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## **Geomorphological mapping of pipe collapses as a tool to identify the relationships of soil piping and geological structure at regional scale**

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Soil piping is an important subsurface soil erosion process that accelerates land degradation in many areas around the world, as well as it impacts landscape evolution mainly by developing new gullies. Up to now, several studies have revealed factors controlling this process (such as high silt content, soil dispersion, biological activity of soil biota, and high hydraulic gradient), but most of them are connected with local soil properties and local topography. This study aims to identify the relationships of soil piping with geological structure at regional scale. The study is conducted in the Bieszczady Mts. (SE Poland), which are the westernmost part of the Eastern Carpathians. The Bieszczady Mts. covers more than 2200 km<sup>2</sup>. They are built of flysch rocks, i.e., sandstones alternated with shales and mudstones, which are diversified in the vertical profile (variable thickness of shale and sandstone layers) and in the horizontal profile (regional variability). Moreover, the Bieszczady Mts. lies in the contact zone of two major tectonic units of the Outer Carpathians (the Dukla and the Silesian Units). The study involves geomorphological mapping of pipe collapses (PCs), which are surface manifestations of soil piping, i.e., pipe roof collapses. PCs are mapped manually by visual inspection using hillshade of LiDAR-based Digital Elevation Model (DEM) with 1 m accuracy, along with the orthophotos. The data are verified in the field. Thanks to the previous study in this area, the geomorphological mapping has been limited to the areas where grasslands/pastures occur and where transition from pastures to forest has been observed (Bernatek-Jakiel and Jakiel, 2021).

First results have shown that PCs are related to geological structure. They develop in the areas where prevails thin- and medium-bedded sandstones with shales, not in the areas with thick-bedded sandstones. These rocks are grouped in the narrow strips of NW–SE direction in the Bieszczady Mts.

Recognition of soil piping relationship with geological structure is an important step to incorporate piping erosion to regional and global soil erosion models. This is of crucial significance in the sustainable soil management.

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