Geophysical Research Abstracts
Vol. 16, EGU2014-10929, 2014
EGU General Assembly 2014

Hilbert-Huang Transform and Scaling Analysis of Various Geoscience data

Francois Schmitt (1) and Yongxiang Huang (2)

(1) CNRS and University of Lille 1, Laboratory of Oceanology and Geosciences, UMR 8187 LOG, 62930 Wimereux, France, (2) Shanghai University, Shanghai Institute of Applied Mathematics and Mechanics, Shanghai, China (yongxianghuang@gmail.com)

In geoscience, the field observation data are always nonlinear and nonstationary. They are also showing multiscale property since different spatial and temporal scales are involved. It is found that traditional methodologies, e.g., Fourier spectral analysis, structure-function analysis, etc., are strongly influenced by either nonlinear or nonstationary events. The Hilbert-Huang Transform (the combination of Empirical Mode Decomposition and Hilbert Spectral analysis) is efficient to handle both the nonlinearity and nonstationarity. In this talk, we apply this Hilbert-based methodology to various geoscience data collected from different field observations to characterize their scaling property. The collected data are daily river discharge, sea level, copepod abundance, wind energy, environmental data (temperature, dissolved oxygen) from coastal line, etc. Scaling property of these processes are then characterized in the frame of Hilbert spectral analysis.
Reference

1. Huang Y, Schmitt F, Lu Z and Liu Y 2008 Europhys. Lett. 84, 40010.
2. Huang Y, Schmitt F, Lu Z and Liu Y 2009 J. Hydrol. 373, 103–111.
3. Schmitt F.G., Huang Y., Lu, Z., Liu Y., and Fernandez N. J. Mar. Sys., 2009, 77, 473-481
4. Schmitt F. G., Huang Y., Lu, Z., Zongo S. B., Molinero J. C. and Liu Y. Nonlinear Dynamics in Geosciences. edited by A. Tsonis and J. Elsner, Springer, 2007, 261-280
5. Huang Y. and Schmitt F. G. J. Mar. Sys., 2014, 130, 90-100
6. Calif R., Schmitt F. G. and Huang, Y. Physica A, 2013, 392, 4106-4120