



Multifractal Analysis on Soil Transect Data

A.M. Tarquis (1,2), M.T. Castellanos(1), M. Carmen Morató(1) and N.R. Bird

(1) Dpto. de Matemática Aplicada. E.T.S. Ingenieros Agrónomos, Universidad Politécnica de Madrid, Ciudad Universitaria s.n. MADRID 28040 . SPAIN. (2) CEIGRAM - U.P.M. (3) Rothamsted Research, Harpenden, Hertfordshire AL5 2JQ. UK. (anamaria.tarquis@upm.es)

Better understanding of spatial variability of soil physical properties as hydraulic parameters is essential to characterize scaling properties and persistency. These are traditionally studied by means of geostatistics and spectral analysis, though powerful for many conditions, have certain limitations when dealing with non-stationary and highly variable data. Our purpose is to study porosity (P), gravimetric (GWC) and volumetric water content (VWC) of a soil transect data to reveal their multiscaling behavior.

Multifractal analysis (MFA) is quite effective in variability and scaling analysis and has been successfully applied in soil science and other disciplines. However, for a series techniques based on distributional fluctuations that are capable of handling non-stationary series, such as structure function (SF) and detrended fluctuation analysis (DFA) have been suggested.

MF-SF and MF-DFA techniques were used in the MFA of these three variables. A comparison between both and their sensitivity to number of data points are fully discussed.