Abstract EGU24-302

[Back] [Session GM9.2]

EGU24-302, updated on 08 Mar 2024
https://doi.org/10.5194/egusphere-egu24-302
EGU General Assembly 2024

New approach to the tendencies of coastal dynamics of the Curonian Spit based on wave reanalysis data

Pranciškus Brazdžiūnas[1], Donatas Pupienis[1,2], Darius Jarmalavičius[2], and Gintautas Žilinskas[2]
[1]Institute of Geosciences, Vilnius University, Vilnius, Lithuania
[2]Laboratory of Geoenvironmental Research, Nature Research Centre, Lithuania

The Curonian Spit is 98 km long, while Lithuania has a 50 km stretch of coastline. The evolution of the Curonian Spit is linked to the alongshore northward sediment transport. However, varying tendencies of coastal dynamics have been observed between the different sections. Hydrodynamic and aeolian processes, generated by the prevailing westerly winds have been identified as the main factors controlling the coastal dynamics. The reasons for inconsistent coastal trends along different sections in a relatively short coast stretch (50 km) remain unclear, despite similar coastal morphology and similar prevailing hydrometeorological conditions.

The previous studies on Curonian Spit coastal development were based on wind, sea level and visual wave observation data collected only in two hydrometeorological (Klaipėda and Nida) stations. The limited spatial distribution of this data allowed only assumptions to be made about the influence of wave regime on the coastal dynamics of the Curonian Spit in different stretches.

The aim of this study was to analyse the spatial variability of the changes in wave regime along the Curonian Spit sea coast and investigate their relationship with the changes in sediment volume. The main goal of this study is to identify the impact of wave regime on the variance of coastal development along the Curonian spit.

The spatial variance of sediment volume was calculated from the 12 cross-shore levelling profiles from the 2003-2019 period. Wave parameters were analysed using Baltic Sea long-term wave reanalysis data, generated with WAM spectral wave model by the Finish Meteorological Institute (FMI). The yearly changes in mean wave parameter values were compared to the sediment volume at the corresponding measurement points using Pearson correlation and regression analysis.

Sediment accumulation in varying magnitude were observed along the entire Lithuanian coast of the Curonian Spit during the study period. The homogeneous changes of wave parameters were established along the entire spit, meaning that the highest and the lowest waves usually occur at the same sites. Significant negative correlation (r= -0.5– -0.7; p<0.05) has been found between the changes in wave height and sediment volume, except for the sites at Juodkrantė, Pervalka and Nida. The prevalent accumulative processes along the entire Lithuanian coast may be linked to the right angle of coast exposition relative to the prevailing south-westerly waves. The magnitude of wave influence on coastal development may be dependent on the wave height. This could imply that the spatial variance of mean wave height may be the reason to varying tendencies of coastal development.

This project has received funding from the Research Council of Lithuania (LMTLT), agreement No. P-ST-23-95.

How to cite: Brazdžiūnas, P., Pupienis, D., Jarmalavičius, D., and Žilinskas, G.: New approach to the tendencies of coastal dynamics of the Curonian Spit based on wave reanalysis data , EGU General Assembly 2024, Vienna, Austria, 14–19 Apr 2024, EGU24-302, https://doi.org/10.5194/egusphere-egu24-302, 2024.