Geophysical Research Abstracts
Vol. 18, EGU2016-4242-1, 2016
EGU General Assembly 2016

Density-lag anomaly patterns in backshore sands along a paraglacial barrier spit

Donatas Pupienis (1), Ilya Buynevich (2), Darius Jarmalavičius (3), Julija Fedorovič (3), Gintautas Žilinskas (3), Daria Ryabchuk (4), Olga Kovaleva (4,5), Alexander Sergeev (4), and Anna Cichon-Pupienis (1)

(1) Vilnius University, Vilnius, Lithuania (donatas.pupienis@gf.vu.lt; anulac@gazeta.pl), (2) Temple University, Philadelphia, USA (coast@temple.edu), (3) Nature Research Centre, Vilnius, Lithuania (jarmalavicius@geo.lt; julijafed@inbox.lt; zilinskas@geo.lt), (4) A.P. Karpinsky Russian Geological Research Institute, St.Petersburg, Russia (daria_ryabchuk@mail.ru; olya_pavlikova@mail.ru; sergeevau@yandex.ru), (5) Tallinn University of Technology, Tallinn, Estonia (olya_pavlikova@mail.ru)

The Curonian Spit, located along the southeast Baltic Sea coast, is one of the longest paraglacial mega-barriers in the world ($\sim$100 km) and is characteried by microtidal sandy beaches and unbroken foredune ridge emplaced by human activities in historical times. Both are dominated by quartzo-feldpathic sand, with various fractions of heavy minerals that may be concentrated as density lag. Such heavy-mineral concentrations (HMCs) may be distributed weither randomly or regularly along the coast, depending on the geological framework, hydro-aeolian processes, and human activities (e.g., steel elements of coastal engineering structures, military installations, etc.).

In this study, we focus on the longshore patterns in HMC distribution and relative magnitude (mainly the concentration of ferrimagnetic components). Along the entire Curonian Spit coast (Russia-Lithuania), a total of 184 surface sand samples were collected at 1 km interval from the berm and foredune toe (seaward base). HMCs were characterized in the laboratory using bulk low-field magnetic susceptibility (MS). The Wavelength and Lomb spectral analysis were used to assess the spatial rhythmicity of their longshore distribution.

Generally, quartz sand is characterised by low MS values of [U+0138]<50 μSI, whereas higher values [U+0138]>150 μSI are typical for heavy mineral-rich sand. MS values on the berm and foredune toe range from 11.2-4977.9 μSI and from 9.2-3153.0 μSI, respectively.

Density lag anomalies had MS values exceeding an average value by $\geq$3 times. Wavelength and Lomb spectral analysis allowed to identify several clusters of periodicities with wavelength varying from 2-12 km, with power spectra having statistically significant values (>95 % CI).

Along the modern Curonian Spit coast, two scales of rhythmic pattern variation are evident: macroscale ($\leq$12 km) and mesoscale (2-3 km). The former can be attributed to localized expressions of geological framework (iron-rich components) and engineering structures (especially within the southern part of the spit), whereas the mesoscale patterns reflect spatial distribution of short-term hydro-aeolian forcing (erosional-accretionary cells) that may shift temporally.

This research was supported by Lithuanian Science Council (Grant No. MIP-039/2014), the Internationalization Program Award, Temple University and Russian Scientific Fund (Grant No. 14-37-00047).