



Links between soil modelling and proximal sensing

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Proximal sensing of soils can provide valuable information for soil modelling, by providing baseline data and validating model predictions through direct observation of soil characteristics. A wide range of soil parameters can be estimated using proximal sensing of soils (PSS), often simultaneously using single hand-held systems, of which there are many types. The benefits for soil modelling include direct observation of modelled parameters, rapid assessment in field conditions and digital data acquisition, making the transfer of information to soil models relatively straightforward. This is an active area of development, with research into improved methods of field-based capture of soil parameters directly relevant for soil modelling. A number of challenges exist, including the removal of or accounting for the effects of field conditions (e.g. soil moisture and structure), and the development of libraries of data that will allow calibration models to be produced. We present an overview of PSS as it relates to soil modelling, including equipment types, calibration approaches, cloud-based processing, soil parameters and processes estimated using PSS, and opportunities and challenges for the future. We also identify and discuss the possibilities for integration of modelling and proximal sensing within precision agriculture/precision land management.