Stochastic investigation of two-dimensional cross sections of rocks based on the climacogram

Anna Kalamioti, Panayiotis Dimitriadis, Katerina Tzouka, Eleutherios Lerias, and Demetris Koutsoyiannis
National Technical University of Athens, NTUA Research Committee, Water Resources and Environmental Engineering, Zografou, Greece

The statistical properties of soil and rock formations are essential
for the characterization of the porous medium geological structure as well as for the prediction of its transport properties in groundwater modelling. We investigate two-dimensional cross sections of rocks in terms of stochastic structure of its morphology quantified by the climacogram (i.e. variance of the averaged process vs. scale). The analysis is based both in microscale and macroscale data, specifically from Scanning Electron Microscope (SEM) pictures and from field photos, respectively. We identify and quantify the stochastic properties with emphasis on the large scale type of decay (exponentially or power type, else known as Hurst-Kolmogorov behaviour).