Geophysical Research Abstracts
Vol. 16, EGU2014-14990, 2014
EGU General Assembly 2014

Geographic patterns of networks derived from extreme precipitation over the Indian subcontinent

Veronika Stolbova (1,2), Bodo Bookhagen (3), Norbert Marwan (1), Juergen Kurths (1,2,4)

(1) Research Domain - IV Transdisciplinary Concepts and Methods,Potsdam Institute for Climate Impact Research, Potsdam, Germany (stolbova.veronika@gmail.com), (2) Department of Physics, Humboldt University, Berlin, Germany, (3) Department of Geography, University of California, Santa Barbara, USA, (4) Institute for Complex Systems and Mathematical Biology, University of Aberdeen, UK

Complex networks (CN) and event synchronization (ES) methods have been applied to study a number of climate phenomena such as Indian Summer Monsoon (ISM), South-American Monsoon, and African Monsoon. These methods proved to be powerful tools to infer interdependencies in climate dynamics between geographical sites, spatial structures, and key regions of the considered climate phenomenon. Here, we use these methods to study the spatial temporal variability of the extreme rainfall over the Indian subcontinent, in order to filter the data by coarse-graining the network, and to identify geographic patterns that are signature features (spatial signatures) of the ISM. We find four main geographic patterns of networks derived from extreme precipitation over the Indian subcontinent using up-to-date satellite-derived, and high temporal and spatial resolution rain-gauge interpolated daily rainfall datasets. In order to prove that our results are also relevant for other climatic variables like pressure and temperature, we use re-analysis data provided by the National Center for Environmental Prediction and National Center for Atmospheric Research (NCEP/NCAR). We find that two of the patterns revealed from the CN extreme rainfall analysis coincide with those obtained for the pressure and temperature fields, and all four above mentioned patterns can be explained by topography, winds, and monsoon circulation. CN and ES enable to select the most informative regions for the ISM, providing realistic description of the ISM dynamics with fewer data, and also help to infer geographic pattern that are spatial signatures of the ISM. These patterns deserve a special attention for the meteorologists and can be used as markers of the ISM variability.