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Trend detection in source to sink dynamics of the Zhujiang (Pearl River), China

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High fluvial suspended sediment loads in Asian rivers are driven by the active tectonic setting, rapid weathering rates, high rainfall and human activities which promote erosion. However, recent reservoirs construction has significantly altered sediment flux and subsequently carbon dynamics. Archived water and sediment data, together with more infrequent measurements of water chemistry provide a means of elucidating the spatial and temporal dynamics of sediment and carbon delivery from terrestrial sources and the river to the South China Sea. This paper focuses on the three main tributaries of the Zhujiang (Pearl River) Basin (Xijiang, Beijiang and Dongjiang), and models the relations between water, sediment and carbon and various environmental variables. Changes in the time series of water and sediment discharge are examined by gradual trend test (Mann-kendall test), and abrupt change test (Pettitt test). Both tests indicate that water discharge at all stations in the Zhujiang Basin showed no significant trend or abrupt shift. Annual water discharges are mainly influenced by precipitation variability, while the construction of reservoirs/dams in the Zhujiang Basin had little influence on water discharge. Sediment load, however, showed significant decreasing trends at some stations in the main channel of the Xijiang and Dongjiang. More stations have seen significantly decreasing trends since the 1990s. Consequently, the total sediment discharge from the Zhujiang to the estuary and South China Sea has declined from 80.4×10^6 tyr^{-1} for the period 1958-1995 to 54.0×10^6 t yr^{-1} for the period 1996-2004. Within the basin, some tributaries have exhibited an opposite tendency with increasing evidence of degradation.. These changes of water discharge

and sediment load in the Zhujiang Basin have exerted substantial influences on downstream channel evolution, delta development and estuary environments, compounded by aggregate extraction in the lower reaches.