Multifractal analysis of soil fauna diversity indexes under different uses and management

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Soil is a heterogeneous system, with intrinsic properties that are acquired by the interaction of the formation processes that provoke alteration in the spatial and temporal variability of the attributes. The soil management and use have a relevant influence on the variability of soil characteristics. This study aimed to evaluate the degree of multifractality of soil fauna diversity indexes under different land uses and management. The work was developed in the State of Maranhão, Brazil in the year 2015. Seven areas of different land use and management were sampled. The soil fauna was collected in pitfall trap, which remained in the field for a period of seven days. Right after this period the traps were removed, sorted and identified. Subsequently, were determined the diversity indexes, descriptive statistics and multifractality were estimated using the current method. Only millet and maize areas presented normality in the data set. All the coefficient of variation values for the seven areas were considered high. The multifractality analysis was performed for all the moments and partition functions were estimated for successive segments of different sizes 2k, k=0 k=7 in interval q=+10 q=-10. The general size spectrum, D_0, for all indexes in millet area was invariable, $D_0=1.000 \pm 0.000$. In the maize area, the overall size spectrum in D_0 ranged from 0.956 ± 0.015 (jackknife richness, Simpson dominance, and Pielou equitability) to 1.000 (individuals traps day) and larger overall dimension values were for the McIntosh index on D_{10} and D_2, and individuals traps day in D_1. The singularity spectra were curves in concave parables with higher or lower skewness for all sampled areas. The indexes remained asymmetric and shifted to the right, in some cases, as the Simpson diversity index, a broader right branch. What indicates the data heterogeneity and multifractality.