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Microscopic and X-ray diffraction properties of weathered grano-diorite in Sudety Mts., SW Poland

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Mineralogical composition of igneous rock contributes significantly to characteristics of regolith and derived soil, while composition of primary and secondary minerals are modified by climatic conditions. Chemical and physicochemical properties of these soils depend on organic colloids formed in humus horizon, as well as clay minerals and other products of weathering processes. The aim of this study was to determine transformation processes of primary minerals and to characterize clay minerals formed in result of parent rock alteration. The objects of this investigation were several cambisol profiles derived from granodiorite of so called "strefa Niemczy" tectonic complex in the middle Sudety Mts., SW Poland. They were arable soils forming catena of different moisture regime, located on gently slope at elevation of 300 m (50˚41 N; 16˚48 E). Weathering processes of granodiorite resulted in strong disintegration of parent rock, and thus regolith material consisted of loose primary minerals and little amount of clay minerals and colloidal silica. Parent rock samples, collected from weakly weathered part of soil profiles, were analyzed with polarized microscope. Additionally, colloidal fraction was isolated from soil material of different genetic horizons, and clay fraction was analyzed with X-ray diffraction method. Obtained results indicated that kaolinite and illite were the main clay minerals formed in all horizons investigated. Microscopic investigation showed that primary K-feldspar altered to kaolinite. Sericite was found in thin sections as weathering product of plagioclases, leading finally to transformation into illite. Additionally, primary biotite and hornblende altered into chlorite minerals. Mechanical disintegration provided regolith reach in fine fractions of quartz, strongly marked on X-ray diffractograms.