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Multifractal Characteristics of Bimodal Mercury Pore Size Distribution Curves

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Characterization of Hg pore size distribution (PSDs) curves by monofractal or multifractal analysis has been demonstrated to be an useful tool, which allows a better understanding of the organization of the soil pore space. There are also evidences that multiscale analysis of different segments found in bimodal pore size distributions measured by Hg intrusion can provide further valuable information. In this study we selected bimodal PSDs from samples taken from an experimental area in São Paulo state, Brazil, where a revegetation trial was set up over saprolitic material. The saprolite was left abandoned after decapitation of an Oxisol for building purposes. The field trial consisted of various treatments with different grass species and amendments. Pore size distribution of the sampled aggregates was measured in the equivalent diameter range from 0.005 to about 50 μm and it was characterized by a bimodal pattern, so that two compartments, i.e. 0.005 to 0.2 μm and 0.2 to 50 μm, could be distinguished. The multifractal theory was used to analyse both segments. The scaling properties of these two segments could be fitted reasonably well with multifractal models. Multifractal parameters obtained for equivalent diameters for the segments > 0.2 and < 0.2 μm showed great differences. For example, entropy dimension, D_1, values from the segment 0.005-0.2 μm were always lower than those for the segment 0.2-50 μm form NDI , whereas the Hólder exponent of order zero, α_0, were higher for the former segment. These results indicate the probability different degrees of heterogeneity within the Hg pore size distributions studied.