Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04444, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04444
EGU General Assembly 2008


# Multifractal detrended fluctuation analysis of wind velocity time series

M.C. Morató (1), M.T. Castellanos (1), J. Seijas (2) and A.M. Tarquis (1,3)

(1) Dpto. de Matemática Aplicada a la Ingeniería Agronómica. E.T.S.I. Agrónomos - Universidad Politécnica de Madrid. Ciudad Universitaria s.n. 28040 Madrid. SPAIN. (2) Dpto. de Señales, Sistemas y Radiocomunicaciones. E.T.S.I.T. - Universidad Politécnica de Madrid. Ciudad Universitaria s.n. 28040 Madrid. SPAIN. (3) CEIGRAM - Universidad Politécnica de Madrid. Ciudad Universitaria s.n. 28040 Madrid. SPAIN. (mariadelcarmen.morato@upm.es)

The temporal structure of wind was investigated by means of temporal correlations of 10-min wind time series measured over a period of one year (2004). The Hurst exponent (H), one of a number of methods to identify the existence of long-range correlations in experimental data, has been applied to quantify self-similarity scaling and correlations in the mesoscale temporal range. The Hurst exponent can be calculated by several different algorithms, each of which has particular advantages and disadvantages. One of these methods is via Multifractal Detrended Fluctuation Analysis (MFDFA) that has been used recently in wind fluctuation series. This type of analysis has important implications on the understanding of wind-speed patterns and shows this variable to be more heterogeneous than is usually modeled in environmental and agricultural models.

The aim of this work is to study the multifractal nature of this series and to fully characterize the dynamical system that supports it. In this way, it is possible to simulate at high resolution (interval of 10 minutes) monthly wind-speed fluctuations series. MFDFA has been applied in measured wind fluctuation for each month of the studied year recording the range of scales where scaling behavior is found. The results point out a multiscaling or scaling behavior, depending on the month analyzed, from 10 minutes till 3 hours, approximately, with a significant anti-persistence character.