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Data Driven Predictions of High-Resolution Thresholded Rainfall Time Series

Anna Deluca (1,2), Alvaro Corral (1,3), and Nicholas R. Moloney (4)

(1) Centre de Recerca Matemàtica, Complex Systems Group, Bellaterra, Spain , (2) Max Planck Institute for the Physics of Complex Systems, Dresden, Germany, (3) Department of Mathematics, Universitat Autònoma de Barcelona, Barcelona, Spain, (4) London Mathematical Laboratory, London, UK

In this contribution we study the effect of thresholding on time series generated by a self-organised criticality (SOC) model and actual high-resolution rainfall events. A better understanding of precipitation is indeed crucial for reducing the intrinsic errors present in climate models. Despite the diversity of individual rain events, a recent array of statistical measures present surprising statistical regularities giving support to the hypothesis that atmospheric convection and precipitation may be a real-world example of SOC. The predictability of rainfall and SOC events is studied by means of a decision variable sensitive to the tendency of the events to cluster or repulse. The quality of the predictions is evaluated by the receiver operating characteristics method. We have applied thresholds on the intensity or activity, which corresponds for SOC models to the fast (avalanche) time scale. In this case, the relative weight of the exponential tail decreases as the threshold increases, leading to higher predictability. For rainfall data, the evolution of the different ROC curves for thresholds on the intensity is not so clear, as the distributions do not seem to scale for high thresholds. A scaling theory developed for the Manna model and valid in general for any system for which the quite-time distribution scales with threshold allows to understand all the details of the prediction procedure.