



A mechanistic model for digital soil mapping: a case study for Natura 2000 areas in Cantabria, Spain

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Detailed, spatially exhaustive soil data on Soil Organic Matter (SOM) content are required to analyse the state of the Natura 2000 areas in the Cantabria region (Spain). These data can be obtained using digital soil mapping (DSM) techniques. However, DSM on SOM content at the regional scale has proven to be difficult. The SOM content is influenced by complex, mechanistic processes, whereas DSM uses statistical models to predict the relationships between the observed SOM content and the spatially exhaustive environmental co-variates. This study analyses the potential for mapping SOM content using a mechanistic approach for DSM rather than a statistical approach. The mechanistic model was based on existing carbon models that describe the processes that influence the SOM content. Compared to the traditional digital soil map based on a statistical model, the mechanistic digital soil map resulted in a lower RMSD and the number of required environmental co-variates decreased. The available knowledge on mechanistic processes that influence a soil property should more often be used in DSM. Mechanistic models incorporate pedological knowledge and predict soil properties by values that typically stay within realistic boundaries.