PROPERTIES OF EJECTA BLANKET DEPOSITS SURROUNDING MORASKO METEORITE IMPACT CRATERS (POLAND).

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Introduction: An iron meteorite shower in Morasko (western Poland), took place about 5000-5300 years BP [2, 3]. It's confirmed by numerous meteorite fragments findings and at least 7 impact craters, which are located in the present "Morasko Meteorite" Nature Reserve in northern part of Poznań. The impact craters were formed on a glacial pushed moraine formed during the Saalian and Vistulian glaciations and built of unconsolidated sediments including clays, tills, sands and gravels [1, 2].

The main objective of the present study is to present:

1) the geological structure of the area around the impact crater;
2) the properties of ejecta blanket.

Study area: The research focused on the proximal part of the largest impact crater, which is approximately 100 m in diameter and about 11.5 m deep. The crater is filled with app. 2.5 deep lake floored with organic deposits, whose thickness does not exceed 4 m [2].

Research material: In order to recognize the geological structure of the area and the ejecta blanket 52 drillings were made along the 6 profiles in radius of about 100 m from the rim of the largest crater. The cores were from 1.9 to 9.5 m in length. The total length of the cores amounted to 158 m. We also revisited 2 old trenches located at the crater rim and a new app. 17 m long trench was made perpendicular to the crater rim. The trenches were excavated to the maximum depth of 2 m.

Results: Based on the conducted studies it was concluded that geological structure of the area around the largest impact crater is highly complex and is represented by four types of deposits:

1) glacitectonically deformed Neogene clays, which form the base of the crater;
2) Quaternary sandy-gravel deposits, which occur directly on Neogene clays;
3) Quaternary diamictons (tills), which are often at the surface;
4) Ejecta deposits composed mainly of diamicton with common clasts of Neogene clays.

The macroscopic analysis of sediment cores allowed to divide ejecta blanket into 2 types: overturned deposits at the crater rim and ballistic ejecta.

Overturned ejecta. The characteristic features of the overturned deposits at the crater rim includes:

1) reversed stratigraphy, including clays, till, sand, paleosoil, sand (sometimes till) and clays;
2) paleosoil horizon, which mostly occurs in very fine and fine sands;

Ballistic ejecta. The features for the ballistic ejecta is the presence of:

1) diamictons containing angular clasts of Neogene clays, whose size and number diminish with the distance from the crater. These deposits can be compared to polymictic breccia which are described for impact craters formed in the bedrock;
2) sands, which represent surface sediments on the southern part of the crater;
3) pieces of organic matter in diamictons, some of them are charcoals;
4) clear boundary between Quaternary sandy-gravel deposits and ejecta blanket. In some places a paleosoil horizon is preserved. However, commonly this boundary is transitional and reveals mixing of ejected particles (e.g. clay clasts) with underlying sands.

Thickness of the ejecta blanket. In general, the thickness of the ejecta blanket is getting smaller with distance from the crater but reveals some changeability. So far, the recognized ejecta has a thickness between 0.5 and 3 m. Ejecta that is less than 0.5 m has yet to be confirmed.

Discussion and conclusion: The ejecta blanket is very mixed and consists of all deposits occurring in the study area. Ballistic ejecta is the dominant sediment thrown out from the crater and occurs all over the area. In several places in the proximal part of the crater rim overturned ejecta deposits were found. The ejecta is similar to local glacial tills, however, it contains angular clasts of Neogene clays, which are so far the easiest diagnostic feature of the deposits. At the moment, the recognition of the ejecta layers is possible only at a distance of 50 m from the crater rim. Further field works and laboratory studies are being conducted to map the exact ejecta distribution and reveal details of its composition.

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References: [1] Hurnik H. et al. 1976. *Polish Scientific Publishers AMU*. [2] Stankowski W. 2008. *Polish Scientific Publishers AMU*. [3] Szokaluk M. et al. 2015. Abstract #1100. Bridging the Gap III: Impact Cratering in Nature, Experiments, and Modeling Conference.