Tidal variation of total suspended solids over the Yangtze bank

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The Yangtze Bank is a flat and broad shallow water, located at the junction of the Yellow Sea and the East China Sea. Large river discharge and strong wind- and tide-induced mixing have created a large quantity of land sediment discharge as well as the resuspension of bottom sediment, making the Yangtze Bank one of the most turbid coastal areas in the world. The high resolution distribution and tidal variation of suspended sediment over the Yangtze Bank have been revealed in a recent study.

The relevant article "Tidal variation of total suspended solids over the Yangtze Bank based on the geostationary ocean color imager," was published in *Science China: Earth Sciences* recently, written by a group led by Daji Huang from the second Institute of Oceanography, Ministry of Natural Resources. The world’s first Geostationary Ocean Color Imager (GOCI) was used to reveal the high resolution spatial pattern and tidal variation of total suspended solids (TSS) over the Yangtze Bank in the Yellow and East China Seas during the winter.

The movement and distribution of suspended sediment are accompanied by processes such as pollutant transmission, nutrient transport, and changes in optical characteristics of seawater, which directly affect the hydrodynamic and ecological environment of seawater. Therefore, sediment transport and distribution in the sea have received attention from oceanographers. So far, scholars have conducted extensive research on suspended sediment transport in different sea areas of the world. Among them, the research on the spatio-temporal variation of suspended sediment in the Yellow and East China Sea, and especially the Yangtze Bank has obtained a wide range of research results. Previous studies on the spatio-temporal characteristics of suspended sediment over the Yangtze Bank had demonstrated that the suspended sediment exhibits obvious inter-annual, seasonal and short-term variation (spring-neap tidal cycle and synoptic scale). These characteristics are modulated by multi-scale hydrodynamic forcing (runoff, wave, tide) and atmospheric forcing (wind, air temperature).

Based on previous studies, this research used the world's first Geostationary Ocean Color Imager (GOCI) to study the high resolution spatial distribution and tidal variation of suspended. Compared with traditional polar orbit satellites, GOCI has the characteristics of high spatial and temporal resolution, and is suitable for monitoring the short-term dynamic processes in coastal ocean. The paper quantified the fronts of TSS in the Yangtze Bank and found that the suspended sediment distribution showed a tongue-shaped structure, which decreases further offshore in a stepwise manner, and described the tidal variation of TSS concentration in detail. In terms of tide-induced mixing, this dynamic analysis shows that both the topography and the tidal currents play an important role in the spatio-temporal variation of TSS during the tidal period. In particular, spatial distribution is primarily determined by the topography, whereas the temporal variations in tidal
scale are determined by the tidal currents.

This research enriched the study of the multi-scale changes of suspended sediment over the Yangtze Bank. The research results enhance our understanding of the short-term changes to TSS in the Yellow and East China Seas, and it provides an observational basis for the numerical study of sediment transportation and resuspension over the Yangtze Bank; further, it has scientific significance and reference value for multi-disciplinary researches such as marine ecological environment, marine remote sensing, marine dynamics, etc.

**More information:** Yu Zhou et al, Tidal variation of total suspended solids over the Yangtze Bank based on the geostationary ocean color imager, *Science China Earth Sciences* (2020). [DOI: 10.1007/s11430-019-9618-7]

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