Geophysical Research Abstracts
Vol. 18, EGU2016-5384, 2016
EGU General Assembly 2016

Impact of river-tide dynamics on the residual water level slope and residual sediment transport in the Pearl River channel networks

Huayang Cai, Zihao Zhang, Qingshu Yang, and Suying Ou
Sun Yat-sen University, School of Marine Sciences, Guangzhou, China (caihy7@mail.sysu.edu.cn)

Large-scale delta systems, such as the Rhine-Meuse delta, the Mississippi River delta, the Mekong delta, the Yangtze delta and the Pearl River delta etc., usually feature a typical channel networks, where individual channels are interrelated through a networks system, resulting in both longitudinal and transverse variations of residual water level slope (averaged over a lunar day) caused by the river-tide interplay. Enhancing our insight of river-tide dynamics in these channel networks has vital importance for the protection and management of estuarine environment since river-tide interplay is closely related to sediment transport, water quality, water utilization and estuarine ecosystem. In this study, we investigate the impact of river-tide dynamics on the temporal-spatial changes of flow and suspended sediment load in terms of residual water level slope and residual sediment transport in the Pearl River channel networks, which is one of the complex channel networks in the world. Making use of a nonstationary harmonic analysis (NS_TIDE), the continuous time series observations of velocity covering a spring-neap cycle in 1999 (representing flood season) and 2001 (representing dry season) collected from around 60 stations in the Pearl River channel networks have been used to extract the temporal-spatial changes in residual velocity and tidal properties (including amplitudes and phases) as a function of variable river flow debouching into the delta. On the basis of harmonic analysis, the tidally averaged friction is decomposed into contributions made by riverine forcing alone, river-tide interaction and tidal asymmetry using Chebyshev polynomials approach. It is shown that river flow enhances friction via river-tide interaction, which increases the residual water level slope that influences the distribution of suspended sediment load in the Pearl River channel networks.