Supporting information

The definition and calculation of F and DA values

Pore shape factor (F) was expressed by:

\[ F = \frac{A_s}{A}, \]  

where \( A_s \) is the surface area of a sphere having a volume equal to that of the pore and \( A \) is the measured pore surface area. A value of one for F means a perfect sphere, whereas smaller F values refer to irregular or elongated pore shapes. In this study, the pore shapes were categorized into three types: regular pores (\( F \geq 0.5 \)), irregular pores (\( 0.2 < F < 0.5 \)) and elongated pores (\( F \leq 0.2 \)) (Pagliai, et al., 2004, Zhou, et al., 2012).

The DA value was calculated by:

\[ DA = \frac{L_1}{L_s}, \]  

where \( L_s \) and \( L_1 \) are the shortest and longest axes of the ellipsoid, respectively, which is fitted and constructed by a series of vectors within the soil-pore system. The DA value of the perfect isotropic structure was defined as one. The larger is the DA value, the more anisotropic is the pore system. The DA value was calculated with the free software package Quant3D (Ketcham, 2005).

References


Figure S1

The detailed procedures of ring artifacts removal. There are three steps. Step 1: convert the original image with ring artifacts into polar space (note that the ring artifacts become straight lines in polar space). Step 2: the ring artifacts (straight lines) were removed by masking the Fourier transformed image with a Matlab program. Step 3: convert the image back to Cartesian space.