Complex network approach for recurrence analysis of time series

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We propose a novel approach for analysing time series using complex network theory. We identify the recurrence matrix (calculated from time series) with the adjacency matrix of a complex network and apply measures for the characterisation of complex networks to this recurrence matrix. By using the logistic map, we illustrate the potential of these complex network measures for the detection of dynamical transitions. Finally, we apply the proposed approach to a marine palaeo-climate record and identify the subtle changes to the climate regime.

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Our presentations on recurrence based complex network analysis of time series can be found:

Today

Session NP2.5 – Modelling and Understanding Geophysical Systems as Complex Networks

Poster XL167
Norbert Marwan, Jonathan F. Donges, and Sebastian Breitenbach
Synchronous climate transitions during the Holocene in Asia derived from speleothems

Poster XL169
Reik V. Donner, Yong Zou, Jonathan F. Donges, Norbert Marwan, and Jürgen Kurths
Recurrence networks - A novel paradigm for nonlinear time series analysis

Poster XL170
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Identifying shrimps in continuous dynamical systems using recurrence-based methods

Tomorrow

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Poster A427
Jonathan F. Donges, Norbert Marwan, and Sebastian Breitenbach
Recurrence structure of speleothem isotope records from Asia hints at simultaneous transitions in climate dynamics during the Holocene

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Talk EGU2010-8219
Reik V. Donner, Jonathan F. Donges, Norbert Marwan, Yong Zou, and Jürgen Kurths
Epochs of synchronous changes and dynamical transitions in African dust flux variability over the past 5 Ma detected by recurrence network analysis