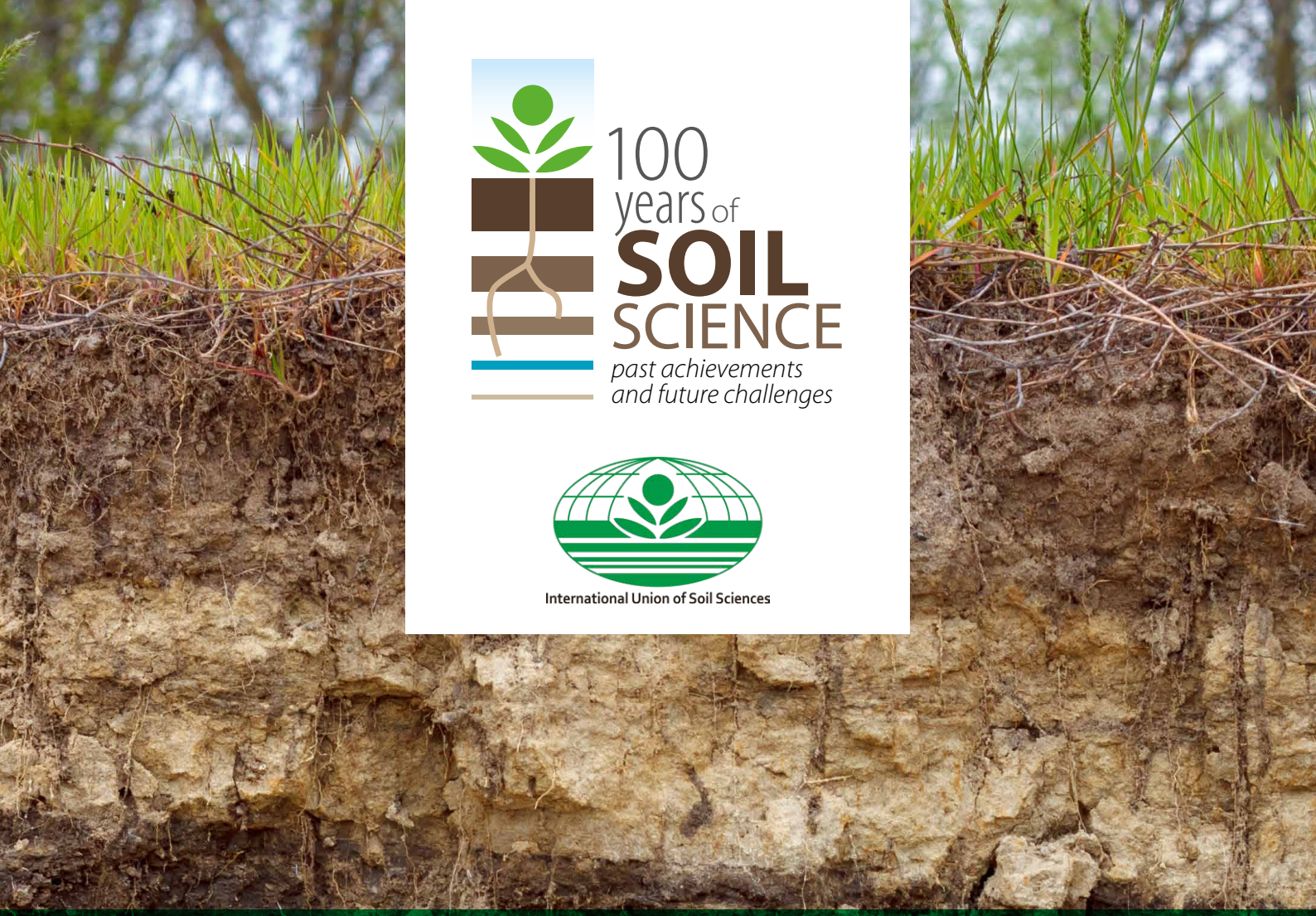

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ABSTRACT BOOK

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4. Soil health in achieving the Sustainable Development Goals
4.28 133610 - Characterizing and selecting soil health indicators at various scales

IMPROVING BASELINE MAPPING OF SOIL ORGANIC CARBON USING LOCAL GEOSTATISTICS: AN APPLICATION AT REGIONAL SCALE IN TUSCANY (ITALY)

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The status and change of soil organic carbon (SOC) concentration are fundamental for assessing soil health, its functionality and contribution to climate regulation. Organic matter decline is one of eight soil threats identified in the EU Thematic Strategy for Soil Protection (EU 2006). The indicator for assessing SOC loss threat is based on SOC change but measuring any change in SOC content requires establishing a SOC baseline. Geostatistical methods are commonly used both for predicting SOC concentrations at unsampled locations and their mapping. However, most geostatistical algorithms rely on variograms, which are usually assumed to remain unchanged through the area of interest. Therefore, it is assumed the stationarity of data and its spatial structure (variogram) over this area. That is a strong assumption, which may not hold. Local geostatistics (LGS) approach allows the local optimization of geostatistical parameters involved in variogram-based models ensuring a better adequacy between the geostatistical model and the data. Particularly, LGS considers locally varying parameters to address non stationarity and local anisotropies and allows to focus on local particularities. The study was aimed at improving baseline mapping of soil organic carbon (0.30 m) using local geostatistics at regional scale in Tuscany (Italy). It was developed within the SERENA project (European Joint Programme on Agricultural Soil Management, EJP SOIL, European Union's Horizon 2020 R&I programme, grant agreement N° 862695) using the SOC dataset of Tuscany Region presented in Gardin et al (2021). To improve the estimation of SOC concentrations by kriging, the elevation, being exhaustively available over the whole area of the Tuscany region, was used as an external drift. To assess the improvement of SOC prediction, the dataset was split into calculation and validation sets. The performance of the LGS approach was assessed by error statistics and compared to the results obtained using a global variogram model. Finally, the baseline map of SOC was complemented by the assessment of the spatial uncertainty using sequential Gaussian simulation.

Keywords: Soil organic carbon,Baseline,Local geostatistics,Spatial uncertainty,Tuscany