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X-ray computed tomography of soil – do we need standardization?

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X-ray computed tomography (CT) has become a popular technique for studying the spatial configuration of soil components, and it is now being used to improve our understanding of many soil physical, chemical and biological properties and processes. Recent advancements in CT scanner technology, have given us the ability to readily acquire X-ray imagery, at spatial resolutions of only several micrometres, for soil samples several centimetres in size. Moreover, multiple energy scans offer the potential for improved discrimination among the liquid and solid phases of soil. Complementary efforts directed at improving upon conventional level-thresholding methods, such as the incorporation of the spatial context of each voxel, are aiding at the very important stage of image classification. Ultimately, interpretations of 3D soil models, based on CT imagery, are dependent not only on sample collection and preparation, but also on imaging parameters, image reconstruction and correction, as well as the approach to image classification. A survey of literature, from the past decade or so, reveals considerable variation in methodologies, some of which can be related to technological advancements. At this time, we should be considering the need for the standardization of methodologies for the application of X-ray CT to soil.