Geophysical Research Abstracts, Vol. 7, 04647, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04647

Measuring and Modelling Long-Range Dependence

H. W. Rust (1), D. Maraun (2), J. Timmer (3), J. Kropp (1)

(1) Potsdam Institute for Climate Impact Research, (2) Potsdam University, (3) Freiburg Centre for Data Analysis and Modelling

The Hurst coefficient H describes the asymptotic behaviour of the auto-correlation function (ACF). A popular method to estimate this long-range dependence parameter is detrended fluctuation analysis (DFA). However, recent works have revealed difficulties inferring long memory from empirical time series by means of DFA. Furthermore, this description with a single parameter focuses on the asymptotic behaviour and is in general not particularly suitable for all finite time scales observed. Additionally, short memory components might systematically bias the estimation of H.

A more flexible way of representing the ACF is stochastic modelling with fractional ARIMA (FARIMA) models. In addition to the long-range dependence described by the Hurst coefficient, these models are also capable of reproducing effects due to short memory processes. We compare this modelling approach to an analysis with DFA, illustrating the results with applications to temperature and river run-off data.