

Overview of Handheld XRF Applications for Soil Science

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Portable x-ray fluorescence (PXRF) spectrometry is a proximal sensing technology which has been used in a number of applications requiring elemental analysis (metallurgy, environmental assessment, etc.). While sanctioned by the US Environmental Protection Agency for use in soils and sediments (Method 6200), the technology has been only slowly adopted by soil scientists. Soil features are often quantified via a complex set of morphological and physicochemical properties per standard laboratory methods. However, these methods are expensive and require considerable time and analysis. A simple, rapid method for on-site elemental analyses would provide soil scientists with a new tool for wide variety of soils applications. Where visible near infrared diffuse reflectance spectroscopy (VisNIR DRS) has been strongly adopted for on-site mineralogical, organic matter, and soil textural applications, PXRF would serve as an excellent complimentary technique for elemental analysis. This presentation provides an overview of multiple applications of PXRF to field soil science including: 1) gypsum quantification, 2) peri-urban heavy metal assessment, 3) enhanced pedon characterization, and 4) soil texture analysis. In summary, PXRF shows considerable promise as a rapid assessment tool for multiple soil science applications.