

Hard Data—The <1m scale

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The majority of soil processes occur at the <1m scale: soil minerals weather, nutrients are transformed, biological activity is controlled, raindrops fall and structure is maintained at the <1m scale. Wind and water flow accumulation, tectonics and catastrophes, and therefore long time scale differentiation of soil properties, are examples of the few processes operating at the >1m scale. One of the current trends in geostatistics in relation to soil management is conditional simulation or stochastic imaging. The major proponents of this work, namely Journel and collaborators, have coined the term “hard data” for properties that have been estimated by measurement on physical soil samples. These hard data are used as the benchmark for determining the utility of the so-called soft (often remotely-sensed) data. The hard data are necessary for effective use of the soft data. The lack of hard data often provides the greatest restrictions to information interpretation and gives rise to the greatest component in the uncertainty in information content for land management. The vast majority of hard data come from measurement at the <1m scale. This alone provides an imperative for maintaining research at the <1m scale. The challenge, however, is to make the leap from research driven by curiosity or desire for knowledge to providing support for those trying to use the hard data for interpretation and subsequent decision-making and/or regulation for land management. Some examples of how measurements from the <1m scale can be used to improve modelling and spatial extension of hard data will be presented. In addition, the commonality of use of data analysis techniques across a range of scales will be briefly explored.