

## **Wind influence on the course of sedimentation processes of the laminated lacustrine sediments of Lake Czechowskie**

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The studies of the laminated lacustrine sediments play a very important role in the analysis of climate change. They provide valuable information related to the response of the ecosystem to changes in the environment. The condition for the development of the annual lamination is calm sedimentation, which can be compromised by the movement of water caused by waving. The depth to which this movement affects depends on the shape of the lake basin as well as the velocity and direction of the wind. During the study of sedimentary processes of laminated deposits in Lake Czechowskie (Tuchola Forest, North Poland, 53°52'N, 18°14' E, 108 m asl), the following question arose: How strong was the influence of the wind on the processes of lacustrine sedimentation? The key in getting the answers was the use of GIS techniques. Lake Czechowskie has an area of 76.6 hectares; it has two deeps separated by a threshold: a deeper one of 33 m (maximum depth of the basin) in the central-eastern part, and a shallower of 13 m in the western part. The speed of movement of water that is able to move sediment from the bottom of the lake, called the orbital wave velocity, is the basis for the designation of areas where re-suspension takes place. To calculate the wave parameters, the process of mixing, as well as the designation of re-suspension zones, the tool-script Wave Model (Rohweder et al. 2008) in the program ArcGIS 10.1 was used. The input data were wind direction and velocity from the meteorological station of Wirty about 15 km away, bathymetric data from acoustic profiling, and the Maximum Orbital Wave Velocity. The elements taken into account include maximum wind velocity of the multi-year 1996-2013, with particular emphasis on hurricanes Ksawery (December 2013) and Yoda (November 2011), during which wind velocity exceeded 120 km/h. In addition, maximum wind velocity ever recorded in the Polish Lowlands was considered. On the basis of the modelling, the authors delimited the areas where re-suspension takes place in medium and extreme conditions, and those in which wind waving does not affect the mixing of the sediment. The areas particularly predisposed to accumulation and preservation of laminated sediments have been identified. The analysis results allow a better understanding of the re-suspension processes, especially in the littoral zone of the lake. This analysis is also helpful in research of the laminated sediments, and is essential for determining locations for their sampling.

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