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# Segmentation of singularity maps in the context of soil porosity

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Geochemical exploration have found with increasingly interests and benefits of using fractal (power-law) models to characterize geochemical distribution, including concentration–area (C–A) model (Cheng et al., 1994; Cheng, 2012) and concentration–volume (C–V) model (Afzal et al., 2011) just to name a few examples. These methods are based on the singularity maps of a measure that at each point define areas with self-similar properties that are shown in power-law relationships in Concentration-Area plots (C-A method). The C-A method together with the singularity map ("Singularity-CA" method) define thresholds that can be applied to segment the map.

Recently, the "Singularity-CA" method has been applied to binarize 2D grayscale Computed Tomography (CT) soil images (Martin-Sotoca et al, 2015). Unlike image segmentation based on global thresholding methods, the "Singularity-CA" method allows to quantify the local scaling property of the grayscale value map in the space domain and determinate the intensity of local singularities. It can be used as a high-pass-filter technique to enhance high frequency patterns usually regarded as anomalies when applied to maps.

In this work we will put special attention on how to select the singularity thresholds in the C-A plot to segment the image. We will compare two methods: 1) cross point of linear regressions and 2) Wavelets Transform Modulus Maxima (WTMM) singularity function detection.

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