Geophysical Research Abstracts
Vol. 17, EGU2015-15396, 2015
EGU General Assembly 2015

Modelling long term morphological changes with XBeach: case study of Kizilirmak River mouth, Turkey

Cüneyt Baykal (1), Aysen Ergin (1), Işıkhan Güler (2), Gülizar Özyurt Tarakcıoğlu (1), Erdinç Söğüt (2), Hasan Gökhan Güler (1), and Gözde Güney Doğan (1)

(1) Middle East Technical University, Dept. of Civil Eng., Ocean Eng. Research Center, Dumlupınar Blv., Çankaya, Ankara, 06800, Turkey, (2) Yüksel Proje Uluslararası A.Ş., Birlik Mah. 450 Cad. No:23, Çankaya, Ankara, 06610, Turkey

The Bafra alluvial plain, where the Kızılırmak River discharges into the Black Sea, is one of the most critical examples of severe coastal erosion problems in Turkey. The amount of sediment carried by the Kızılırmak River has decreased from approximately 23 million ton per year to 0.46 million tons/year starting from 1960s as a result of construction of flow regulatory structures in the following years. This drastic decrease in the amount of sediment carried by the river resulted in a severe shoreline retreat up to 1 km in the cross-shore direction since 1988 according to the Regional Directorate of State Hydraulic Works and local residents (Kökpınar et al., 2007). The first remedial measure against this severe coastal erosion problem at the river mouth was constructed in 2000 by State Hydraulic Works (DSİ). It was composed of two Y-type and one I-type groins constructed at the eastern shoreline of the river mouth. After construction of the first remedial system, the shoreline retreat slowed down between the groins and trapping of sediment initiated. Today, the gaps between the groins are almost completely filled with sediment. In this study, the shoreline changes between the groins of the first remedial system for the years 1999, 2003 and 2007 are studied using the open source numerical model called XBeach (Roelvink et al.2010) focusing on the hydrodynamics and tombolo formation around the groins. The numerical model has been developed mainly to model short term morphological changes such as nearshore responses under storm and hurricane conditions. Herein, the preparation of the wave data input to minimize the computational demand of the model and the effect of the sequence of the input wave directions are discussed in detail in this study. Finally, the shoreline changes obtained from numerical model simulations are compared with the field data.

Keywords: Numerical modeling of shoreline changes, tombolo formation