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Methodology for global digital soil mapping

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A Digital World Soil Properties Map consortium (www.globalsoilmap.net) has been formed and comprises representatives from universities, research centres, development organisations and private enterprises around the world. The objective of this consortium is to create a digital map of the world's soil properties. The methods for mapping soil properties globally are not straightforward as different parts of the world have varying data sources of varying qualities. The soil data can be, e.g. legacy soil profile data, existing soil maps, and data from reflectance spectra. The soil-landscape model will vary from place to place. Knowledge and techniques for regional soil mapping may not be applicable at a global scale.

In this paper we will discuss the methodology for global digital soil mapping. For a defined physiographic area, we assemble the scorpan or environmental covariates. The methods used for digital soil mapping depends on the availability of soil data. The possibilities in the order from the richest to the poorest soil information are: 1. Detailed soil maps with legends and soil point data This is the richest information that can give the best prediction of soil properties. Soil properties can be derived from both soil maps and soil point data. The available methods are: extracting soil properties from soil map using a spatially weighted measure of central tendency, e.g. the mean, spatial disaggregation of soil maps, scorpan kriging (see explanation below) and combination of these. 2. Soil point data When soil point data are available, soil properties can be interpolated and extrapolated to the whole area by using a combination of empirical deterministic modelling and a stochastic spatial component. We called this the scorpan kriging approach. 3. Detailed soil maps with legends When only soil maps are available, we need to extracting soil properties from soil maps using the central concept of

soil maps along with covariates. 4. No data When no data or soil maps exist in area, we will use a homologue approach, which means that we need to estimate the likely soil properties under the observed soil forming factors.

There are many important questions that need to be answered in the methodology such as: (1) Which method is the most robust in particular areas or situations? (2) What are the crucial data layers? (3) What is the most appropriate way of modelling and depicting uncertainties?