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Parent material, vegetation or slope position - which soil-forming factor controls the intensity of podzolization process in the soils of the Sudety Mountains montane zone?

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Climatic conditions, parent material and vegetation type are considered to be the main soil-forming factors controlling podzolization process advancement. Moreover, in hilly and mountainous areas properties of soils that are undergoing podzolization process are influenced significantly by its location on a slope, due to lateral translocation of soil solutions. The Sudety Mts. are a medium-high mountain range characterized by geological mosaic with many different sedimentary, igneous and metamorphic rocks, mostly poor in alkali elements. Most of the Sudety Mts. area lies in a lower montane zone, where the dominant natural vegetation were temperate mixed and deciduous forests. However, since 18th century natural vegetation was significantly transformed by widespread introduction of spruce monocultures. These distinguishing features of the Sudety Mts. natural environment are considered to be responsible for prevalence of podzolized soil in this area, however the intensity of podzolization process is very differentiated.
The aim of presented research was to determine the influence of varying parent material, different vegetation types and different slope positions the on the soil properties variability, and thus, to answer the question which of the analyzed soil-forming factors is controlling the podzolization process advancement in the Sudety Mountains montane zone?
Data from A, E, Bs and C horizons of 16 soil profiles developed from different parent materials (granite, sandstone, andesites and mica schists), located under various types of vegetation (spruce and beech forests) and in different slope positions (upper, middle and lower parts of the slopes) were taken into the analysis. All analyzed soil profiles were located in lower montane zone between 550 and 950 m a. s. l. to avoid the influence of varying climatic conditions. One-way ANOVA and Principal Components Analysis (PCA) were used to analyze differentiation of soil texture, pH, organic carbon and nitrogen content, total content of Si, Al and Fe as well as dithionite and oxalate forms of this elements and its ratios in relation to soils' parent material, vegetation and slope position.
The results showed that the analyzed soil properties variability was explained, primarily, by the lithological diversity of the soil parent material and, secondly, by the varying vegetation type. Slope position didn't show significant relations with the diversity of analyzed soil properties.