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Relationship between soil water retention curves and soil properties in the Havana province

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Employing Pedo-transfer Funtions (PTFs), in which the soil water retention curves (SWRCs) are estimated from more easily measured or available soil parameters, is now a widely used strategy to circumvent the costs associated with the determination of this hydraulic property. However, some studies have demonstrated that several sound approaches fail when dealing with tropical soils. The objective of this work is to identify relationships between the SWRC and physico-chemical properties of soils in the Havana province. This area has the highest agricultural potential in Cuba. We show preliminary results of a more ambitious project aimed at developing new PTFs and regionalizing the soil properties in that province. Field campaigns were carried out to collect 160 soil samples (80 sampling points and the two soil depths of 10-15 cm and 35-40 cm), using a random sampling scheme that covered a significant part of the region of interest. Besides the SWRC, for each sample we measured particle size distribution (PSD), aggregate size distribution (ASD), bulk density (ρ_b), specific density (ρ_b), penetration resistance, organic matter (OM), cation exchange capacity (CEC) and pH. The PSD, ρ_b, and OM are classic input data in many models and generally showed relatively low correlation when compared with others related to the ASD and the CEC, reinforcing the criterion respect to the suitability of well-known approaches in our soils. A linear model comprising the aggregates between 0.5 and 5 cm, clay content, and the content of some cations, as calcium and sodium, explained approximately 72% of the totoal variability of the two principal components of the soil water content at the measured matric potentials. However, less clear relationships were found for the parameters of the van Genuchten (1980) analytical relation. More robust analyses, based on the use of neural networks, are being implemented to enhance the predictive character of the soil properties.