



Morphology and Environmental Significance of Relict Sorted Polygons, Krkonoše Mountains, Czech Republic

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The development of sorted polygons is driven by several interconnected processes related to freeze-thaw cycles, the frequency and/or intensity of which is determined by regional climatic factors and site-specific factors that influence local microclimate, such as relief, lithology, snow cover, drainage and vegetation. The interplay of the above factors generates different ground thermal and moisture regimes and therefore influences the spatial distribution and morphology of sorted polygons.

In this paper, we describe relict large-scale sorted polygons in the Krkonoše Mountains (Czech Republic) and we aim (1) to determine the relations between polygon morphology and clast distribution; (2) to determine the extent to which the morphology and clast distribution of the polygons were influenced by past microclimates; and (3) to present palaeoenvironmental evidence from the periglacial environment of the summit area of the Krkonoše Mountains during the Last Glacial/Holocene period. Sixty-two sorted polygons with an average length of 194 cm and an average height of 21.5 cm and in total 7740 clasts were measured at four sites on Mt Luční hora (50°43'40"N; 15°40'57"E), at elevations of 1455 to 1555 m asl.

Larger sorted polygons are formed by larger clasts and tend to occur in poorly drained sites at lower altitudes. Smaller polygons and polygons with greater relative height are better sorted. More up-domed and better sorted polygons are located at higher altitudes suggesting more severe and longer-lasting microclimates suitable for the development of sorted polygons. The altitudinal gradient in polygon morphology and sorting, preserved since the Last Glacial period, indicates the high palaeoenvironmental potential of the relict large-scale sorted polygons located on flat or convex parts of the terrain. Polygon development probably involves positive feedback between morphology and frost susceptibility, driven by microclimate.

The proposed method for evaluating frost sorting (based on clast size measurements) allows for rapid non-invasive assessment of sorting using modern methods, including high-resolution remote sensing (especially terrestrial photogrammetry) and modifications of the sampling strategy and repetitive measurements within individual sorted patterned-ground features. This method is designed for general use in periglacial landscapes.