

Summary from the group exploring "Hysteresis and multiple stability in numerical simulation" with Mary Silber, Kaitlin Hill, Jan Seiber, and Karna Gowda:

- To detect tipping in a large scale climate model, one may wish to run numerical experiments to identify a "bifurcation diagram"
- Varying a parameter monotonically in time can trace out the steady states, but also create the false illusion of bistability/hysteresis (or it can be missed).
- See this in the climate model where CO₂ is varied, a few other sources.
- The "hysteresis loop" may just be caused by the lag in the system tracking the static equilibrium.
- You may also miss the hysteresis
- Procedures for reducing error:
 - vary the parameter more slowly
 - set the parameter, let the system settle down, change the parameter, ...
 - vary the parameter according to the procedure that Jan described.
- Is it worthwhile to do a procedure like this for PDE models like vegetation pattern models?
 - numerical continuation can be done, besides
 - not clear what the right metric is for vegetation in the presence of patterns. Average? Max amplitude?
 - would be useful to know what goes on near vegetation collapse.