Minimalistic models of savanna vegetation dynamics to address broad spatial scales in presence of scarce data

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The savanna biome encompasses variations of vegetation physiognomies that traduce complex dynamical responses to the gradients of decreasing rainfall leading from tropical forests to hot deserts. Such responses are shaped by interactions between woody and grassy plants that can be either direct, fire-mediated or both. There has been increasing evidence that several states of vegetation, sometimes highly contrasted ones may durably coexist under similar rainfall conditions suggesting either multi-stability or very long transitions. These fascinating questions have triggered burgeoning modelling efforts which have, however, not yet delivered an integrated picture liable to furnish at broad scales (i.e. for fractions of continent) sensible predictions of possible vegetation. Such a "big picture" is desirable for figuring out the future of vegetation in the face of climate and anthropic change scenarios. It is also necessary for applications to territories devoid of reference data and long term observation sites (that is, most of tropical Africa). In this talk, we will advocate the design of minimalistic models, capturing essential processes while retaining sufficient mathematical tractability and restricting themselves to a minimal set of assessable parameters (e.g. [1]). We will also envisage how ongoing progresses in space observation may help calibrating or validating such models (e.g. [2]).

References

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