Geophysical Research Abstracts
Vol. 19, EGU2017-7212-1, 2017
EGU General Assembly 2017

Effects of Water and Sediment Regulation Scheme on estuarine morphodynamics: a combined numerical and theoretical modelling study

Weilun Gao (1) and Dongdong Shao (2)

(1) State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China (wl.gao@mail.bnu.edu.cn), (2) State Key Laboratory of Water Environment Simulation & School of Environment, Beijing Normal University, Beijing, China (ddshao@bnu.edu.cn)

Water and Sediment Regulation Scheme (WSRS) has been implemented since 2002 at Xiaolangdi Reservoir in Yellow River, North China, to generate artificial flood pulses to scour the sediments silted in the lower reaches of Yellow River, and maintain base flow in the river channel during dry seasons. While remote sensing data has shown close correlation between the temporal progradation pattern of the currently active delta lobe and the recurrent flood pulses, the effects of the WSRS on the estuarine morphodynamics are still largely elusive. In this study, numerical experiments based on Delft3D were carried out using simplified scenarios. Daily river discharge data for 2002-2014 was used to generate a schematized stepped hydrograph, which was further formulated using four chosen IHA (Indicators of Hydrologic Alteration) parameters, namely 30-d maximum discharge, 90-d minimum discharge, Julian date of maximum discharge and duration of high pulses. The numerical results successfully reproduced the temporal progradation pattern, i.e. stepwise growth, of the natural delta. A modified box model for delta progradation was further developed and calibrated using the numerical results. This study highlights the importance of the basin-scale regulation of water and sediment to estuarine morphodynamics, and provides reference to improve the implementation of WSRS and other similar schemes.