yellow River system

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The Yellow River system used to have very high sediment export to ocean (around 1.5 Gt/yr in the 1950s) because of severe soil erosion on the Loess Plateau. However, its sediment export has declined to <0.25 Gt/yr in recent years (in the 2000s), mainly due to human activities like construction of reservoirs and check dams and other soil and water conservations such as construction of terraces and vegetation restoration. Such drastic reduction in soil erosion and sediment flux and subsequently in associated Particular Organic Carbon (POC) transport can potentially play a significant role in carbon cycling. Through the sediment flux budget we examined POC budget and carbon sequestration through vegetation restoration and various soil and water conservations including reservoirs construction over the past decades in the Yellow River system.

Landsat imageries were used to delineate the reservoirs and check dams for estimating the sediment trapping. The reservoirs and check dams trapped a total amount of sediment 0.94 Gt/yr, equivalent to 6.5 Mt C. Soil erosion controls through vegetation restoration and terrace construction reduced soil erosion 1.82 Gt/yr, equivalent to 12 Mt C. The annual NPP increased from 0.150 Gt C in 2000 to 0.1889 Gt C in 2010 with an average increment rate of 3.4 Mt C per year over the recent decade (from 2000 to 2010) through vegetation restoration. The total carbon stabilized on slope systems through soil erosion controls (12 Mt C per year) was much higher than the direct carbon sequestration via vegetation restoration (3.4 Mt C per year), indicating the importance of horizontal carbon mobilization in carbon cycling, albeit a high estimate uncertainty.