Land-to-Ocean flux of water, sediment and nutrients in the Changjiang River continuum

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**Abstract:** Rivers worldwide supply a huge amount of water, sediment and nutrients to coastal oceans and these material flux has strong implication for land-to-ocean interaction and estuarine and oceanic ecosystem. Under the circumstances of climate change and anthropogenic influences, the material flux of many rivers are changing, which potentially invokes coastal erosion and shoreline retreat, which threaten densely populated deltas and coastal zones. Understanding the land-to-ocean material flux is a prerequisite of sediment management and ecosystem restoration. This work examines changes in streamflow, sediment load and major nutrients across the Changjiang River continuum (CRB) based on a long time series of data since 1950s. Data shows that the streamflow shown no direction change other than a decline change point in 1954. Sediment load, however, have decreased progressively throughout the basin at multiple time scales. The sediment loads have decreased by ~96% and ~74% at the outlets of the upper basin and entire basin, respectively, when data from the earlier, less disturbed period (1950–1985) is compared to the most recent, post-major dam construction period (2006–2020). The flux of silicon flux decreased accordingly, whereas that of N and P have increased apparently. This resulting in changes in N:P ratios and has strong impact on the coastal ocean ecosystem. Moreover, the series of large hydropower reservoirs in the upper basin become sinks of POC, which is to affect the carbon flux and budget of the whole river-ocean system. Understanding the material flux, their source, transport and sink behavior shed lights on basin-scale river management.

**Keywords:** Streamflow, Sediment load, Nutrient, Changjiang River