Geophysical Research Abstracts, Vol. 9, 06584, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06584

Qualitative Characterization of Long-Term Climate Change recorded in Palaeoclimatic Time Series by Multivariate Dimension Estimates and their Univariate Analogs

R. Donner (1), A. Witt (2)

(1) Institute for Transport and Economics, Dresden University of Technology, Germany (reik@agnld.uni-potsdam.de), (2) Department of Geography, King's College London, United Kingdom

The complexity of environmental conditions can be qualitatively estimated by the number of statistically relevant components in multivariate climatological time series. This applies especially to palaeoclimatic records, where the instationarity of the data (i.e., changes of these conditions) leads to variations of both, the total number and relevance of such components.

Recently, it has been demonstrated that dimension estimates based on an appropriate statistical decomposition of multivariate palaeoclimatic records (in particular, trace element abundances and grain-size distributions) are well-suited to characterize variations of the complexity of environmental conditions and thus trace the dynamic influence of long-term climate change within the data. In a similar way, this method may be applied to spatially distributed univariate records.

In this contribution, we give some illustrative example of how multivariate dimension estimates may used to infer the dynamic fingerprint of varying climatic conditions in palaeoclimatic records. In addition, we discuss a potential extention of our statistical approach to single univariate time series by applying singular system analysis (SSA) for the derivation of statistically meaningful variability patterns. The power of the presented method is tested for data from different sediment as well as ice core observations.