Convenient Estimation of Soil Conductivity, Sub-Soil Conductivity and Soil Thickness from Electromagnetic Induction. (S01-taylor181613-Oral)

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Abstract:

Electromagnetic induction (EMI) has become widely used for measuring the apparent electrical conductivity of soils. Short EMI instruments, with a transmitter-receiver separation ranging typically between 1- and 4-m, are most convenient for such measurement due to their portability and their sensitivity to depths that are of interest to soil scientists. For instruments operating at a frequency that is sufficiently low, the relationship between sensitivity and depth becomes a relatively simple function of instrument geometry, to the point that the sensitivity function can be incorporated easily into common spreadsheet programs. Where measurements are made with two geometries that have distinct sensitivity functions, a spreadsheet that incorporates both functions facilitates the interpretation of measurements using basic mathematical techniques. For example: 1) separate conductivities for soil above a given depth and for sub-soil beneath that depth can be calculated from simultaneous equations; and 2) the thickness of soil materials of a given conductivity above contrasting soil materials of substantially different conductivity can be estimated from an incremental search. Comparing such interpretations of EMI measurements with coring demonstrates the effectiveness of judicious application of the technique.

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