Assessing the impact of uncertainty in global soil property datasets on soil erosion predictions.

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Abstract

Soil maps are essential for understanding and managing Earth's resources, with applications in hydrology, agriculture, climate modeling, and disaster response. Conventional soil maps group soils based on their similar cartographic properties, as on the legendary soil surveys, while digital soil mapping predicts the values of various soil properties through available soil point datasets and geostatistics or other modeling techniques. It is expected that both types of soil mapping contain some degree of uncertainty. Traditional soil maps, based on field surveys, can be subjective, while digital soil maps, derived from geostatistical and pedometrical techniques, may suffer from limited data and modeling errors. This study evaluates the representativeness of global and pan-European digital soil maps by comparing them to detailed national soil data from Greece. Specifically, we compare gridded datasets from the European Soil Data Centre (ESDAC) and ISRIC World Soil Information (SoilGrids) with point data from the soil map of Greece repository and field surveys, focusing on soil properties relevant to erosion prediction (e.g., soil texture, depth, infiltration capacity, organic matter). Initial results show significant spatial variability in the agreement between datasets, with larger discrepancies in areas with distinct soil characteristics (e.g., fine soil types). These differences can significantly impact soil erosion predictions. This research highlights the importance of multi-source data integration for developing more robust and reliable global soil datasets and provides recommendations for future mapping initiatives.

Keywords

SoilGrids; Global Soil Datasets; RUSLE; soil erosion modeling