Assessing spatial variability of soil properties and ions associated to salinity using the multifractal approach

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The lowlands coastal region of the state of Pernambuco, Northeast of Brazil, was formerly covered by humid Atlantic forest (Mata Atlântica) and then has been increasingly devoted to Sugar cane production. Because the water table is near to the soil surface salinity can occur in this area. The objective of this study was to assess the scale dependence of parameters associated to soil salinity and ions responsible for salination using multifractal analysis. The field work was conducted at an experimental field located in the Goiania municipality, Pernambuco, Brazil. This site is located 10 km east from the Atlantic coast. The field has been devoted to monoculture of sugarcane *(Saccharum of?cinarum sp.)* since 25 years. The climate of the region is tropical, with average annual temperature of 24ºC and 1800 mm of precipitation per year. Soil was sampled every 3 m at 128 locations across a 384 m transect at a depth of 0-20 cm. The soil samples were analysed for pH, electrical conductivity (EC), Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^- and SO_4^{-2}; also sodium adsorption ratio (SAR) was calculated. The spatial distributions of all the studied variables associated to soil salinity exhibited multifractal behaviour. Although all the variables studied exhibited a very strong power law scaling, different degrees of multifractality, assessed by differences in the amplitude and several selected parameters of the generalized dimension and singularity spectrum curves, have been appreciated. The multifractal approach gives a good description of the patterns of spatial variability of properties and ions describing soil salinity, and allows discriminating differences between them.