Geophysical Research Abstracts
Vol. 19, EGU2017-1531-1, 2017
EGU General Assembly 2017


# An extreme breaching of a barrier spit: insights on large breach formation and its impact on barrier dynamics

Florin Iulian Zăinescu, Alfred Vespremeanu-Stroe, and Florin Tătui
University of Bucharest, Faculty of Geography, Romania (florinzainescu@yahoo.com)

In this study, we document a case of exceptionally large natural breaching of a sandy spit (Sacalin barrier, Danube delta) using Lidar data and satellite imagery, annual (and seasonal) surveys of topography and bathymetry on successive cross-barrier profiles, and hourly datasets of wind and waves. The breach morphology and dynamics was monitored and described from its inception to closure, together with its impact on the adjoining features (upper shoreface, back-barrier lagoon, downdrift coast) and on the local sediment budgets.

Breaching is first observed to occur on a beach-length of 0.5 km in April 2012 and two years later reached 3.5 km (May 2014). The barrier translates to a recovery stage dominated by continuous back-barrier deposition through subaqueous cross-breach sediment transport. Soon, the barrier widening triggers a negative feedback which limits the back-barrier sediment transfer. As a result, back-barrier deposition decreases whilst the barrier aggradation through overwash becomes more frequent.

The event was found to be a natural experiment which switched the barrier's decadal evolution from low cross-shore transport to high cross-shore transport over the barrier. Although previously considered as constant, the cross-shore transport recorded during the large breach lifespan is an order of magnitude larger than in the non-breach period. 3 x $10^6 m^3 of sediment were deposited in three years which is equivalent to the modelled longshore transport in the region. Neverthe$
$4m.$

In the absence of tides, the Sacalin breach closed naturally in 3 years and brings a valuable contribution on how breaches may evolve, as only limited data has been internationally reported until now. The very high deposition rate of sediment in the breach is a testimony of the high sediment volumes supplied by the longshore transport and the high sediment release through shoreface retreat, and resulted in widening the barrier to a maximum of 1 km.

Since the newly-formed barrier shoreline got displaced backward up to 500 m, this reveals that barrier breaching is an important mechanism which significantly accelerates the landward migration of the barrier system and is a proof of the highly nonlinear morphodynamics involved in the barrier island translation.

We demonstrate that the 2012-2015 event was an example of complex barrier breaching which has a substantial influence on the longer-term evolution of the spit. Studies of breaching help us understand the barrier evolution and will help coastal erosion risk management policy makers undertake better decisions on barrier management practice.