

ICMS Tipping Points Workshop

Discussion Group Report: Nonsmooth phenomena

Types of phenomena:

- Threshold-type
 - Condensation/ precipitation
 - Convection – stratified layers
 - Fronts
 - Earthquakes

- Delta function
 - Volcanoes
 - Freshwater flux
 - Earthquakes

- Box model circulation

- Physical constraints and boundaries
 - Ice line

- Micro-scale smooth, but modeled as nonsmooth on macro-scale

Questions:

- Should we model more processes as nonsmooth/discrete?
 - Or do smooth models more accurately describe phenomena?

- Can the nonsmooth climate models we have be handled with current theory?
 - What new theory do we need to explore/ develop?

- Noise in nonsmooth systems?

- Early warning tests in nonsmooth systems (cf. Christian Kuhn's talk)?
 - Which ones still “work”?
 - Can we develop new ones which do?

- Hogg CO₂ model as nonsmooth model (not numerically)?

- Analogues between existing nonsmooth models in other applications and climate models?