

# MJO Breakout Session Report

CMMAP Team Meeting

July 30, 2009

# Talks

- 1:45-1:50 Brief Synopsis on Work with Conventional CAM
- 1:50–2:10 **Gabriel Williams:** Modeling of Diabatically Forced Tropical Circulations
- 2:10-2:25 **Partha Mukhopadhyay:** Analysis of subgridscale cloud processes versus MJO regime
- 2:25-2:45 **Bo-Wen Shen:** "Hierarchical Multiscale Interaction during Tropical Cyclone Formation associated with an MJO or AEW."
- 2:45-3:00 **Dave Randall:** Analysis of the SP-CAM Coupled to a Slab Ocean Model

# Talks

3:15-3:30 **Marat Khairoutdinov:** SP-CAM  
Sensitivity Experiments

3:30-3:40 **Mitch Moncrieff:** "Summary of YOTC  
Implementation Workshop"

# General Recommendations

More extensive process-oriented diagnosis of SP-CAM and why it produces an MJO is needed.

Translation of SP-CAM successes in MJO simulation into convection parameterization improvements is needed

# Specific Recommendations

1) Examination of dominant sub-gridscale cloud type/regime in SP-CAM as a function of MJO phase is useful

Collaborations should be increased with those doing similar work in observations to provide an observational benchmark against which SP-CAM can be compared:

- Eric Tromeur and Bill Rossow: ISCCP cluster analysis
- Greg Elsaesser and Chris Kummerow: TRMM analysis

# Specific Recommendations

2) Reconcile different sensitivities of MJO to WISHE in zonally symmetric SP-CAM aquaplanet versus Eric's conventional parameterized version of CAM

Hypotheses:

a) Different basic state mean winds explain different sensitivities

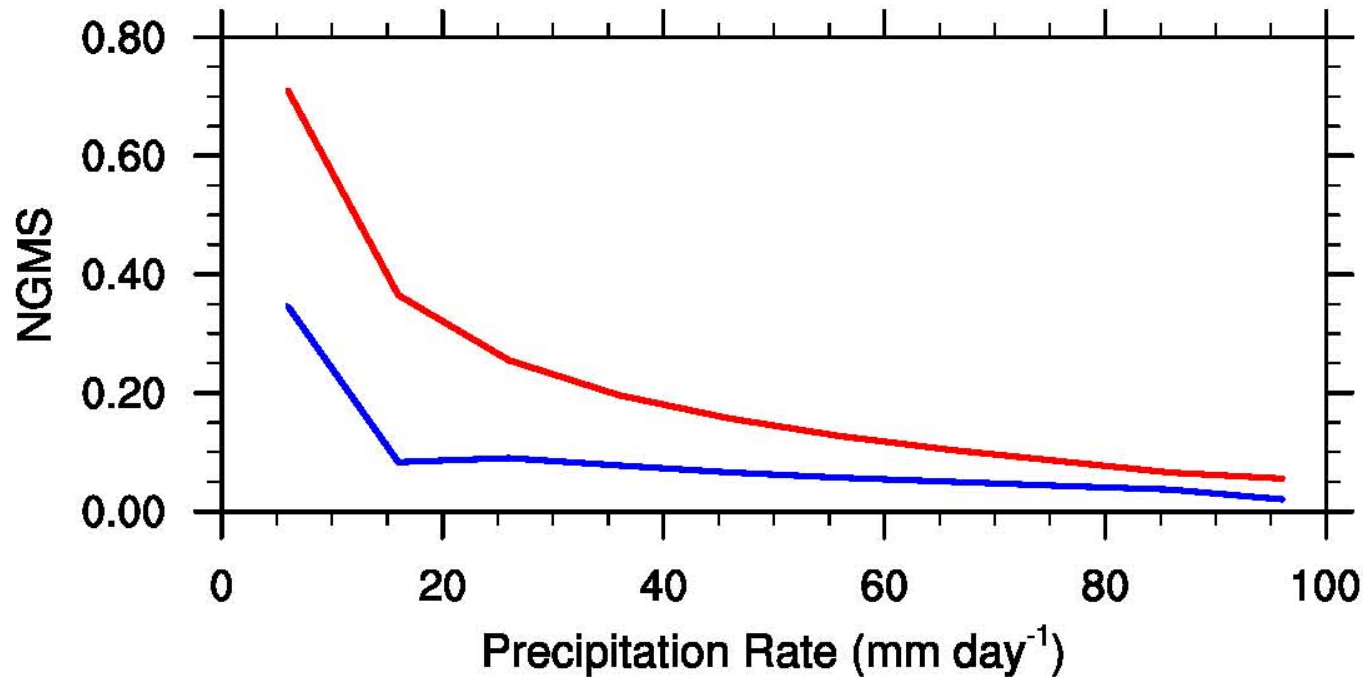
b) Large-scale divergent circulations in SP-CAM import moist static energy in areas of deep convection and do not require WISHE to destabilize it, whereas in conventional CAM, MSE export occurs requiring WISHE to support moisture mode instability. Factors influencing this include:

- Vertical profile of heating
- Vertical MSE profile

Eric will get data from SP-CAM from Marat to diagnose model. See next page.....

# Normalized Gross Moist Stability in CAM3 with RAS Convection

NGMS vs. Precip Rate (Blue=Vertical, Red=Vertical+Horiz)



Moist static energy export per unit dry static energy export

# Specific Recommendations

3) Diagnosis of moist static energy budget in SP-CAM

-Zhiming Kuang and Joseph Andersen, Harvard are conducting such an analysis

4) Diagnosis of boreal summer ISO in SP-CAM

- Northward propagation

- Tropical cyclones



# Specific Recommendations

5) Couple shallow water models without longwave approximation to moisture equation and prognostic diabatic heating

Gabriel Williams, Alex Gonzales, Matt Masarik

6) Diagnose SP-CAM effects of synoptic waves on the intraseasonal moisture and momentum budgets to test hypotheses broached in the literature:

Majda and Stechmann (2009): Momentum

Maloney (2009): Moist static energy

# Specific Recommendations

- 7) Incorporate datasets from YOTC into comprehensive process-oriented diagnosis of MJO in SP-CAM
- 8) Forge stronger links to DYNAMO effort, a proposed U.S. component to a 2011 field experiment to examine MJO initiation in the Indian Ocean. Forge similar links to possible CPT proposal to improve convection parameterizations in global models (e.g. Maloney, Mapes, Raymond, Waliser, Sobel, Zhang)

# Specific Recommendations

9) Data assimilation approaches to diagnosing tendency biases during MJO events in SP-CAM as compared to conventional GCMs to gain insight into parameterization deficiencies

Discussions with Brian Mapes about  
MERRA

10) Examination of diurnal cycle in conventional CAM3 with enhanced free troposphere moisture sensitivity

# Discussion: Need for More Input

- What have the major accomplishments of the MJO Breakout Group been to date?
- What should be the focus over the next 5 years?