MICRODEFORMATIONS AT THE CONTACT ZONES OF THE MORASKO IRON METEORITE WITH SURROUNDING SEDIMENTS - LIKELY EVIDENCE OF METEORITE IMPACT

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Introduction: The Morasko meteorite fall is known as a meteoritic shower [1] . The area where the meteorite fragments were found extends over several square kilometres in northern part of city of Poznań (Poland). This study investigated five meteorite fragments and their outer contact zones with surrounding sediments, from few millimeters to two centimeters thick. The sediments consist of Pleistocene glacial tills and Miocene - Pliocene clays of the Poznań Formation [2]. The objective of the study was to test the preliminary findings suggesting the presence of microdeformations formed likely due to impact of the meteorite in the sediments.

Methods: Mineralogical components as well as texture and structure of the rocks surrounding the meteorite fragments were the subject of microscopic examination in both transmitted and reflected light (Axioplan 2, Zeiss microscope). The microscopic studies were verified by the SEM-EDS and electron microprobe CAMECA SX100.

Results and Discussion: Microscopic observations showed that in the direct contact of the meteorite fragments the sediments contain distinctive structures, such as grain deformations (various degree) and cracks of quartz grains, which are present also in surrounding matrix composed of tills. The cracks vanish in a distance of 2 - 6 mm from the boundary of the meteorite fragments. The grains show the structures similar to the open spallation type. Mineral grains are cemented by matrix, built of Fe-oxides and carbonates. The longer grains axes are commonly parallel to the meteorite boundary.

The matrix mineralization in the contact zone, variable in composition, may have been formed by weathering or could be associated with the processes connected to the meteorite fall. However, a relatively sharp boundary between the meteorite and surrounding rocks seems to indicate the primary influence of impact and secondary of weathering. Thin coatings of Fe-oxides and Fe-oxyhydroxides on the meteorite fragments could have been formed by weathering, as indicated by hematite and goethite presence within a few millimeter bands around the meteorite fragments. Deformed or crushed grain clasts in the sediments around the meteorite fragments clearly indicate the meteorite fall. A small range of the observed microstructures in the deformation zones can only be the result of a small meteorite fall.

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