

1163-92-1465

Mary Silber* (msilber@uchicago.edu), Department of Statistics, University of Chicago, Chicago, IL 60637. *A fast-slow pattern formation model for investigating large-scale vegetation bands in drylands.*

From infiltration of water into the soil during rainstorms to seasonal plant growth and death, eco-hydrological processes relevant to the formation of banded vegetation patterns in drylands occur across multiple timescales. A new fast-slow switching model, developed to capture key processes on appropriate timescales, is introduced in the form of reaction-advection-diffusion equations. The fast system captures hydrological processes that occur on timescales associated with major rainstorms. The slow system acts between rain events, on a timescale that evolves vegetation and soil moisture over the dry seasons. We explore the fast-slow switching model through numerical simulation on a one-dimensional hillslope, and find agreement with certain observations about the pattern formation phenomenon, including band spacing and upslope colonization rates. This fast-slow model framework introduces a tool for investigating the possible impact of changes to frequency and intensity of rain events in dryland ecosystems, as well as stochasticity of rain inputs. (This talk is based in part on a paper coauthored by P Gandhi, S Bonetti, S Iams, and A Porporato, that appeared in *Physica D* in 2020.) (Received September 15, 2020)