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How does digital soil information source affect soil ecosystem services assessment?

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Soil is a natural capital that provides several ecosystem services ensuring human well-being and sustainable socio-economic development. The scarcity of soil information is the main shortcoming to assess soil ecosystem services (SESs). At regional level, soil information is available at coarse spatial resolution (1:250,0000 in Brittany, France) and represented as a tessellation of polygon defining Soil Map Unit (SMU), where each SMU can include one or several Soil Type Units (STU) with given proportions derived from expert knowledge. Spatial disaggregation of complex SMU appears to be a relevant approach to enhance soil spatial resolution. The aim of this study was to test the hypothesis that using disaggregated soil information rather than legacy soil data 1:250, 000 leads to a more accurate SESs assessment. Four SESs (climate regulation, crop production, water quality regulation and soil fertility maintain) were assessed using the STICS soil crop model mobilizing successively three different sources of soil information: (i) legacy soil properties maps 1:250,000, (ii) disaggregated soil properties maps at 50m resolution and (iii) field measurements as validation dataset. Over 6775 km^2, 61 sites located in croplands were sampled according to the standard GlobalSoilMap depths (0-5cm, 5-15cm, 15-30cm, 30-60cm, 60-100cm and 100-200cm) to determine soil properties: soil organic carbon content, 5 particle-size fractions, coarse fragments, CEC, and pH. Conventional soil map 1:250,000 was previously disaggregated using DSMART algorithm with soil landscape relationships at 50m resolution (Vincent et al., 2018). Soil properties were then predicted at the GlobalSoilMap standard depths by fitting spline functions. For legacy soil maps, for each SMU and soil property, the value of the dominant STU was allocated to the whole SMU. A total of 183 STICS simulations (61 locations and 3 datasets) were computed over a period of 30 years. Four SESs indicators, one indicator per SES, were estimated from STICS outputs to evaluate SES supplies. The ongoing work shows that 1) SES provision strongly depends on inherent soil properties and is therefore sensitive to the soil information considered. 2) Disaggregating conventional soil improves the accuracy of the soil properties prediction at regional scale and therefore partially compensates the lack of soil information for SES assessment over large areas. Overall, expected results of this work are to evaluate the impact of pedological information quality on the SESs assessment using available tools and models.