

The relation between geological structure and slope orientation as a context of landslide development: An example from Lubań and Gorc ridge (Gorce, Polish Outer Carpathians)

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Structural geology has recently become a key topic in landslide research. However, the link between tectonics and slope orientation in landslide development is not deeply recognized. The aim of our research is to find out relation between bedding and slope orientation as a context of occurrence and distribution of landslides.

Area of the research covers parts of Gorce Mountains (Polish Carpathians), along the Lubań and Gorce ridge which include 129.5 km². Study area is placed in the southern part of Magura nappe (Polish Outer Carpathians) and includes two main tectonic unit: Krynicka Unit and Bystrzycka (Sądecka) Unit (Paul, 1980).

This region is built of sandstone–shale flysch deposits of turbidite origin. Mechanical characteristic of flysch rocks and very complex tectonics contribute to development of mass movements (Kleczkowski, 1955; Mastella, 1975; Bober, 1984; Wójcik, 1997; Margielewski, 2004). On the area of the research altogether 494 landslides were mapped. Landslides cover 15 % of this region. Distinguished landslides include all type of mass movements (Dikau et al., 1996; Margielewski, 2009).

Proposed method is comparison of several raster maps of different parameters: map of bed strike, map of bed dip, map of slope and map of aspect. To create continuous map of bedding we built 3D geological model using all available data such as geological unit boundary, location of faults and strike/dip measurements and DTED2 (Digital Terrain Elevation Model Level2). Maps of slope and aspects are based on DTED2. Using simple map algebra we are able to calculate the relation between beddings and slopes

parameters. Final bedding vs. slope map were compared to map of distribution of landslide. Our methodology allows to define witch kind of slope is more predictable for developing of the mass movements.

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