Exploiting Topographic Heterogeneity to Probe Models of Dryland Vegetation Patterns

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Abstract: A beautiful example of spontaneous pattern formation appears in the distribution of vegetation in some dry-land environments. Examples from Africa, Australia and the Americas reveal that vegetation, at a community scale, may spontaneously form into stripe-like bands, alternating with striking regularity with bands of bare soil, in response to aridity stress. A typical length scale for such patterns is ~100 m; they are readily surveyed by modern satellites (and explored from your armchair in Google maps). These ecosystems represent some of Earth’s most vulnerable under threats to desertification, and some ecologists have suggested that the patterns, so easily monitored by satellites, may have potential as early warning signs of ecosystem collapse. I will describe efforts based in simple mathematical models, inspired by decades of research on pattern formation, to understand the morphology of the patterns, focusing particularly on the potential to constrain models by investigating topographic influences.