Map Scale in the Context of Progress in Soil Geography

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In this presentation, we review historical soil maps from a geographical perspective, in contrast to the more traditional temporal perspective. Our geographical perspective is operationalized by comparing soil maps based on their scale and classification system. To analyze the connection between scale in historical soil maps and their associated classification systems, we place soil maps into three categories of cartographic scale. We then examine how categories of cartographic scale correspond to the selection of environmental soil predictors used to initially create the maps, as reflected by the maps' legend. Previous analyses of soil mapping from the temporal perspective have concluded that soil classification systems have co-evolved with gains in soil knowledge. We conclude that paradigm shifts in soil mapping and classification can be better explained by their correlation to historical improvements in scientific understanding, differences in purpose for mapping, and advancement in geographic technologies. We observe that, throughout history, small cartographic scale maps have tended to emphasize climate-vegetation zonation. Medium cartographic scale maps have put more emphasis on parent material as a variable to explain soil distributions. And finally, soil maps at large cartographic scales have relied more on topography as a predictive factor. Importantly, a key characteristic of modern soil classification systems is their multi-scale approach, which incorporates these phenomena scales within their classification hierarchies. Although most modern soil classification systems are based on soil properties, the soil map remains a model, the purpose of which is to predict the spatial distributions of those properties. Hence, multi-scale classification systems still tend to be organized, at least in part, by this observed spatial hierarchy. Although the hierarchy observed in this study is generally known in pedology today, it also represents a new view on the evolution of soil science. Increased recognition of this hierarchy may also help to more holistically combine soil formation factors with soil geography and pattern, particularly in the context of digital soil mapping.