1. How robust are improvements in SPCAM's diurnal rainfall cycle to arbitrary MMF configuration options?

Mike Pritchard, scripps

How robust are improvements in the diurnal rainfall cycle to arbitrary SPCAM configuration options?

Mike Pritchard, Scripps

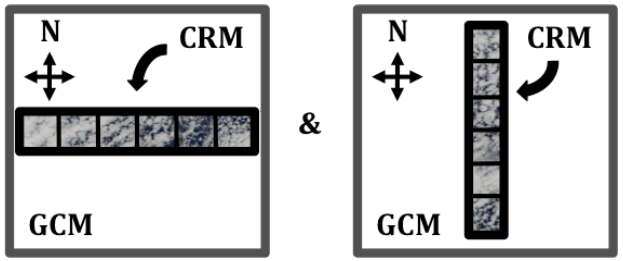
Key improvement due to super-parameterization:	Robust?
• Diurnal amplitude becomes less statistically significant.	✔
• Diurnal amplitude reduces	✔
• Goodness of fit of 24-hour sinusoid reduces	✔
• Peak timing of land rainfall shifts to later in the afternoon.	✗

The consequences of moving in the underexplored MMF parameter space of interior & exterior resolution are unclear.

2. Evaluating forecasts of central US mesoscale convective systems in a GCM with explicit embedded convection

Questions

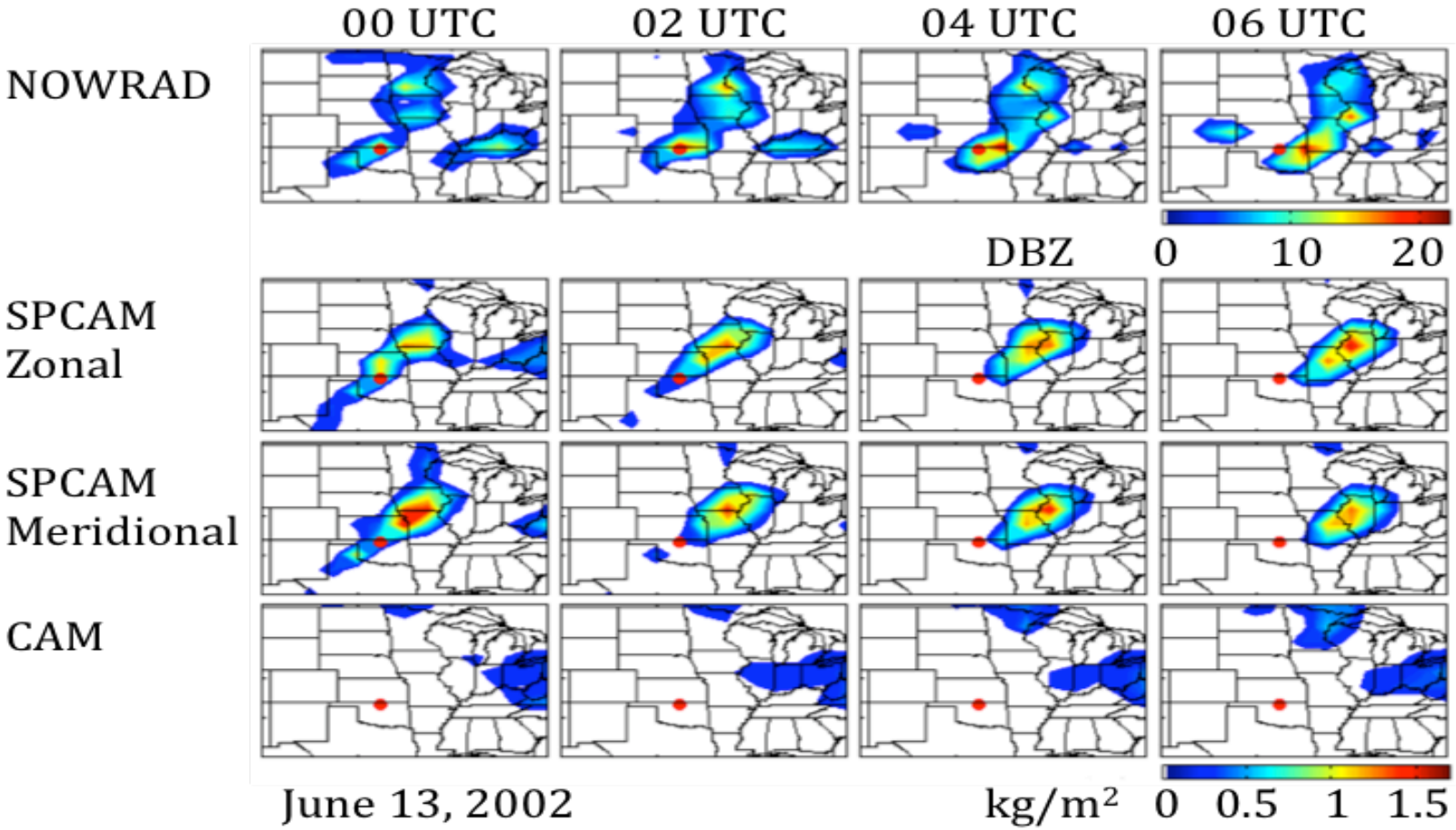
How important is CRM orientation and the direction of shear organization for simulating mesoscale convective systems (MCS)? How well do simulated MCSs compare to observations?



Approach

- Develop a new technique to initialize both resolved scales in the MMF.
- Run SPCAM in forecast mode initialized prior to an MCS observed over ARM site.
- Test sensitivity to zonal/meridional CRM orientation.
- Compare SPCAM to high value observations (ARM).

Gabe Kooperman, Mike Pritchard, Richard Somerville, Marat Khairoutdinov



Key Accomplishments

The challenge of initializing the CRM domain for SPCAM forecasts has been overcome. SPCAM is able to forecast a mode of convection that CAM cannot in both CRM orientations. SPCAM mispositions the storm center location and over simulates IWP.

3. Subgrid-scale fluxes at the PBL top in CRMs

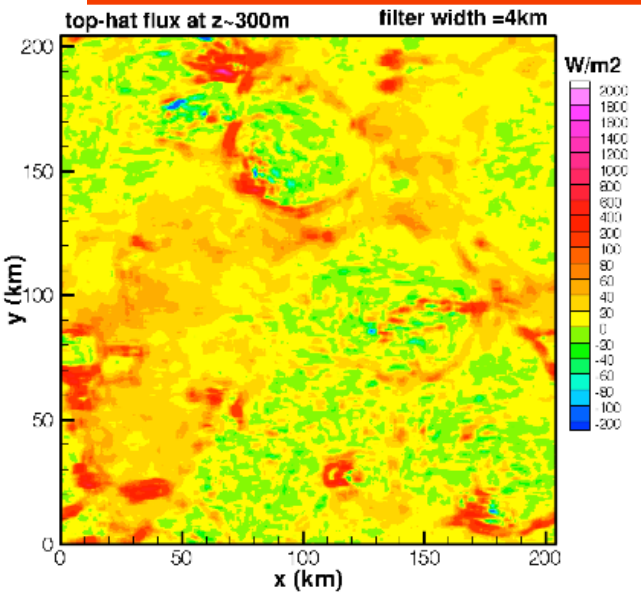
Investigate ways to represent the subgrid-scale flux in CRMs, focusing on the PBL top for PBL-cloud interaction.

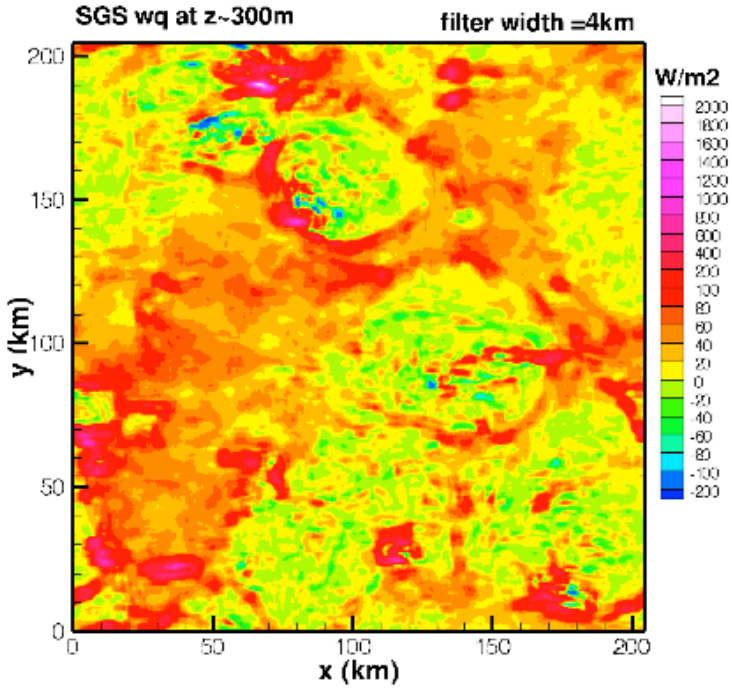
Chin-Hoh Moeng

CMMAP Aug. 2011 meeting

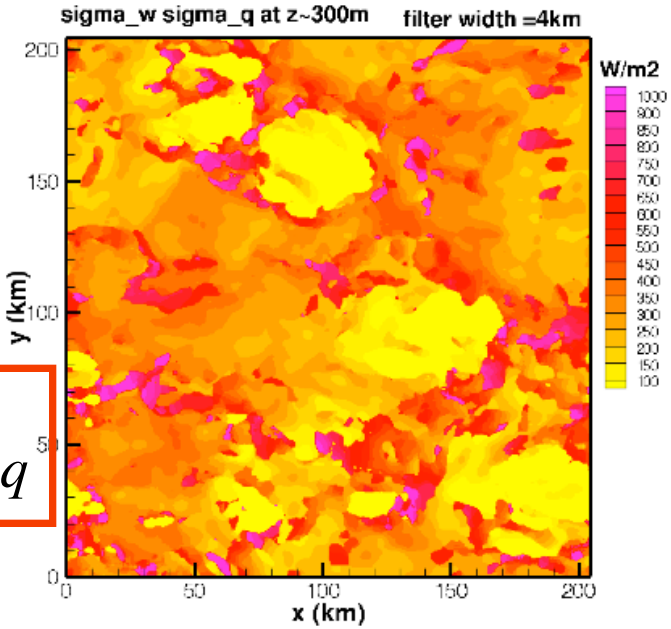
SGS fluxes can be well represented by:

1. top-hat flux $(w^U_{SGS} - w^D_{SGS})(q^U_{SGS} - q^D_{SGS}) / 4$





$\sigma_w \sigma_q$



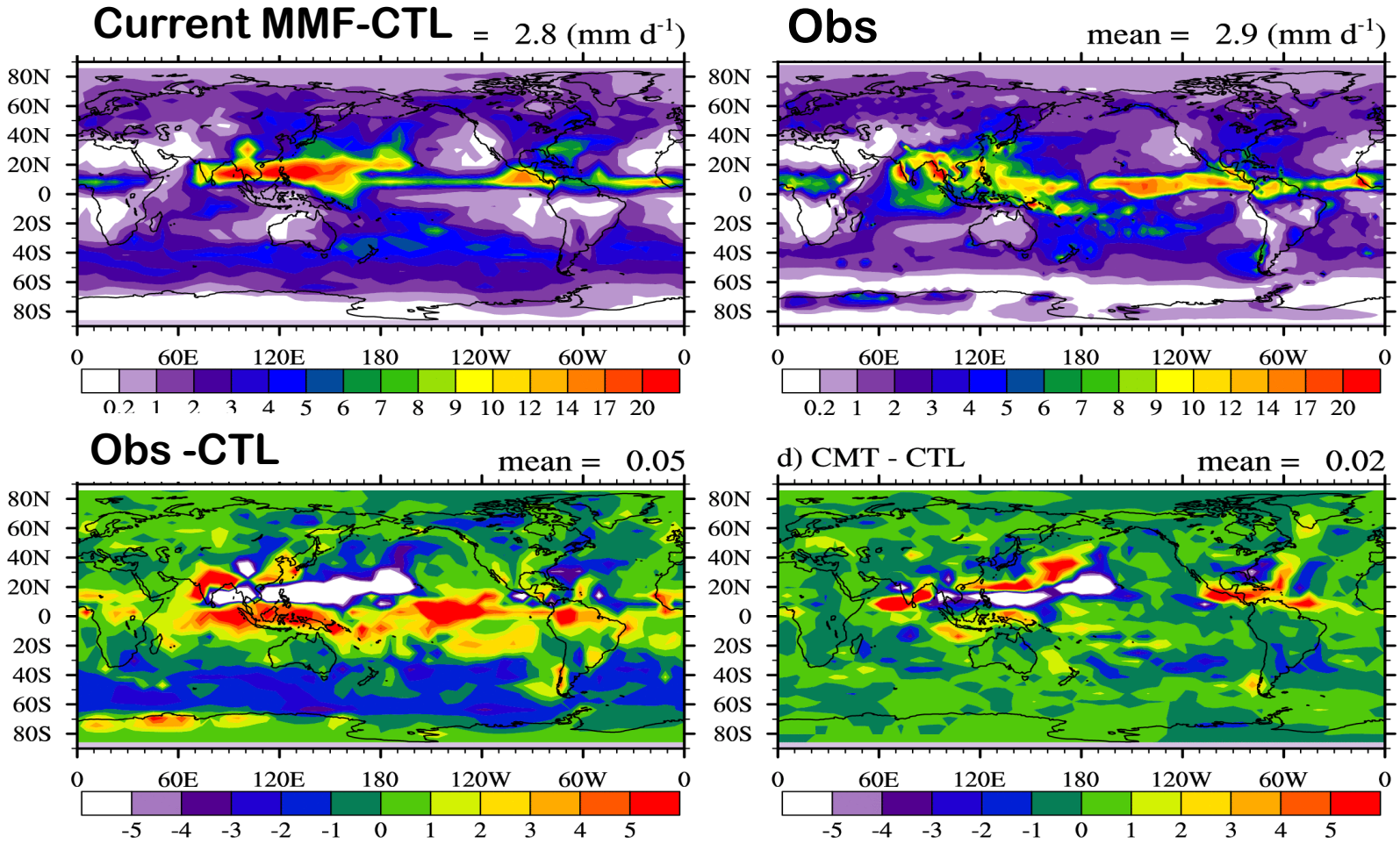
4. A Momentum Transport Parameterization for MMF and Preliminary Results

Implement a momentum transport parameterization by clouds in CRM and test in an SPCAM.

Anning Cheng[1] and Kuan-Man Xu [2]

1. **Science Systems and Applications, Inc.**
2. **Science Directorate, NASA Langley Research Center**

The excessive precipitation in the warm pool region decreases more than 5 mm per day---when CRM momentum transport is included in MMF.



Global Distribution of JJA-mean Surface Precipitation

5. Cloud system resolving model simulations of aerosol effects on tropical deep convection

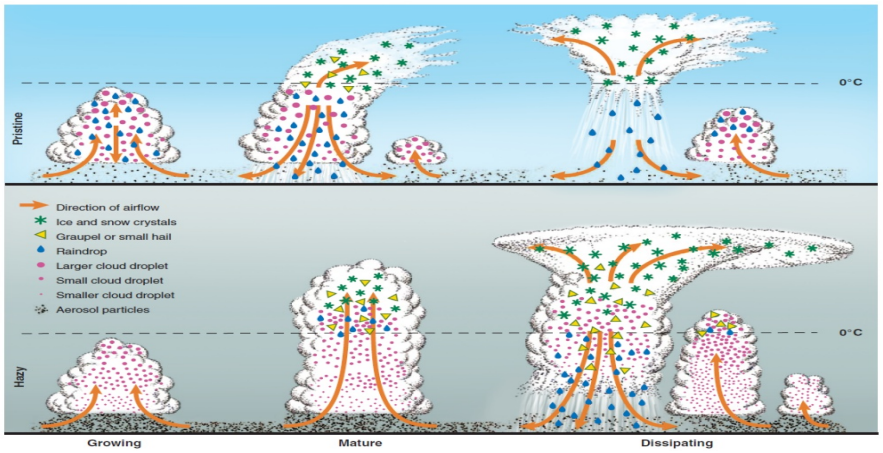
Study surface precipitation under pristine and polluted conditions

Wotjek Grabowski/Hugh Morrison

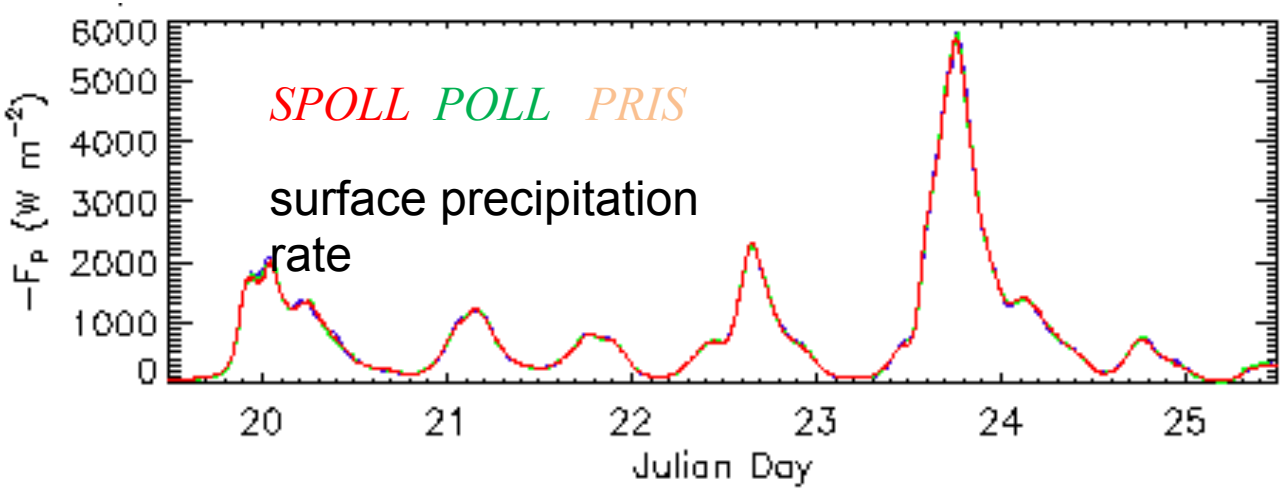
NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

CMMAP
Reach for the sky.

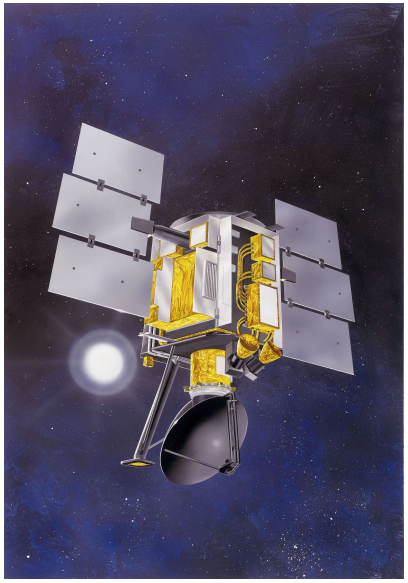
Rosenfeld et al. (2008): invigoration of deep convection by suppression: of warm-rain processes:

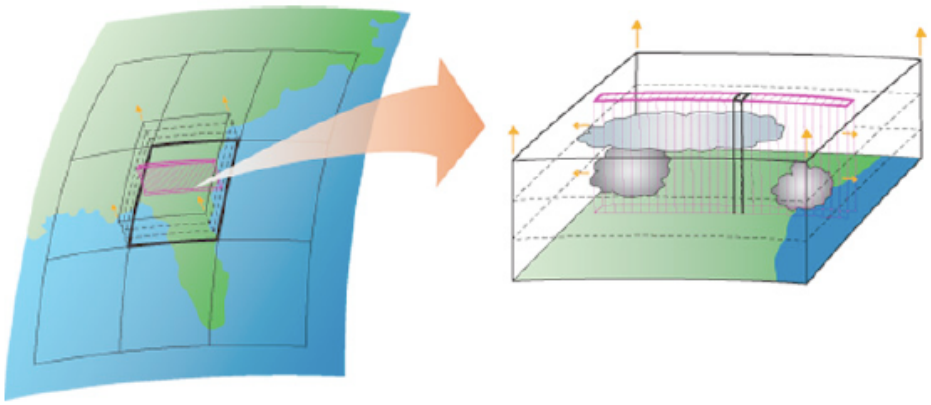


Simulations using TWP-ICE forcing show a very small difference in surface precipitation between pristine and polluted conditions. The difference comes from the impact of microphysics on radiative transfer, and not from convection invigoration via the warm-rain suppression



Morrison and Grabowski, ACPD, 2011



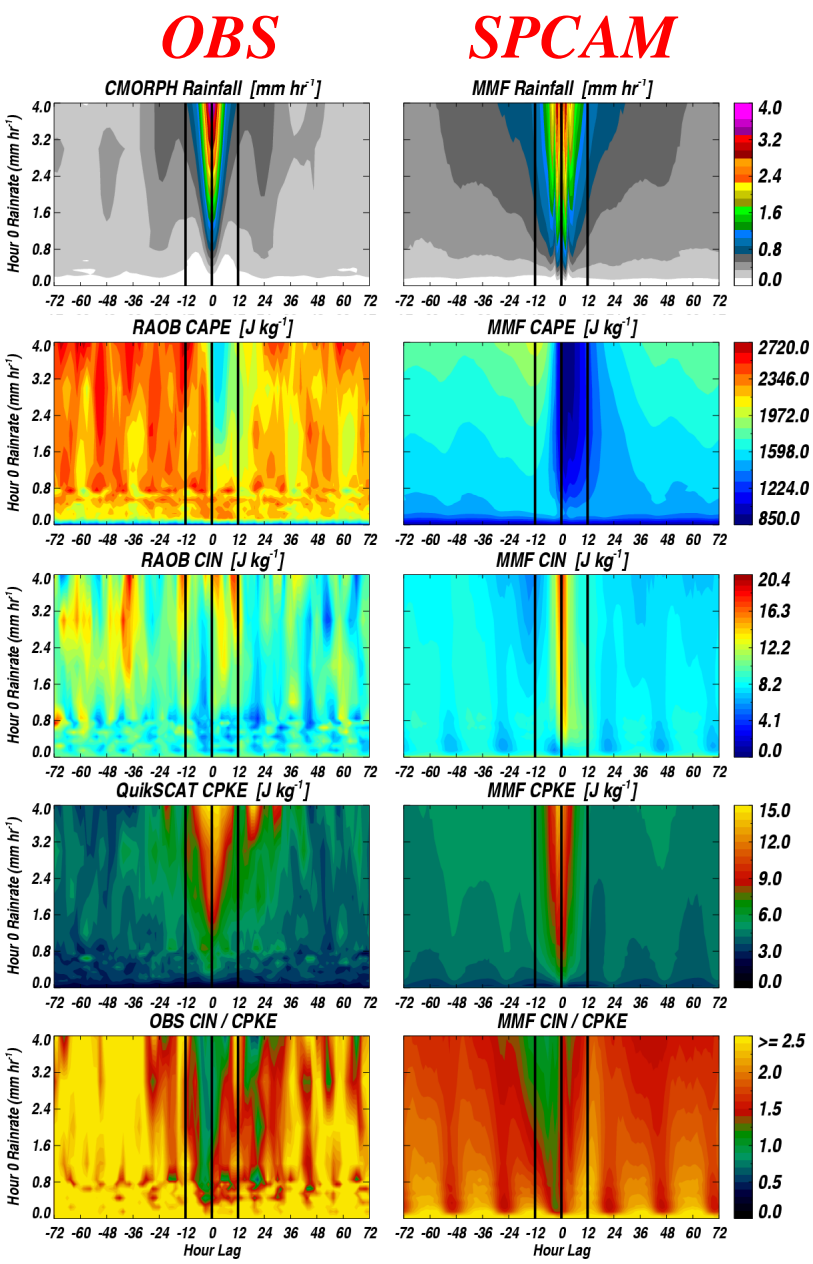


6. Investigating the Hourly to Daily Evolution of Light To Heavy Rainfall in the Tropics

(using satellite OBS and MMF)

Greg Elsaesser, CSU
Physical Processes Breakout Session

Performance of SPCAM rainfall cycle



- **OBS depict ~ 40% decrease in CAPE over 3-6 hrs for high-amplitude rainfall cycles; MMF simulates this non-equilibrium convection well.**
- **Kinetic energy associated with mesoscale cold pools / downdrafts can overcome CIN leading to increase in rainfall. Signature of this is found in MMF as well.**
- **CIN and cold pool kinetic energy in phase in MMF, implying that CIN may be unable to shut off rainfall as easily - does this help to explain the longer MMF rainfall cycles shown in the top right panel?**