Research Topic: Shallow-to-Deep Transitions and Upscale Growth

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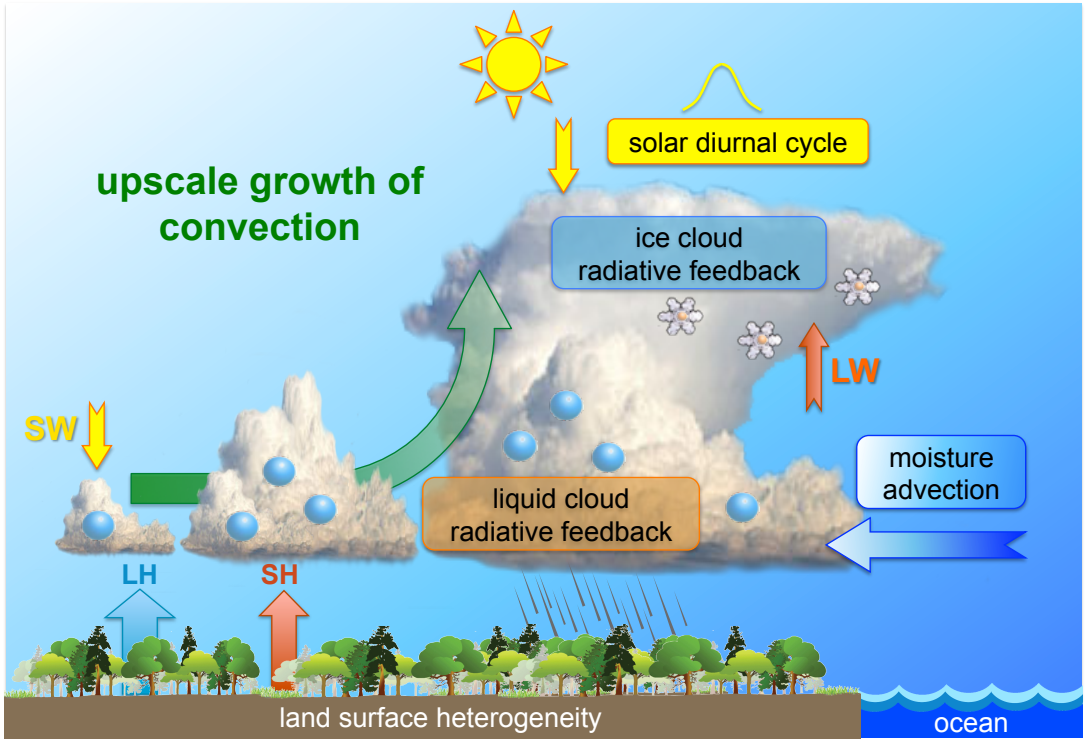
Science question

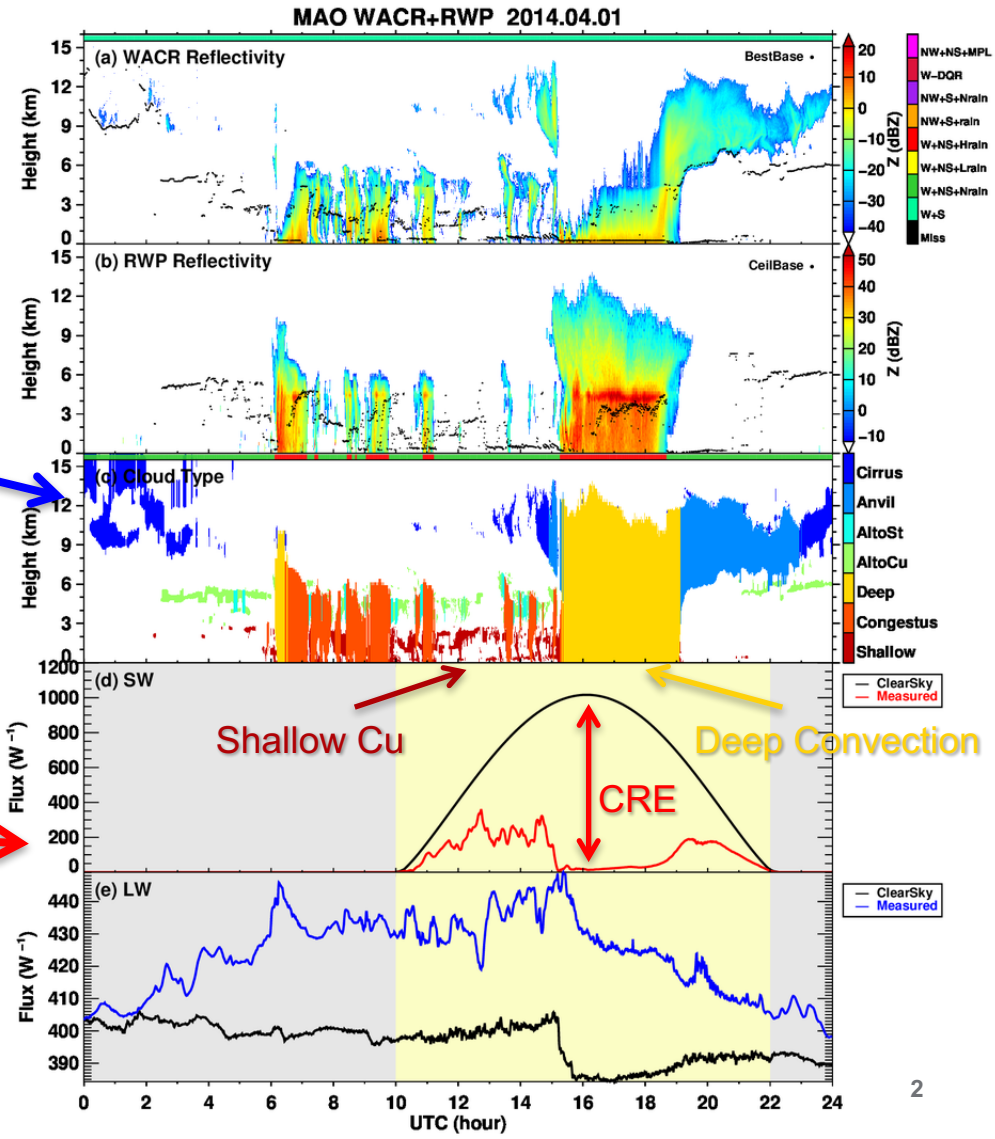
- What are the **comparative impacts** of the diurnal cycle, cloud radiative feedback, surface conditions, and advection on shallow-to-deep transitions and **upscale growth leading to mesoscale convective systems** over **land**?



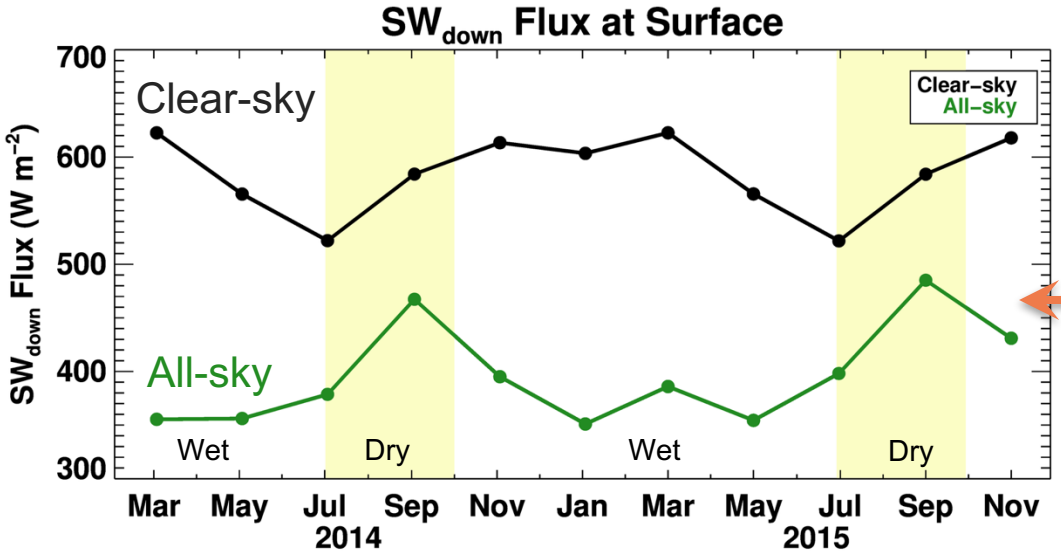
Goal: Improved understanding and model representation of organized convection over tropical continental land

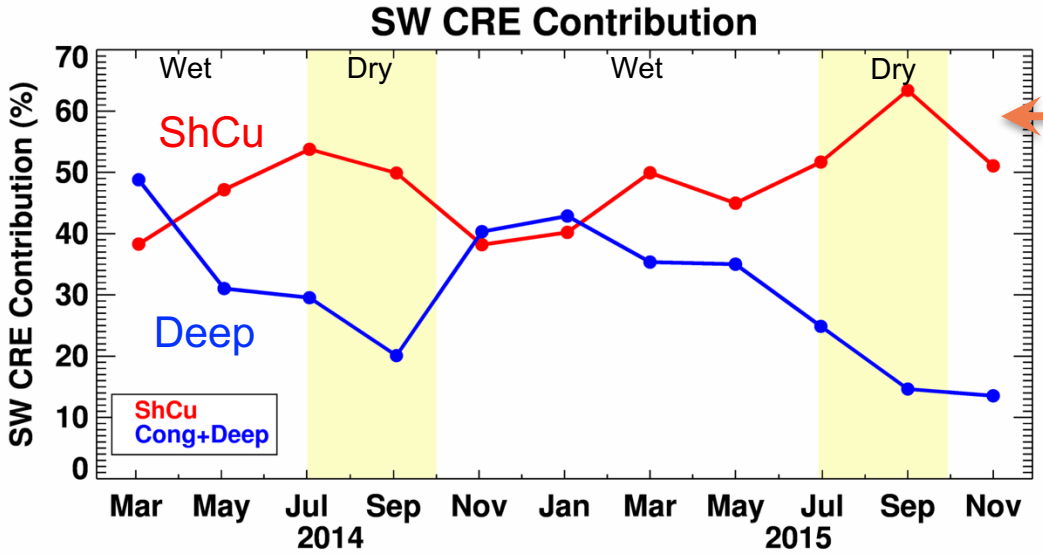
Merged AMF data products

- WACR-ARSCL+RWP merged cloud mask data product
- Merged product **improves characterization of all precipitating clouds**
- Cloud-type classification (Burleyson et al. 2015 JAMC)
- Surface radiative flux analysis (QCed fluxes, clear-sky fluxes)
- **Estimate cloud radiative effects (CRE) by cloud types**, which is dominated by shortwave (SW) effects



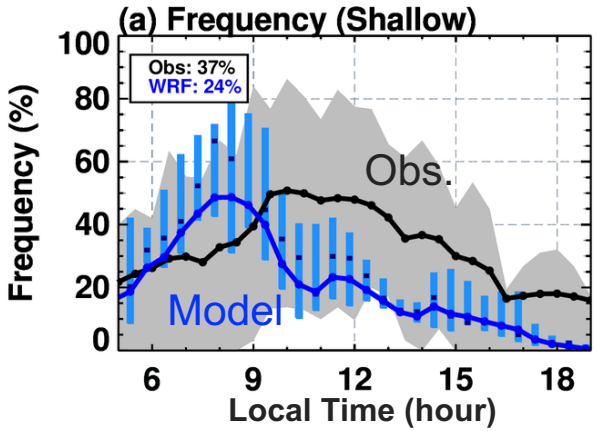
Clouds weaken the seasonal cycle

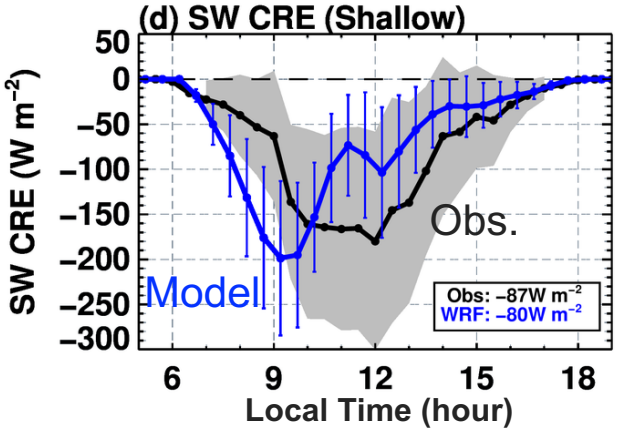




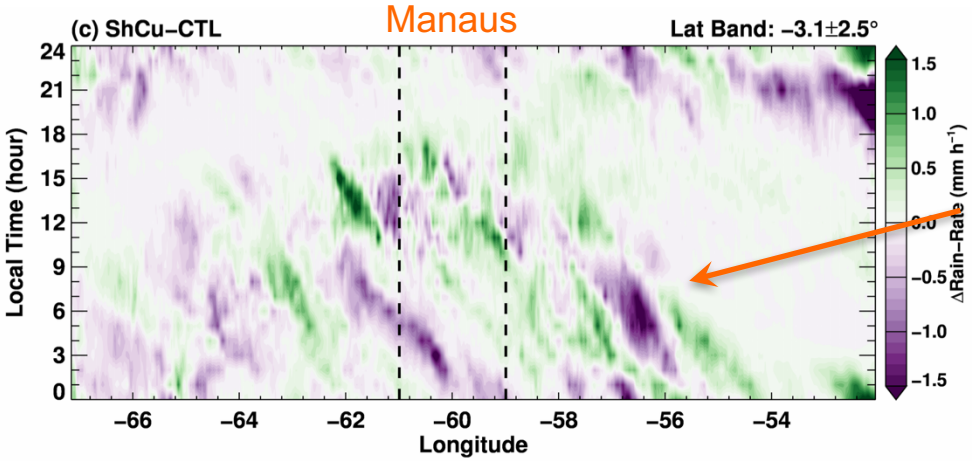
- Clouds reflect more incoming SW radiation in wet season than dry season → **clouds weaken seasonal cycle**
- Shallow and deep clouds contribution to SW CRE changes between seasons → **the relative proportions of shallow vs. deep clouds are important to the seasonal cycle**
- How well does the model simulate these effects?

Preliminary high-resolution regional WRF simulation

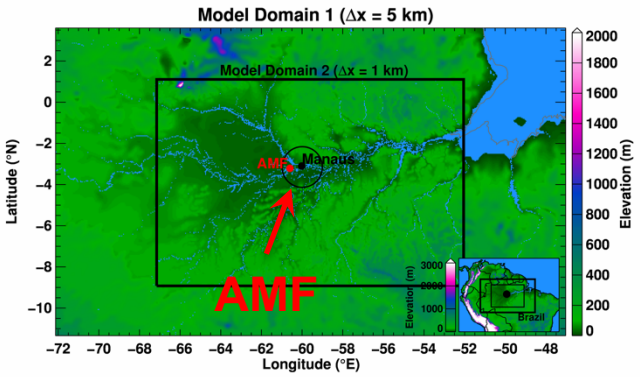




- Preliminary CPM (Δx=1km) simulation underestimates ShCu frequency and SW CRE during wet season



Difference in precipitation



- Increasing ShCu SW CRE results in significant changes in propagating precipitation over night and morning hours
- Will quantify response of convection upscale growth