THE NONLINEAR PHYSICS OF DRYLAND LANDSCAPES

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Abstract. The impact of global climate change on ecosystem function and stability pose great challenges for current research in ecology. Of particular concern are processes involving desertification and biodiversity loss in drylands. Studies of these processes are hampered by the complexity of dryland ecosystems, which involve several levels of organization and different spatial scales. In this talk I will present and discuss a platform of nonlinear mathematical models that capture these elements of dryland ecosystems, and allow studying aspects of desertification and biodiversity-change phenomena. Specifically, I will discuss the emergence of vegetation patchiness as a symmetry-breaking phenomenon, and the implications of this phenomenon on state transitions and on landscape, resource and species diversity.