



Local dimension and recurrent circulation patterns in long-term climate simulations

Sebastian Buschow (1) and Petra Friederichs (2)

(1) Meteorological Institute, University of Bonn, Germany (s6sebusc@uni-bonn.de), (2) Meteorological Institute, University of Bonn, Germany

With the recent advent of a sound mathematical theory for extreme events in dynamical systems, new ways of analysing a system's inherent behaviour have become available: Studying only the probabilities of extremely close Poincaré recurrences, we can infer the local dimensionality of the hypothesized underlying chaotic attractor - a quantity which is closely linked to the predictability of individual configurations, as well as the information gained from observing them. In this talk (or poster), we take a closer look at multiple ways of estimating local attractor dimensions, identify potential pitfalls and discuss conceivable applications. Long trajectories of a simplified climate model based on the primitive equations serve as our test case. It is demonstrated that the introduction of a simple, analytical estimator streamlines the procedure and allows for additional tests of the agreement between theoretical expectation and observed data. We furthermore show how this technique can complement classical principal component analysis and may assist in separating dynamically meaningful patterns from mathematical artifacts.