

C. DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

From the soil science point of view, calcium carbonate consists one of the most important components within the soil substrate. The primary source and further determinant of calcium carbonate-rich soil formation in Carpathian region is parent material e.g. limestone, sandstone, calcium-carbonate rich shale or marl. As the calcium carbonate may occur in the lithogenic (derived from the parent material) and pedogenic forms (mostly governed by pedogenic processes e.g. precipitation, dissolution, translocation as well as recrystallization processes). The diverse lithology of carbonate-rich parent materials could lead to significant differences in mineralogical composition in developed soils and further mineralogical transformations. Calcium carbonate-rich soil are characterized by occurrence of various clay minerals mainly from the group of kaolinite, smectite, illite and micas (mixed-packaged minerals). Furthermore, wide range of heavy minerals can be identified, which can also consist the accessory forms. Moreover, wide range of heavy minerals can be identified, which can also consist the accessory forms. Therefore, it should be stated that in the mountain soils, expected spectra of clay and heavy minerals could be under the influence of allogenic admixture or slope processes which may disorder the expected transformations and distribution of minerals in calcium carbonate-rich soils. The key questions of proposed project are as follows: may various calcium carbonate-rich rocks reveal different pathways of minerals transformation? and does the full set of minerals came directly from parent material or some allochthonous contribution can be detected? Due to provoke questions, a wide range of multidisciplinary methods will be applied including mineralogical, geochemical and micromorphological procedures. Literature and field reconnaissance allow us to distinguish various cases of soils, within which calcium carbonate play different role and occur in various ways: i) parent material rich in calcium carbonate and soil material evidently indicate presence of calcium carbonates; ii) within soil profile, only calcium carbonate-rich rock fragments show occurrence of calcium carbonates; iii) only lowermost soil horizons (BC and/or C horizons) host calcium carbonates. Based on proposed multiproxy approach the main goals of project are as follows: i) assessment of calcium carbonate influence on the direction of soil development and minerals transformation in above mentioned cases of soils; ii) detection of primary and secondary carbonates and related features as well as evaluation of critical factors for their presence/formation; iii) detection of input of allochthonous components (e.g. aeolian silt) and degree of their admixture into the soil rich in calcium carbonate and their further influence on the soil formation. Additional purpose is to propose the classification criteria for calcium carbonate-rich soils.

Proposed project will be based on 21 calcium carbonate-rich soil profile located at the area of polish Carpathians. Determined research areas will represent various calcium carbonate-rich parent materials, i.a.: different types of limestone, limestone and sandstone colluvium, red sandstone, grey sandstone, sandstone with muscovite, shales with interbeds of calcite veins, menilite shale, variegated shale, claystone, granite conglomerate and marl. Such approach shows the differentiation of calcium carbonate-rich parent material. Then, characteristics of the morphology and detailed description of the soil profiles in accordance with the requirements of Polish Soil Taxonomy (2011) and FAO (2006) will be executed. From profiles soil material with disturbed and undisturbed structure, necessary to laboratory analysis will be collected. Because this project has an interdisciplinary character, two groups of laboratory analyses will be executed. First group will be included the following analyses: particle-size distribution, pH, content of organic carbon, total nitrogen, calcium carbonate, active calcium carbonate, 'free' iron and aluminium, 'active' iron and aluminium, sum of exchangeable base cations, and hydrolytic acidity. Those analyses will focus on identification of diagnostic horizons and materials, soil classification and description of dominant soil forming process. Second group of analyses will based on micromorphology, mineralogical composition of clay fraction, heavy minerals content as well as geochemistry. This set of interdisciplinary analyses will help to define the intensity of pedogenesis, identify the direction of mineral transformation in calcium carbonate materials and determine the occurrence of primary and secondary pedofeatures. Furthermore, will be possible to determine the homogeneity/heterogeneity of soil substrate as well as identify the admixture of allochthonous material (aeolian silt).

Implementation of proposed project rises the importance of local and global issues related with the assessment of the impact of diverse lithogenic and pedogenic factors on calcium carbonate-rich soil formation as well as identification main soil-forming processes and mineral transformation in such soils. Additionally, determination the scale of allochthonous components admixtures (aeolian silt) to the calcium carbonate-rich soil and their influence on the soil development will be performed. Currently, the important issue in soil science is the classification of calcium carbonate-rich soils. Based on the performed study, proposing of the classification criteria for subject of this project will be possible.