Reflecting on the structure of soil classification systems: insights from a proposal for integrating subsoil data into soil information systems

Stefaan Dondeyne (1), Jérôme Juilleret (2), Karen Vancampenhout (3), Jozef Deckers (1), and Christophe Hissler (2)

(1) Department of Earth and Environmental Sciences, University of Leuven, Celestijnenlaan 200E, B-3001, Leuven, Belgium (stefaan.dondeyne@kuleuven.be), (2) Luxembourg Institute of Science and Technology, Department Environmental Research and Innovation, 5 avenue des Hauts-Fourneaux, L-4362 Esch/Alzette, Grand-Duchy of Luxembourg, (3) Cluster for Bioengineering Technology, Department of Microbial and Molecular Systems, Technology Campus Geel, University of Leuven, Kleinhoefstraat 4, 2440 Geel

Classification of soils in both World Reference Base for soil resources (WRB) and Soil Taxonomy hinges on the identification of diagnostic horizons and characteristics. However as these features often occur within the first 100 cm, these classification systems convey little information on subsoil characteristics. An integrated knowledge of the soil, soil-to-substratum and deeper substratum continuum is required when dealing with environmental issues such as vegetation ecology, water quality or the Critical Zone in general. Therefore, we recently proposed a classification system of the subsolum complementing current soil classification systems. By reflecting on the structure of the subsoil classification system which is inspired by WRB, we aim at fostering a discussion on some potential future developments of WRB.

For classifying the subsolum we define Regolite, Saprolite, Saprock and Bedrock as four Subsolum Reference Groups each corresponding to different weathering stages of the subsoil. Principal qualifiers can be used to categorize intergrades of these Subsoil Reference Groups while morphologic and lithologic characteristics can be presented with supplementary qualifiers. We argue that adopting a low hierarchical structure - akin to WRB and in contrast to a strong hierarchical structure as in Soil Taxonomy – offers the advantage of having an open classification system avoiding the need for a priori knowledge of all possible combinations which may be encountered in the field. Just as in WRB we also propose to use principal and supplementary qualifiers as a second level of classification. However, in contrast to WRB we propose to reserve the principal qualifiers for intergrades and to regroup the supplementary qualifiers into thematic categories (morphologic or lithologic). Structuring the qualifiers in this manner should facilitate the integration and handling of both soil and subsoil classification units into soil information systems and calls for paying attention to these structural issues in future developments of WRB.