UNIVERSITÄT DUISBURG ESSEN

PHYSIK E=

Physikalisches Kolloquium

Mittwoch, 16.12.2020
13:00 Uhr
ZOOM Online

Exploring Predictability of Extreme Climate Events via a Complex Network Approach

Professor Jürgen Kurths

Potsdam Institute for Climate Impact Research
Dept. of Physics, Humboldt University

Objectives: To reveal spatial structures in network of extreme events over the Indian subcontinent and their seasonal evolution during the year.

The Earth system is a very complex and dynamical one basing on various feedbacks. This makes predictions and risk analysis even of very strong (sometime extreme) events as floods, landslides, heatwaves, earthquakes etc. a challenging task.

Here, I will introduce a recently developed approach via complex networks mainly to analyze strong climate events. This leads to an inverse problem: Is there a backbone-like structure underlying the climate system? For this we propose a method to reconstruct and analyze a complex network from data generated by a spatio-temporal dynamical system.

This approach enables us to uncover relations to global and regional circulation patterns in oceans and atmosphere, which leads to construct substantially better predictions, in particular of the onset of the Indian Summer Monsoon and El Nino.

References:
V. Stolbova, et al, Geophys. Res. Lett. (2016)
B. Goswami, et al,, Nature Communications 9, 48(2018)
N. Boers, et al, Nature 566, 373 (2019)
J. Meng, et al, PNAS 117, 177 (2020)