



Soil Porous Structure as Heterogeneous Networks

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In this paper we present an application of the Complex Network theory to Geosciences. In particular, we show the implementation of the Heterogeneous Preferential Attachment (HPA) model [1] as a new way to quantify the structure of porous soils and closer relate them with soil texture. In the HPA model, already introduced in this context [2], pores are considered as nodes and their properties, such as position and size, are described by fixed states in a metric space. An affinity function is introduced in the HPA soil model in order to bias the attachment probabilities of links between pores according to their properties and soil texture. We perform an analytical study of the connectivity distributions of pores, $P(k)$, and develop a numerical analysis for the HPA soil model considering a combination of parameters corresponding to eleven empirical soil samples with different physical properties and five different textures.

[1] A. Santiago and R. M. Benito, An extended formalism for preferential attachment in heterogeneous complex networks, *Europhysics Letters*, 82 (2008) 58004.

[2] A. Santiago, J.P. Cárdenas, J.C. Losada, R.M. Benito, A.M. Tarquis and F. Borondo, Multiscaling of porous soils as heterogeneous complex networks, *Nonlinear Processes in Geophysics*, 15 (2008) 893-902.