

ON THE POSSIBLE INFLUENCE OF SMALL IMPACT ON GEOENGINEERING PROPERTIES OF SUBSOIL.

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Introduction: Meteorite impact events appear to have played a significant role in deformation of sediments in the area of the impact. Part of sediments is ejected into the atmosphere creating an impact crater. The rest, below the crater, is intensely fractured and partially compacted. The deformation of sediments is reflected in geoengineering properties of soil.

The main aim of the study was to investigate the changes in geoengineering properties of non lithified deposits below the craters in comparison to genetically the similar types of sediments unaffected by impact. The research was carried out in Morasko Meteorite protected area in northern Poznań. The Morasko meteorite impact has been assessed to be relatively young and took place in unconsolidated sediments [1], [2]. Bottom of the impact crater is build of Quaternary peat, gyttja, till and Neogene clay [3]. As a reference area the Warta river valley was chosen, where Neogene clay occurs in subsoil covered by alluvial sediments.

Results and Discussion: The fractures and compaction occurred in sediments during the impact have the reflection in values of the strength and deformation parameters like small strain shear modulus (G_0) and constrained modulus (M). The values of these parameters coming from geoengineering in-situ tests: CPTU (cone penetration test), DMT (Marchetti dilatometer test) and SDMT (seismic dilatometer test) which were conducted. These tests have gained increasing popularity in geoengineering site characterization and are based on the vertical penetration of the measuring gauge in the subsoil.

Three testing points were founded at the site, first on the top of the major crater rim and the last a 150 m away. An additional CPTU has been carried out in the Warta river valley, for getting the reference values of geoengineering properties of similar sediments not subjected to the impact. On the basis of the tests, the lateral and vertical changes in geotechnical properties in the vicinity of the craters were discussed. The three different geotechnical tests allowed to identify the significant change in soil stiffness and shear strength parameters in the vicinity of Morasko crater in comparison to similar sediments in the Warta river valley. It is likely that the detected increase in strength parameters is associated with the Morasko impact.

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References:

[1] Hurnik H. 1976. *Astronomia* 2: 3-6. [2] Muszyński A. et al. 2012. Bogucki Polish Scientific Publishers. [3] Stankowski W. et al. 2002. *Proc. Estonian Acad. Sci. Geol.* 51, 4: 227-240.