Assessment of soil health and fertility indicators with mobile phone imagery

Matt Aitkenhead, Richard Gwatkin, Malcolm Coull, and David Donnelly

The James Hutton Institute, Aberdeen, United Kingdom (matt.aitkenhead@hutton.ac.uk)

Work on rapid soil assessment in the field has led to many hand-held sensors for soil monitoring (e.g. NIR, FTIR, XRF). Recent work by a research team at the James Hutton Institute has led to an integrated framework of mobile phones, apps and server-side processing. One example of this is the SOCIT app for estimating soil organic matter and carbon using geolocated mobile phone camera imagery. The SOCIT app is only applicable for agricultural soils in Scotland, and our intention is to expand this work both geographically and in functional ability. Ongoing work for the development of a prototype app for estimating soil characteristics across Europe using mobile phone imagery and the JRC LUCAS dataset will be described. Additionally, we will demonstrate recent work in estimating a number of soil health indicators from more detailed analysis of soil photographs. Accuracy levels achieved for estimating soil organic matter and organic carbon content, pH, structure, cation exchange capacity and texture vary and are not as good as those achieved with laboratory analysis, but are suitable for rapid field-based assessment. Issues relating to this work include colour stabilisation and calibration, integration with data on site characteristics, data processing, model development and the ethical use of data captured by others, and each of these topics will also be discussed.