Soil Classification System based on Pore Space Structure

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A soil classification system was proposed based on the clustering of similar air availability curves [$A_a(s)$ curves, s is the suction] determined in the soil sample scale, where $A_a(s)$ is the complement of the water retention curve, $\theta(s)$, in relation to the saturated water content, Φ. This system is identified by the acronym SPSCS (*Soil Pore space-Structural Classification System*) and defines the structural Families as the soil classes that group similar $A_a(s)$ curves. In SPSCS, the $A_a(s)$ curve was modelled by the van Genuchten (VG) equation with a protocol for the determination of its parameters valid in the suction range from 30 cm to 18000 cm, for which the prediction of water retention data by the VG model is acknowledged to be more adequate. Two categorical levels are indicated in SPSCS: Orders and Suborders. SPSCS was based on the textural classification system and conceives a triangle analogous to the textural triangle, called structural triangle, where samples plotted in specific sub-areas have similar pore size distribution curves. These sub-areas define the soil Orders. The Suborder represents the soils with similar active pore space, a term proposed in this work to express the difference between Φ and the residual water content, θr. Nine Orders (from A to I) and four Suborders (from 1 to 4) are proposed, thus resulting in 36 possible structural Families. SPSCS was implemented with a broad and diverse soil database with approximately 3,000 soil samples from tropical and temperate environments. All the structural Orders and Families were represented, with exception of three Families, with a greater concentration of samples in Orders B, G and H and Suborders 2 and 3. Because it is based on an analytical methodology, SPSCS may be a useful tool in the development of pedotransfer functions of hydraulical properties when information related to the soil structure is taken into account. Its use may also be relevant in studies to correlate soil pore structure and hydraulic functioning, pedological classes and soil physico-chemical properties, which may contribute to build up knowledge on hydraulical and pedological processes.

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