



1 Estimating Dimensionality of Geological Multi-Proxy Records

R. Donner (1), A. Witt (1,2), F. Demory (3), H. Oberhänsli (4)

(1) Nonlinear Dynamics Group, Department of Physics, University of Potsdam, Germany, (2) Environmental Change Research Centre, University College London, U.K., (3) Centre de Sédiméntologie-Paléontologie, Université de Provence, Marseille, France, (4) Climate Dynamics and Sediments Group, GeoForschungsZentrum Potsdam, Germany
(reik@agnld.uni-potsdam.de)

Paleoclimate variations are reflected in varying properties of deposited lake sediments. Different climatic epochs like glacials/interglacials and stadials/interstadials are expected to follow dynamically different regimes.

We grasp these different dynamical properties in terms of dimensionality of the system, i.e. we assign the Karhunen-Loëwe dimension of the multi-proxy record (consisting of different physical, chemical, and/or biological parameters) of a sediment layer to its age.

We apply the proposed method to high-resolution multi-proxy data from Lake Baikal sediments. The results are validated by additional application of independent component analysis. A wavelet analysis of the major patterns observed is presented.