

Do ecohydrology and community dynamics feed back to banded-ecosystem structure and productivity?

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Mixed communities including grass, shrubs and trees are often reported to populate self-organized vegetation patterns. Patterns of survey data suggest that species diversity and complementarity strengthen the dynamics of banded environments. Resource scarcity and local facilitation trigger self organization, whereas coexistence of multiple species in vegetated self-organizing patches, implying competition for water and nutrients and favorable reproduction sites, is made possible by differing adaptation strategies. Mixed community spatial self-organization has so far received relatively little attention, compared with local net facilitation of isolated species.

We assumed that soil moisture availability is a proxy for the environmental niche of plant species according to Ursino and Callegaro (2016). Our modelling effort was focused on niche differentiation of coexisting species within a tiger bush type ecosystem. By minimal numerical modelling and stability analysis we try to answer a few open scientific questions: Is there an adaptation strategy that increases biodiversity and ecosystem functioning? Does specific adaptation to environmental niches influence the structure of self-organizing vegetation pattern? What specific niche distribution along the environmental gradient gives the highest global productivity?