Geophysical Research Abstracts,
Vol. 11, EGU2009-8792, 2009
EGU General Assembly 2009

Recurrence Plots for the Analysis of Complex Systems in Earth Sciences

N. Marwan and J. Kurths

Potsdam Institute for Climate Impact Research, Transdisciplinary Concepts and Methods, Potsdam, Germany (marwan@pik-potsdam.de)

Recurrence is a fundamental property of dynamical systems, which can be exploited to characterise the system's behaviour in phase space. A powerful tool for their visualisation and analysis is the recurrence plot. Methods basing on recurrence plots have been proven to be very successful especially in analysing short, noisy and nonstationary data, as they are typical in Earth sciences. Recurrence Plots (RPs) have found applications in such diverse fields as life sciences, astrophysics, earth sciences, meteorology, biochemistry, and finance, where they are used to provide measures of dynamical properties, complexity or dynamical transitions. Theoretical results show how closely RPs are linked to dynamical invariants like entropies and dimensions. Moreover, they are successful tools for synchronisation analysis and advanced surrogate tests.