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Combining local scaling and global methods to detect soil pore space

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The characterization of the spatial distribution of soil pore structures is essential to obtain different parameters that will influence in several models related to water flow and/or microbial growth processes. The first step in pore structure characterization is obtaining soil images that best approximate reality. Over the last decade, major technological advances in X-ray computed tomography (CT) have allowed for the investigation and reconstruction of natural porous media architectures at very fine scales. The subsequent step is delimiting the pore structure (pore space) from the CT soil images applying a thresholding. Many times we could find CT-scan images that show low contrast at the solid-void interface that difficult this step.

Different delimitation methods can result in different spatial distributions of pores influencing the parameters used in the models. Recently, new local segmentation method using local greyscale value (GV) concentration variabilities, based on fractal concepts, has been presented. This method creates singularity maps to measure the GV concentration at each point. The C-A method was combined with the singularity map approach (Singularity-CA method) to define local thresholds that can be applied to binarize CT images. Comparing this method with classical methods, such as Otsu and Maximum Entropy, we observed that more pores can be detected mainly due to its ability to amplify anomalous concentrations. However, it delineated many small pores that were incorrect. In this work, we present an improve version of Singularity-CA method that avoid this problem basically combining it with the global classical methods.

References

Martín-Sotoca, J.J., A. Saa-Requejo, J.B. Grau, A.M. Tarquis. New segmentation method based on fractal properties using singularity maps. Geoderma, 287, 40–53, 2017.

Martín-Sotoca, J.J, A. Saa-Requejo, J.B. Grau, A.M. Tarquis. Local 3D segmentation of soil pore space based on fractal properties using singularity maps. Geoderma, http://dx.doi.org/10.1016/j.geoderma.2016.11.029.

Torre, Iván G., Juan C. Losada and A.M. Tarquis. Multiscaling properties of soil images. Biosystems Engineering, http://dx.doi.org/10.1016/j.biosystemseng.2016.11.006.