



A New Generation of High-Resolution Benchtop Micro-CT Scanners for Application in Earth Sciences

Markus Tuller (1), Carlos M.P. Vaz (2), Paulo O. Lasso (2), and Ramaprasad Kulkarni (3)

(1) The University of Arizona, Department of Soil, Water and Environmental Science, Tucson, AZ, USA

(mtuller@cals.arizona.edu), (2) Embrapa Agricultural Instrumentation, São Carlos, SP, Brazil, (3) The University of Arizona, Department of Electrical and Computer Engineering, Tucson, AZ, USA

Recent technological advances and steadily increasing computational capabilities led to the development of a new generation of benchtop X-Ray Micro-Computed Tomography (M-CT) systems with maximum resolution and image quality comparable to synchrotron M-CT. The objective of the presented study was to evaluate and optimize an advanced, high-resolution benchtop M-CT system for quantification of phase distributions in artificial and natural porous media. Effects of metal filters and various acquisition parameters (i.e. total rotation, rotation step, and radiograph frame averaging) on image quality and acquisition time were evaluated. Impacts of sample size and scanning resolution on CT-derived porosities and pore-size distributions are illustrated. In addition, it is shown that dense mineral particles can be discriminated from slightly attenuating elements and minerals. Advanced three-phase segmentation is discussed.