PAGES
PAST GLOBAL CHANGES

cirques & lakes
PN-II-RU-TE-2012-3-0386

Nov. 2014

Editor
Marcel MINDRESCU

Associate editor
Ionela GRADINARU

Late Pleistocene and Holocene Climatic Variability in the Carpathian-Balkan Region

ABSTRACTS VOLUME

Ştefan cel Mare University Press

Late Pleistocene and Holocene climatic variability in the Carpathian-Balkan region. Abstracts volume

Ştefan cel Mare University Press

THE EVOLUTION OF SF. GHEORGHE (DANUBE) ASYMMETRIC DELTAIC LOBE

Alfred VESPREMEANU-STROE[1], Luminiţa PREOTEASA[1], Florin TĂTUI[1], Alida TIMAR-GABOR[2], Ionela CÂRDAN[2]

[1] *Faculty of Geography, Bucharest University, Bucharest, 1 Bd. N. Balcescu, 01004, Romania*

[2] *Faculty of Environmental Science and Engineering, Babes-Bolyai University, Cluj-Napoca, Fantanele 30, 400294, Romania*

[3]*Interdisciplinary Research Institute on Bio-Nano-Science of Babes-Bolyai University, Cluj-Napoca, Treboniu Laurean 42, 400271, Romania*

Abstract

The wave asymmetric Sf. Gheorghe lobe is the only active in the Danube delta where river mouth bar (and the associated barrier islands and spits) continuously deployed a cyclic development for almost two millennia. During first stage, the Sf. Gheorghe distributary had a small discharge (with an order of magnitude lower than present) which after that experienced a rapid increase in consequence of the successive avulsions of Împuţita (southern distributary of Sulina arm) and Dunavăţ distributaries. Our morphological analyses together with the newly obtained chronology, revealed the multiple ridgesets structure of Sf. Gheorghe deltaic lobe. In fact, all ridgesets (10) follow a common morphodynamic pattern characterized by the cyclic succession of three stages: i) subaqueous mouth bar development, ii) barrier island emergence, iii) barrier spit phase with several secondary spits derived from an updrift trunk ridge. The size of each ridgeset increased exponentially with every new cycle due to the constant lengthening of the coastline as the downdrift side of the lobe advances seaward through a series of progressively larger similar quadrilaterals, yielding to a constant enlargment of the delta front size.

Even though each newly formed ridgeset (cycle) had a longer lifespan, (the latest cycles lasting 4 – 5 times longer than the first ones), the evolutionary model remained unchanged as long as the balance of wave- and river-borne sediments, expressed by the asymmetry index, maintained constantly low ($Ai \leq 0.1$) whereas the mean advancing rates of river mouth kept constant to 10 m/yr. Since the beginning of the 20th century abrupt changes occurred as a consequence of the sediment depletion of the Danube flow which imposed the stopping of the updrift coast progradation and the prevalence of submarine erosion in front of the river mouth. These changes seem the result of the Ai sudden increase (0.37 in the present) controlling the recent (1930s – present) river mouth dynamics which for the first time in its multi-millennia evolution stopped

the long-term seaward expansion in favor of a deflected downdrift migration, indicating the transition of the Sf. Gheorghe mouth from an asymmetric to deflected wave-influenced delta morphology.