

The Yangtze subaerial delta: Progradation despite substantial decrease in river sediment input



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Background

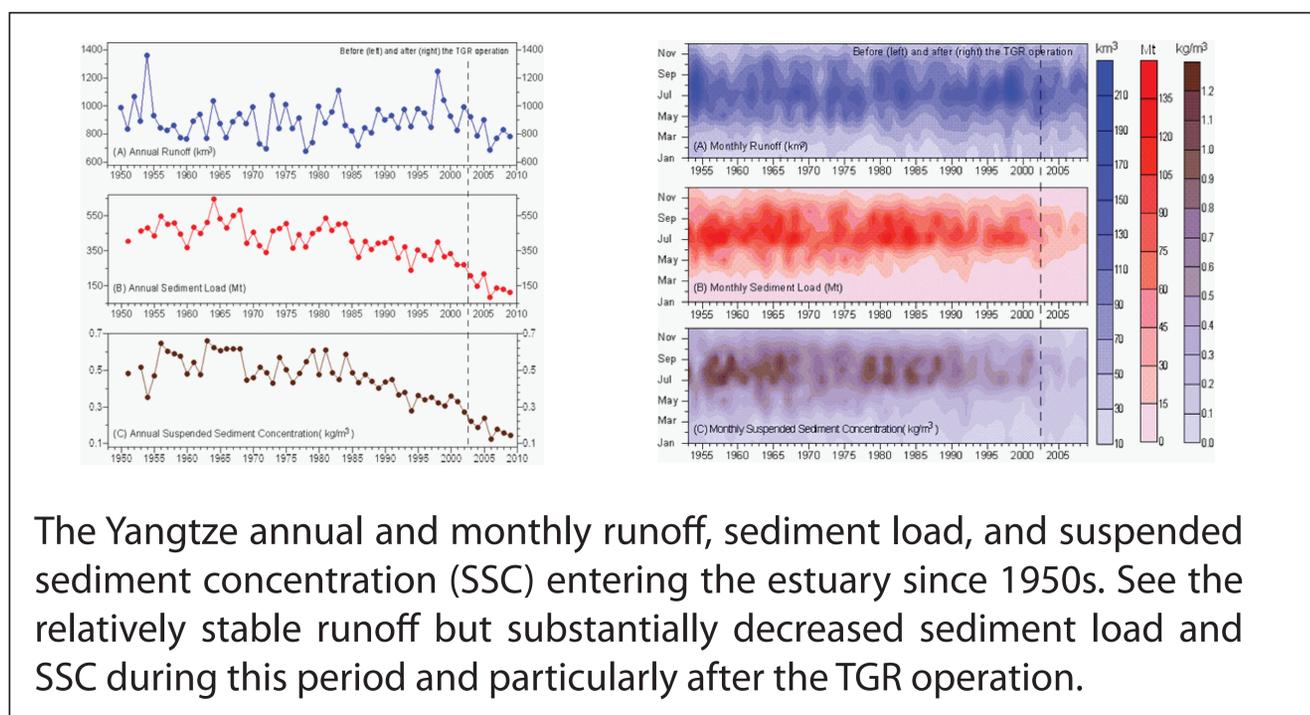
The river delta among areas where land-ocean interactions occur is one of the most sensitive to the fluvial and oceanic changes. In a short-term period (e.g. a few years to several decades), the fluvial process is often dominant.

The Yangtze is the third largest in length, fifth largest in water discharge, and fourth largest in sediment load in the world at natural state.

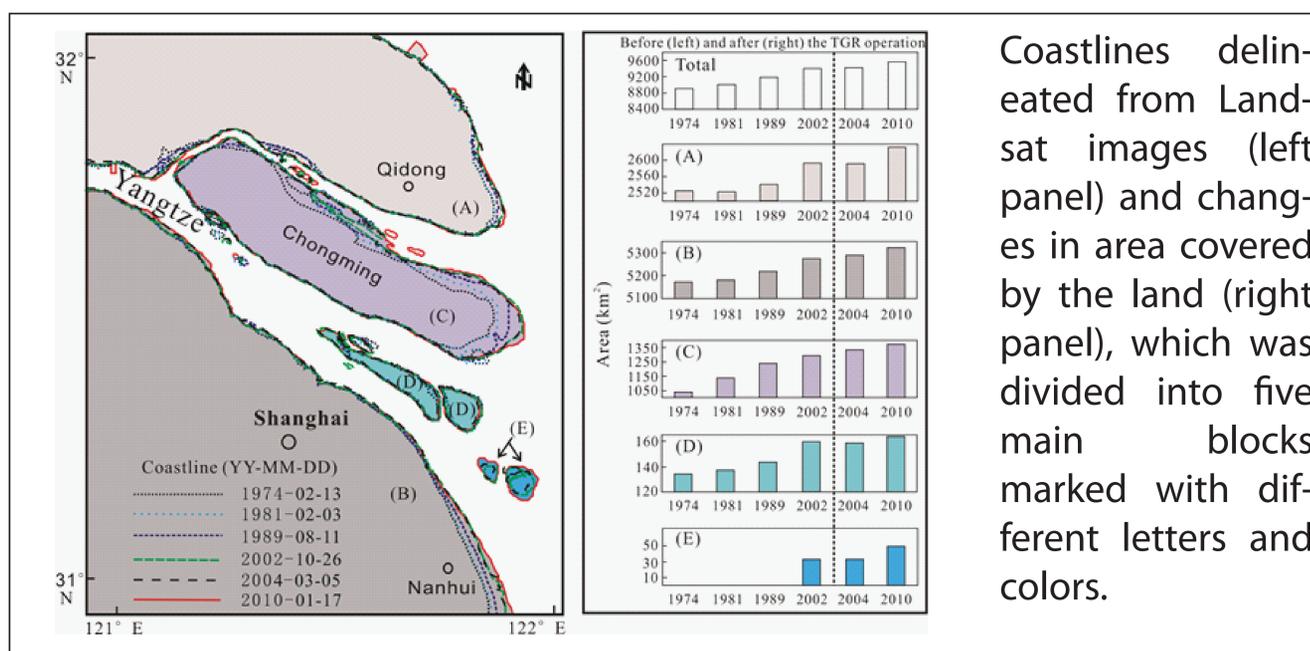
The Three Gorges Reservoir (TGR) Dam, the world's largest hydropower project ever built, commenced its operation in 2003.

Motivating questions:

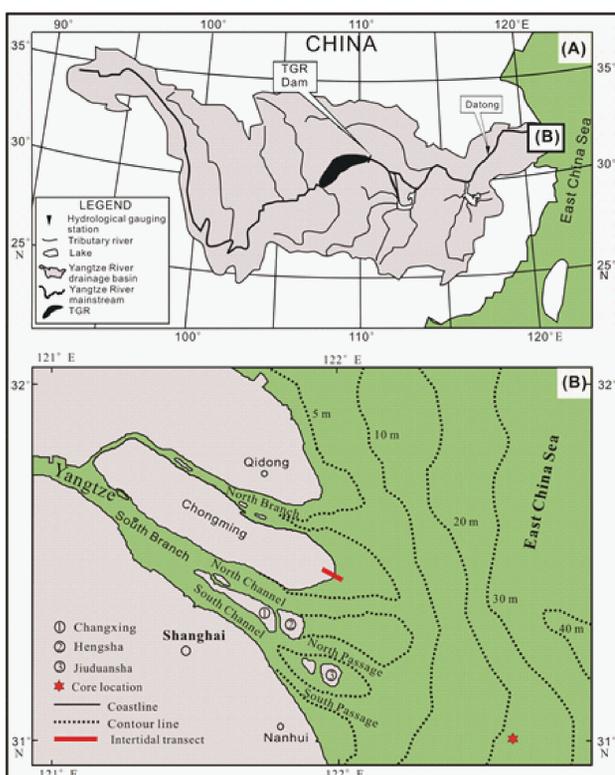
1. How about recent changes in coastline movement of the Yangtze subaerial delta?
2. Does TGR Dam clearly affect the evolution of the Yangtze subaerial delta?
3. What controls on the progradation of the present Yangtze subaerial delta?



The Yangtze annual and monthly runoff, sediment load, and suspended sediment concentration (SSC) entering the estuary since 1950s. See the relatively stable runoff but substantially decreased sediment load and SSC during this period and particularly after the TGR operation.



Coastlines delineated from Landsat images (left panel) and changes in area covered by the land (right panel), which was divided into five main blocks marked with different letters and colors.



Conclusions

1. Significant parts of the shoreline of the Yangtze delta in the past four decades and particularly after the TGR operation, experienced continual progradation despite a substantial decrease in the Yangtze sediment input.
2. An important (probably dominant) reason for the Yangtze shoreline progradation is coastal engineering, such as sea reclamation works, filling project, and wharf constructions.
3. It is still not very clear how the Yangtze subaerial delta has responded to the substantial decrease in the Yangtze sediment input, because most of the shorelines are reinforced by jetties and revetments. Future studies should be focused on sediment movement within the delta region and lag effect of the TGR operation.

Reference:

More information in: Chu, Z., et al. (2013). Temporal and spatial changes in coastline movement of the Yangtze delta during 1974–2010. *Journal of Asian Earth Sciences* 66, 166–174.

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