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Considering the spatial-scale factor when modelling sustainable land management.

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Modelling soil-plant processes is a necessity when exploring future effects of climate change and innovative soil management on agricultural productivity. Soil data are needed to run models and traditional soil maps and the associated databases (based on various soil Taxonomies), have widely been applied to provide such data obtained at "representative" points in the field. Pedotransferfunctions (PTF)are used to feed simulation models, statistically relating soil survey data (obtained at a given point in the landscape) to physical parameters for simulation, thus providing a link with soil functionality. Soil science has a basic problem: their object of study is invisible. Only point data are obtained by augering or in pits. Only occasionally roadcuts provide a better view. Extrapolating point to area data is essential for all applications and presents a basic problem for soil science, because mapping units on soil maps, named for a given soil type,may also contain other soil types and quantitative information about the composition of soil map units is usually not available. For detailed work at farm level (1:5000-1:10000), an alternative procedure is proposed. Based on a geostatistical analysis, onsite soil observations are made in a grid pattern with spacings based on a geostatistical analysis. Multi-year simulations are made for each point of the functional properties that are relevant for the case being studied, such as the moisture supply capacity, nitrate leaching etc. under standardized boundary conditions to allow comparisons. Functional spatial units are derived next by aggregating functional point data. These units, which have successfully functioned as the basis for precision agriculture, do not necessarily correspond with Taxonomic units but when they do the Taxonomic names should be noted . At lower landscape and watershed scale (1:25.000 -1:50000) digital soil mapping can provide soil data for small grids that can be used for modeling, again through pedotransferfunctions. There is a risk, however, that digital mapping results in an isolated series of projects that don't increase the knowledge base on soil functionality, e.g.linking Taxonomic names (such as soil series) to functionality, allowing predictions of soil behavior at new sites where certain soil series occur. We therefore suggest that aside from collecting 13 soil characteristics for each grid, as occurs in digital soil mapping, also the Taxonomic name of the representative soil in the grid is recorded. At spatial scales of 1:50000 and smaller, use of Taxonomic names becomes ever more attractive because at such small scales relations between soil types and landscape features become more pronounced. But in all cases, selection of procedures should not be science-based but based on the type of questions being asked including their level of generalization. These questions are quite different at the different spatial-scale levels and so should be the procedures.