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Digital mapping of soil information at a broad-scale: A review on GlobalSoilMap

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In the 21st century, soils are at the crossroads of global issues (i.e., food security, water security, biodiversity protection, climate change, and ecosystem services) and essential to achieve some of the Sustainable Development Goals. Although soils are central to these global issues, their management requires local actions and knowledge, which requires fine-resolution soil information. With an emphasis on broad-scale studies (>10,000 km²), this review outlines recent progress in the development of GlobalSoilMap, an initiative to provide a global fine-resolution grid of soil properties with quantified uncertainties using the bottom-up approach. This review provides an overview related to the soil data source, environmental covariates, spatial prediction, modelling and mapping techniques, uncertainty qualification, and target soil properties. The main findings of this review are: (1) A great increase of publication was observed after 2012, reaching a peak in recent years; (2) Australia and China were the most active countries; (3) *Geoderma* was the most frequent journal that was preferred by authors to publish related studies; (4) More than a half of the studies did not report soil sampling design; (5) Data splitting was the most frequent strategy for model evaluation, and independent validation was rarely used; (6) Nonlinear predictive model (i.e., machine learning) was becoming popular than ever before; (7) Relief, organisms and climate were the top three SCORPAN factors used in modelling; (8) Soil organic carbon (or soil organic matter) was the top soil property of interest.

This review also highlights the perspectives of GlobalSoilMap for further improving the quality of soil information globally and making it practical in decision making.