Pore Size Distribution Estimates Compared: Available software applied to soil CT and synthetic images.

Alasdair N Houston, Ruth E Falconer, Wilfred Otten, and Simona M Hapca

SIMBIOS, Abertay University, United Kingdom (al.houston@gmail.com)

The Pore Size Distribution (PSD) has been widely used as a means of characterising porous media and, in conjunction with knowledge of pore space connectivity, has been used to infer hydrological properties. There exist various strategies to estimate PSD from a segmented image and each strategy typically involves a sequence of algorithms that transform image information. Some of these algorithms may be explicitly parameterised, requiring decisions by a knowledgeable operator. As a result PSD estimates may be quite variable between software applications and operators. In order to better understand these differences, a constrained boolean model was used to construct synthetic images whose pore structure is without ambiguity and whose properties can be analytically determined. Applying to such images a selection of analysis procedures in the form of readily available software applications, reveals differences between PSD estimates and analytic information. In some cases it is possible to attribute these differences to artifacts visible within map images generated by the analysis procedures, permitting correction procedures to be devised. In the case of soil CT images which exhibit complex interconnected pore structure, differences in the PSD estimate between analysis procedures are very great in some cases. Inspection of map images can again help in identifying the cause of such problems, but this may result from a fundamental property of the procedure with respect to complex pore structure. Based on the evidence presented, we conclude that some readily available software will produce PSD estimates that can usefully characterise geomaterials.