Geophysical Research Abstracts
Vol. 18, EGU2016-4398, 2016
EGU General Assembly 2016

SoilJ – An ImageJ plugin for semi-automatized image-processing of 3-D X-ray images of soil columns

John Koestel

Swedish University of Agricultural Sciences, Soil and Environment, Uppsala, Sweden (john.koestel@slu.se)

3-D X-ray imaging is a formidable tool for quantifying soil structural properties which are known to be extremely diverse. This diversity necessitates the collection of large sample sizes for adequately representing the spatial variability of soil structure at a specific sampling site. One important bottleneck of using X-ray imaging is however the large amount of time required by a trained specialist to process the image data which makes it difficult to process larger amounts of samples. The software SoilJ aims at removing this bottleneck by automatizing most of the required image processing steps needed to analyze image data of cylindrical soil columns. SoilJ is a plugin of the free Java-based image-processing software ImageJ. The plugin is designed to automatically process all images located with a designated folder. In a first step, SoilJ recognizes the outlines of the soil column upon which the column is rotated to an upright position and placed in the center of the canvas. Excess canvas is removed from the images. Then, SoilJ samples the grey values of the column material as well as the surrounding air in Z-direction. Assuming that the column material (mostly PVC of aluminium) exhibits a spatially constant density, these grey values serve as a proxy for the image illumination at a specific Z-coordinate. Together with the grey values of the air they are used to correct image illumination fluctuations which often occur along the axis of rotation during image acquisition. SoilJ includes also an algorithm for beam-hardening artefact removal and extended image segmentation options. Finally, SoilJ integrates the morphology analyses plugins of BoneJ (Doube et al., 2006, BoneJ Free and extensible bone image analysis in ImageJ. Bone 47: 1076-1079) and provides an ASCII file summarizing these measures for each investigated soil column, respectively. In the future it is planned to integrate SoilJ into FIJI, the maintained and updated edition of ImageJ with selected plugins.