Geophysical Research Abstracts
Vol. 19, EGU2017-17761-3, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Multi-component time, spatial and frequency analysis of Paleoclimatic Data

Luigia Cristiano (1), Johannes Stampa (1), Ingo Feeser (2), Walter Dörfler (2), and Thomas Meier (1)

(1) Institute of Geosciences ,Christian-Albrechts Universitaet zu Kiel, Kiel, Germany (luigia@geophysik.uni-kiel.de), (2) Institut für Ur- und Frühgeschichte ,Christian-Albrechts Universitaet zu Kiel, Kiel, Germany

The investigation of the paleoclimatic data offers a powerful tool for understanding the impact of extreme climatic events as well as gradual climatic variations on the human development and cultural changes.
The current global record of paleoclimatic data is relatively rich but is not generally uniformly structured and regionally distributed.
The general characteristic of the reconstructed time series of paleoclimatic data is a not constant sampling interval and data resolution together with the presence of gaps in the record.

Our database consists of pollen concentration from annually laminated lake sediments in two sites in Northern Germany. Such data characteristic offers the possibility for high-resolution palynological and sedimentological analyses on a well constrained time scale.
Specifically we are interested to investigate the time dependence of proxies, and time and spatial correlation of the different observables respect each other.
We present here a quantitative analysis of the pollent data in the frequency and time.

In particular we are interested to understand the complexity of the system and understand the cause of sudden as well as the slow changes in the time dependence of the observables.
We show as well our approach for handling the not uniform sampling interval and the broad frequency content characterizing the paleoclimatic databases.
In particular we worked to the development of a robust data analysis to answer the key questions about the correlation between rapid climatic changes and changes in the human habits and quantitatively elaborate a model for the processed data.
Here we present the preliminary results on synthetics as well as on real data for the data visualization for the trend identification with a smoothing procedure, for the identification of sharp changes in the data as function of time with AutoRegressive approach.
In addition to that we use the cross-correlation and cross spectrum by applying the Multiple Filtering Technique(MFT) of different pollen data from same location and same pollen data from different locations to identify the short and long period terms and to quantify the similarities in time and frequency domain.