SuperParameterized CESM

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Superparameterization

- GCM timestep; tens of minutes
- CRM computes sources/sinks of temperature and moisture. timestep; seconds

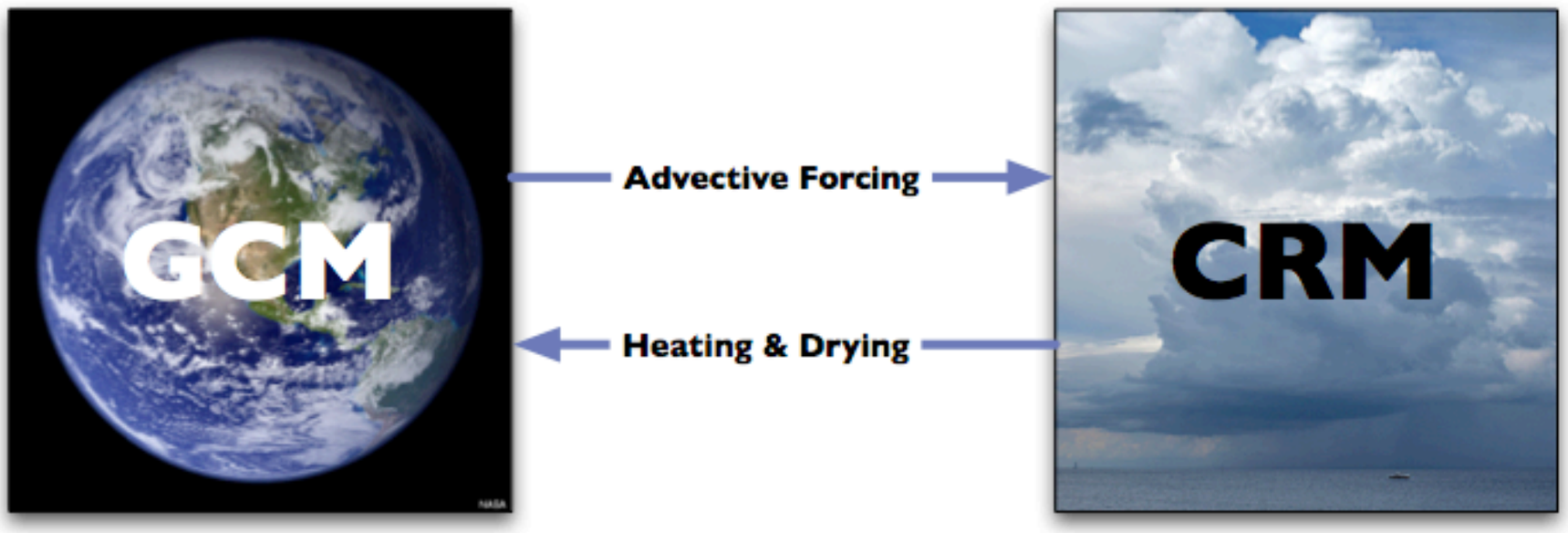
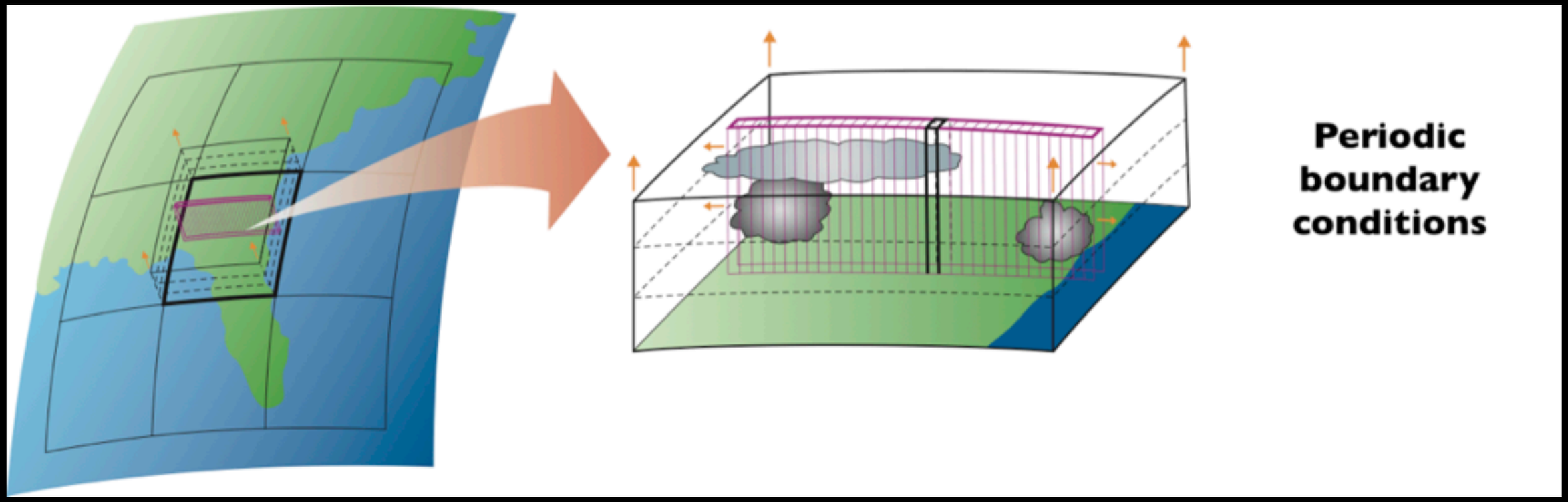


Fig. 1: Schematic illustrating the coupling of the GCM and the CRM, in the SP-CAM.

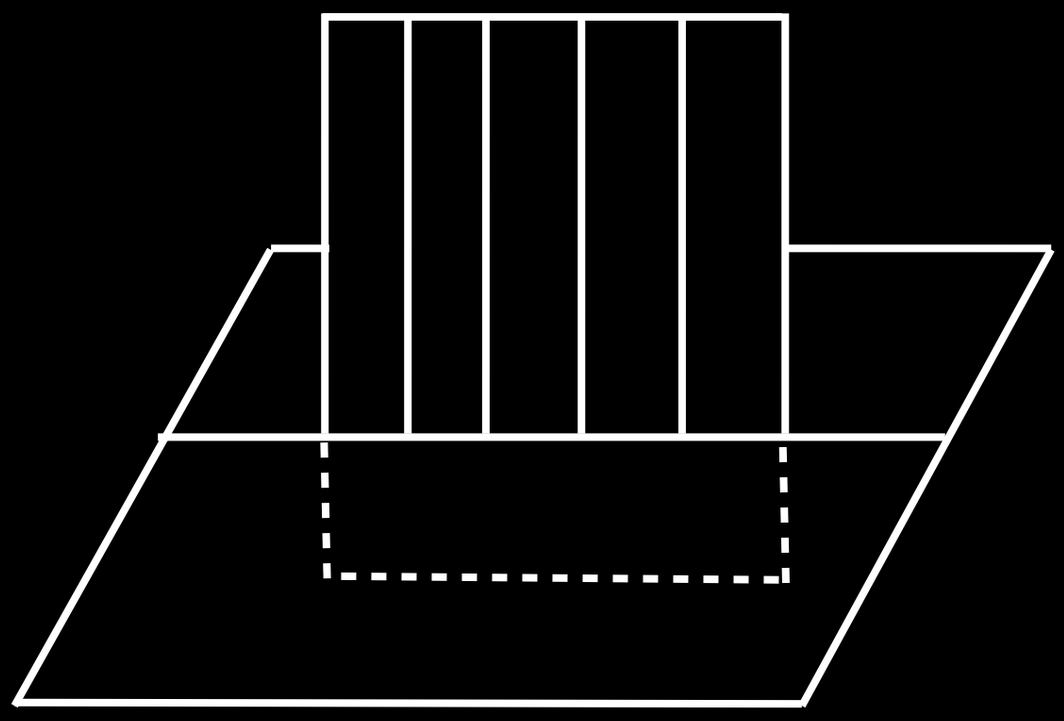
Superparameterization

- ‘Curtain’ of CRMs in a single GCM gridcell
- Current Version: CAM/SAM/CLM
- How do we represent land in this configuration?



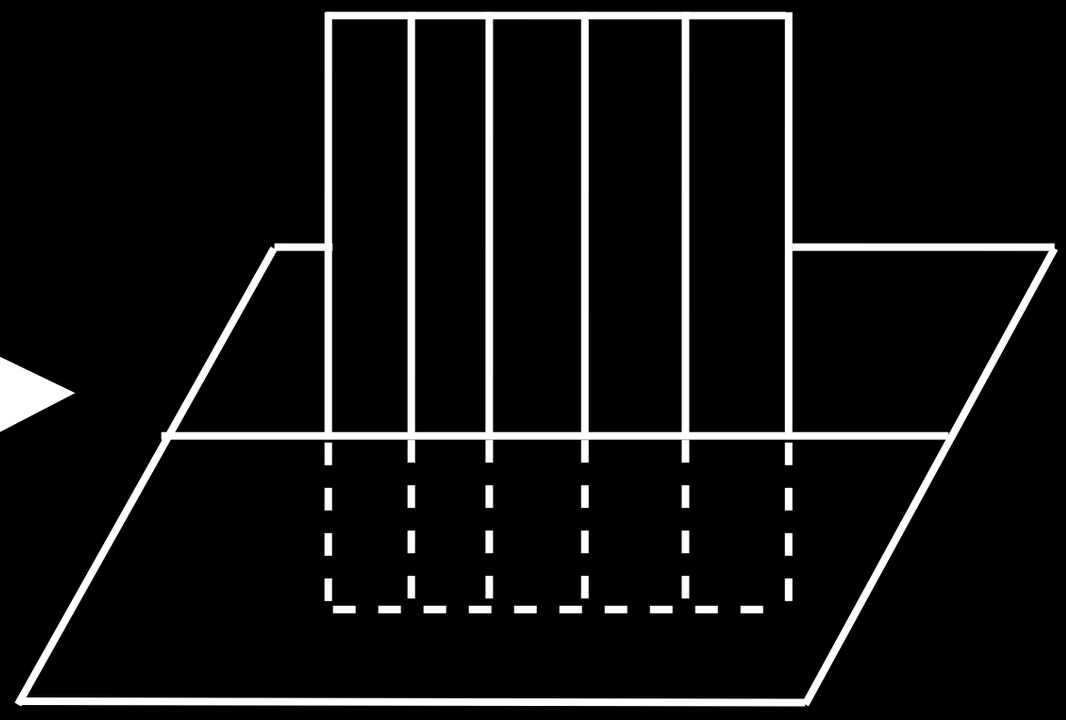
Superparameterized CESM (SP-CESM)

From this



Multiple atmospheres, single land

To this



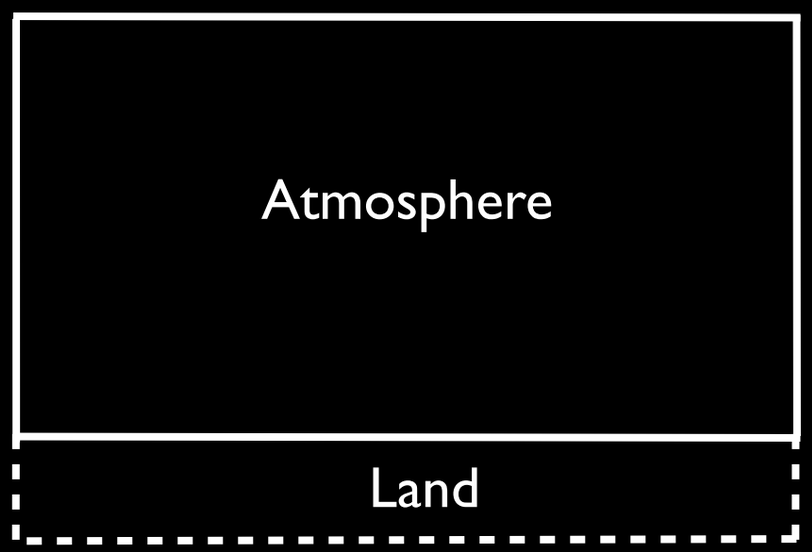
Multiple atmospheres, multiple land

Testing

- Does it matter?
- Can we evaluate in a tractable way?
- Single GCM (SCM) column studies
  - ARM
  - Brazil (Tapajos)

Superparameterized Single Column Model (Super-SCM)

From this



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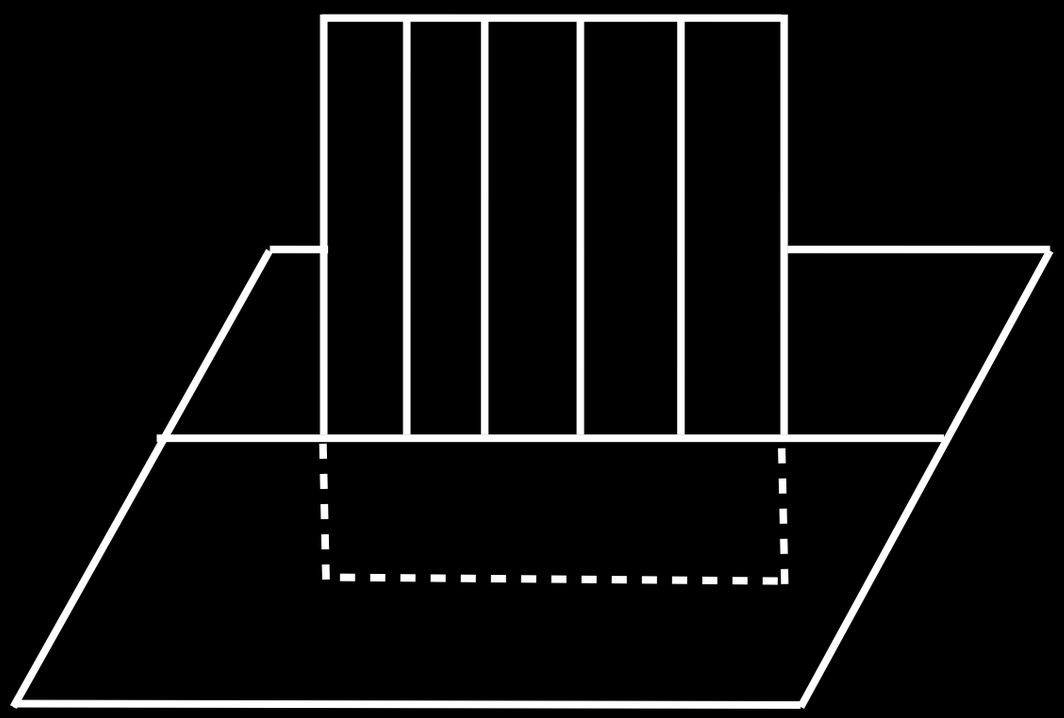

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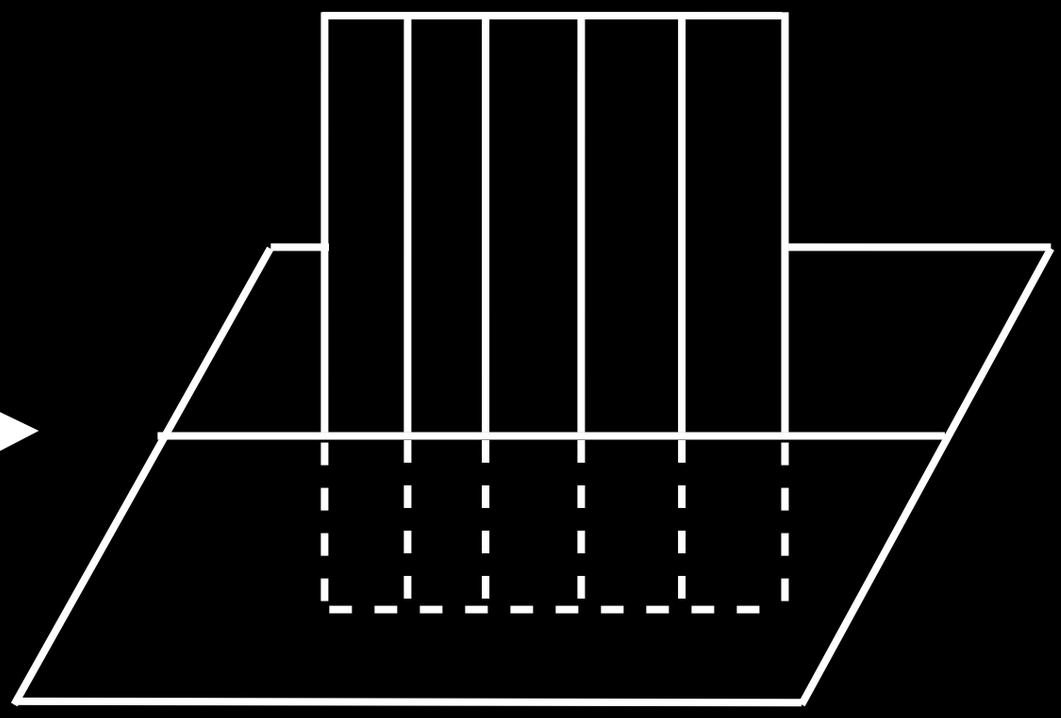
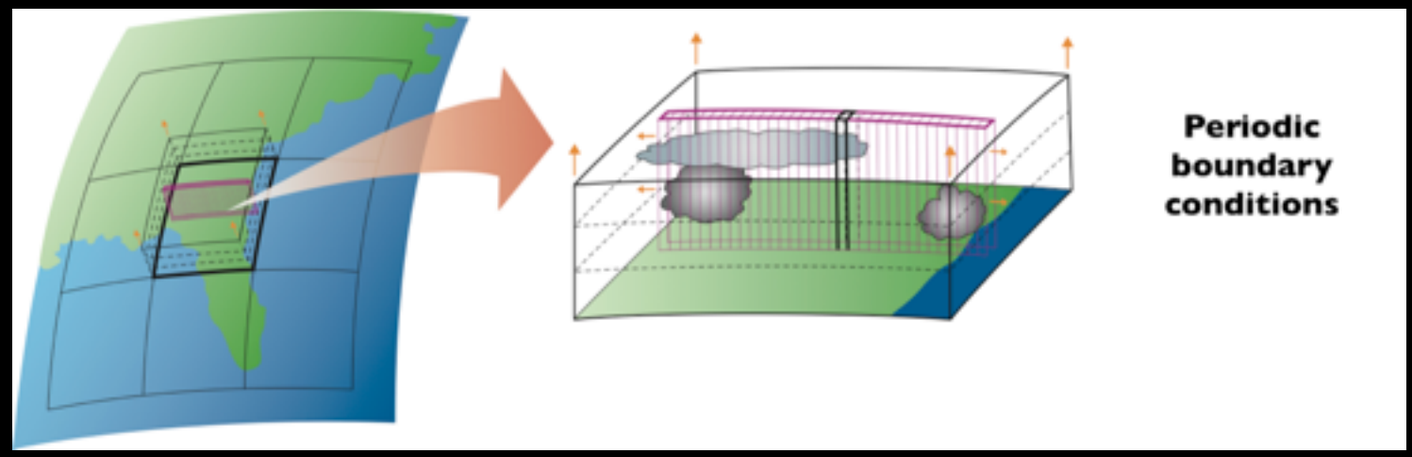
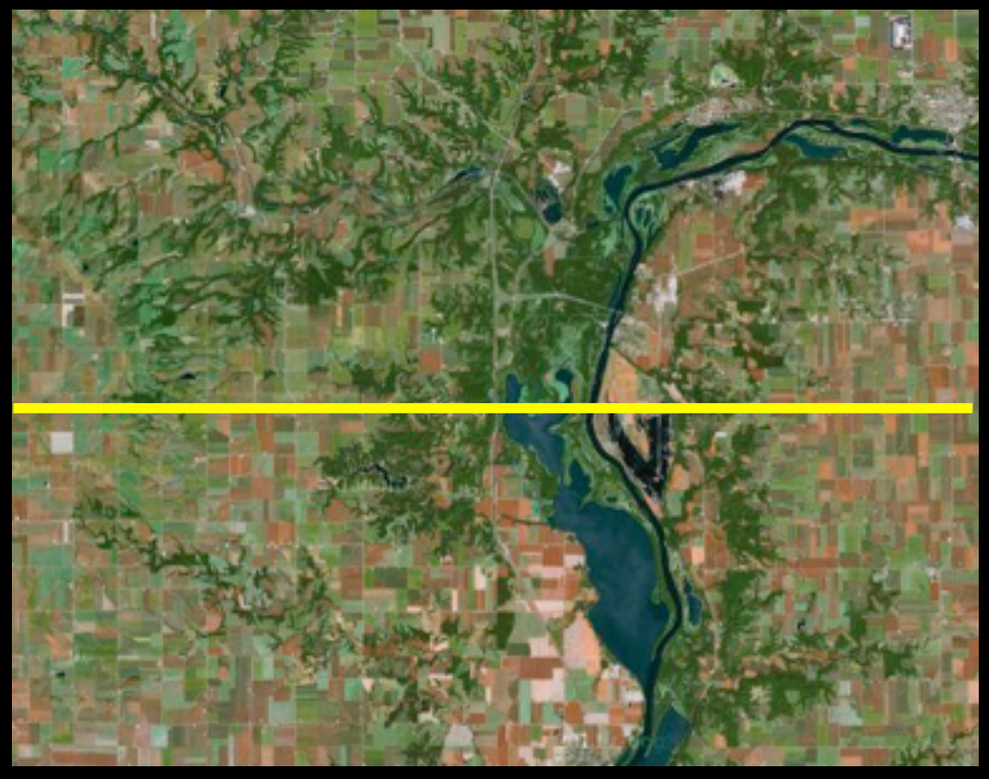


Questions



- How should we handle surface heterogeneity?
  - PFT Tiles
    - ★ whole gridcell
    - ★ ‘stripes’ or spatial organization
    - ★ Initial release: tiles
  - Dominant veg type
  - Something else?



- Does representation matter for Bowen ratio, trace gas flux, or both?

Research

- Emergent Properties (i.e. MJO)
  - Amazonian wet season onset
  - Polar vortex
    - trace gas transport/model resolution
    - amplitude of seasonal cycle