



Boundary effects in network measures of spatially embedded networks - A case study for German rainfall data

A. Rheinwalt, N. Marwan, J. Kurths, and P. Werner

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

In studies of spatially confined networks, network measures can lead to false conclusions since most measures are boundary effected. This is especially the case if boundaries are artificial and not inherent to the underlying system of interest (e.g. borders of countries). An analytical estimation of boundary effects is not trivial due to the complexity of measures. A straightforward approach we propose is to use surrogate networks that can provide estimates of boundary effects in graph statistics. This is achieved by using spatially embedded random networks as surrogates that have approximately the same distribution of spatial link lengths.

Our approach is used in an analysis of spatial patterns in characteristics of regional climate networks. As an example a network derived from daily rainfall data and restricted to the region of Germany is considered.