Talk Title: How to predict the upcoming spatially organized critical transition?

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Abstract

Understanding the variability of systems remains an outstanding scientific challenge especially for systems, which are far from equilibrium. Such systems are driven by internal non-linear processes, which make the evolution of this system transient. Transient behavior of the non-linear system is very sensitive to fluctuations and initial conditions. Therefore it is challenging to predict future changes in such systems from observational data alone since there is only one realization (of many possible transients) available. My lecture aims to connect theoretical insights of bifurcations to puzzles in our current understanding of the properties of spatially organized critical transitions in different systems. I start from the example of the study of natural phenomenon - the Indian Summer Monson to explain the principles of underlying mechanisms and then I will show how to apply concepts that may benefit science, engineering, and medicine.