

The MJO Model Intercomparison Project

Vertical Structure and Diabatic Processes of the MJO *A Global Model Evaluation Project*

A Joint Research Activity by the
WCRP-WWRP/THORPEX MJO Task Force & Year of Tropical Convection (YOTC)
and the
GEWEX Atmosphere System Study (GASS)

Synopsis: The **objective** of this project is to **characterize, compare and evaluate the heating, moistening and momentum mixing processes associated with the MJO** that are produced by our global weather and climate models, with a particular focus on their vertical structure. The **goal** is to **improve our understanding of the role that convection, cloud, radiative and dynamic processes play in the development and evolution of the MJO** in order to achieve better fidelity of the MJO in our global prediction models.

Two types of simulations will be carried out:

1. Twenty-year climate simulations [...] from both ocean-coupled global models as well as those that use specified SSTs are solicited.
2. A series of daily initialized hindcasts for two MJO events within the YOTC period, specifically the two successive MJO events during boreal winter 2009-10 (i.e. YOTC events E and F).

CMMAP Participation

- Provide daily mean output from ~20 years of SP-CCSM simulation (*Stan, DeMott*).
- Perform new 20-year simulation with a “newer” version of SP-CAM (*Branson, Pritchard, DeMott*).
- Use the above model to perform hindcast simulations (*Pritchard*).

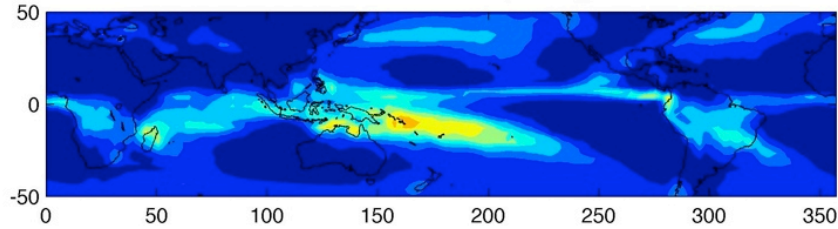
A “Newer” version of SP-CAM?

- SP-CAMfv: replace SLD dynamical core with FV dynamical core. Like CAM4.0
- PNNL-MMF: Like CAM5.0, with Morrison microphysics (1D or 2D), aerosols, radiation, turbulence,...

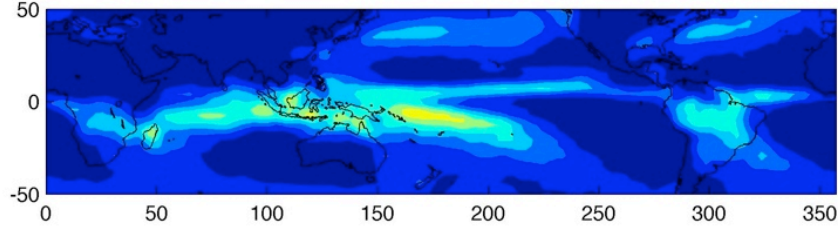
DJF Precipitation

SP-CAMsId

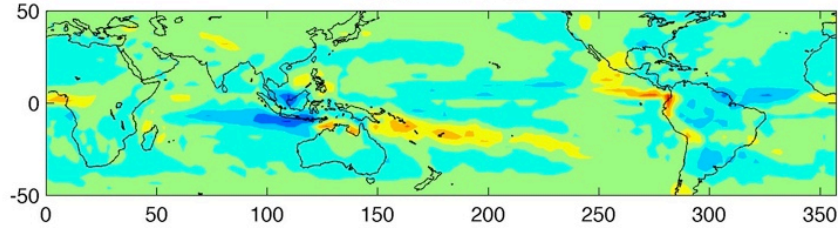
SPCAM3.0 DJF rainfall (mm/day)



OBS (Xie-Arkin)

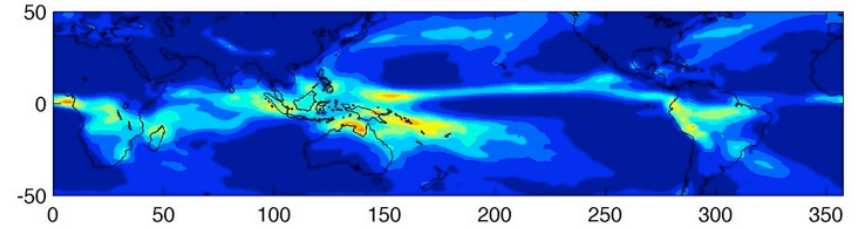


Model minus OBS

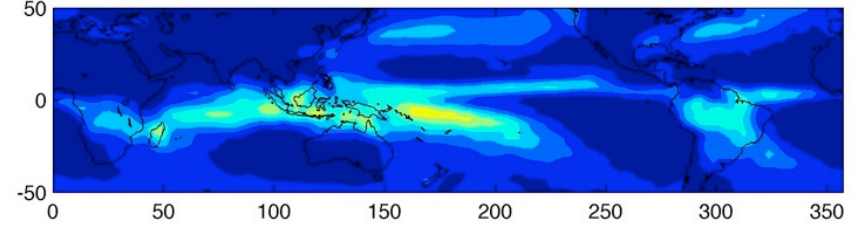


PNNL-MMF

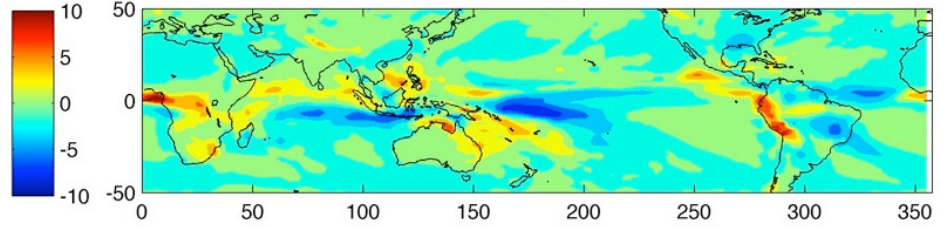
PNNL MMF DJF rainfall (mm/day)



OBS (Xie-Arkin)



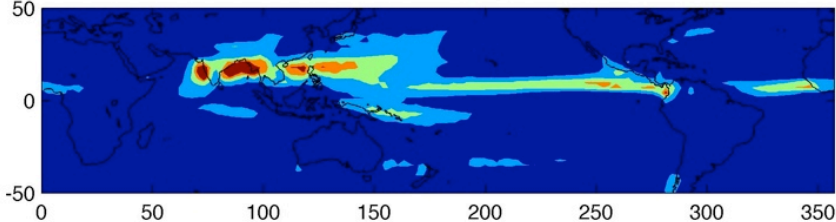
Model minus OBS



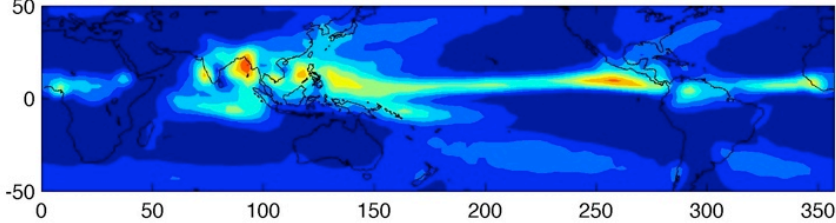
JJA Precipitation

SP-CAMsId

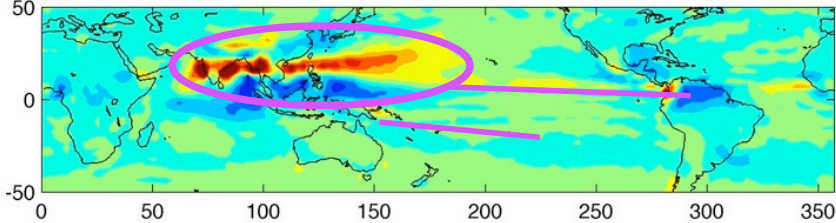
SPCAM3.0 JJA rainfall (mm/day)



OBS (Xie-Arkin)

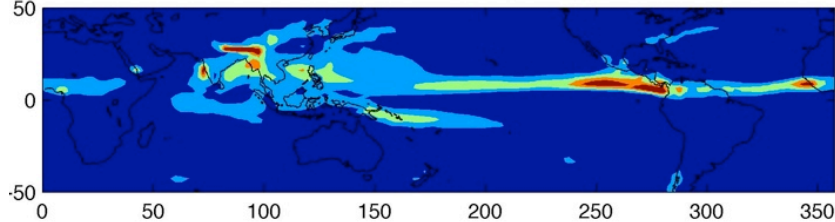


Model minus OBS

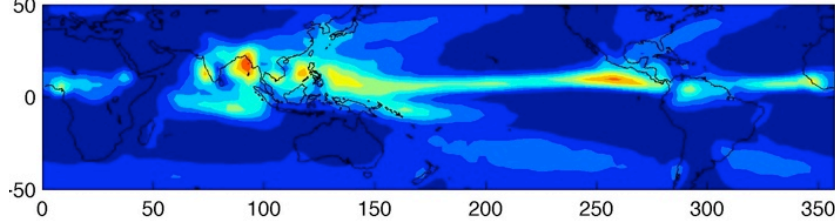


PNNL-MMF

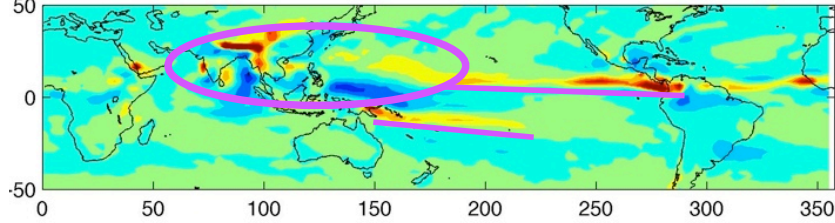
PNNL MMF JJA rainfall (mm/day)



OBS (Xie-Arkin)



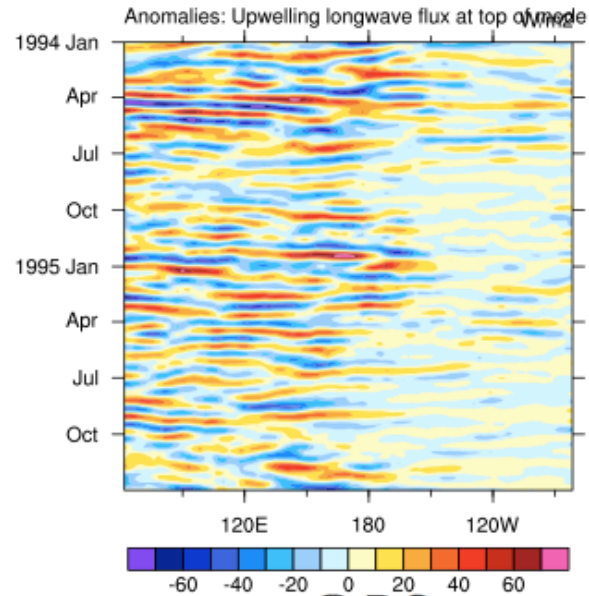
Model minus OBS



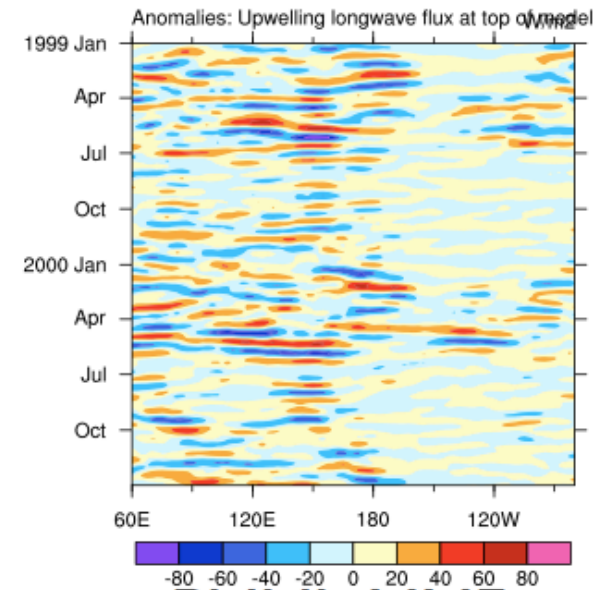
Intraseasonal Variability in Newer Versions

20-100
day OLR
HovMueller

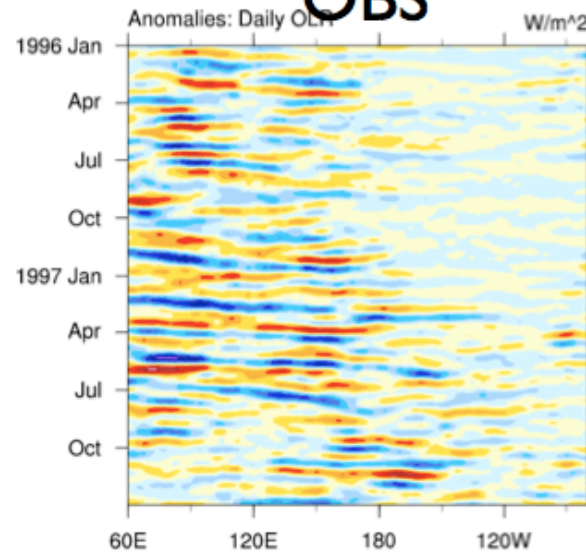
SP-CAMslc



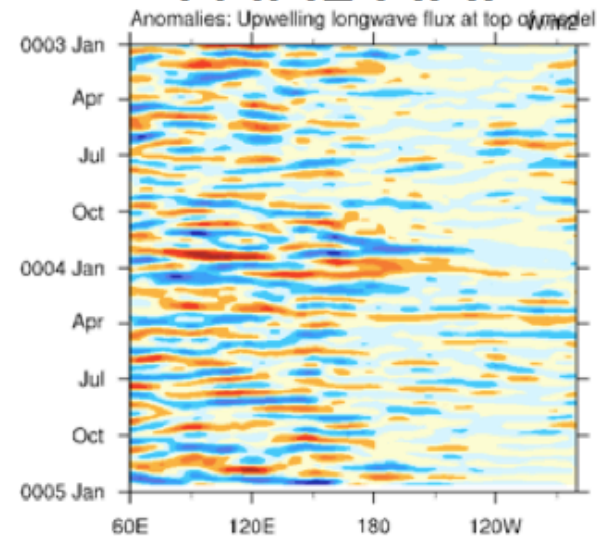
SP-CAMfv



OBS

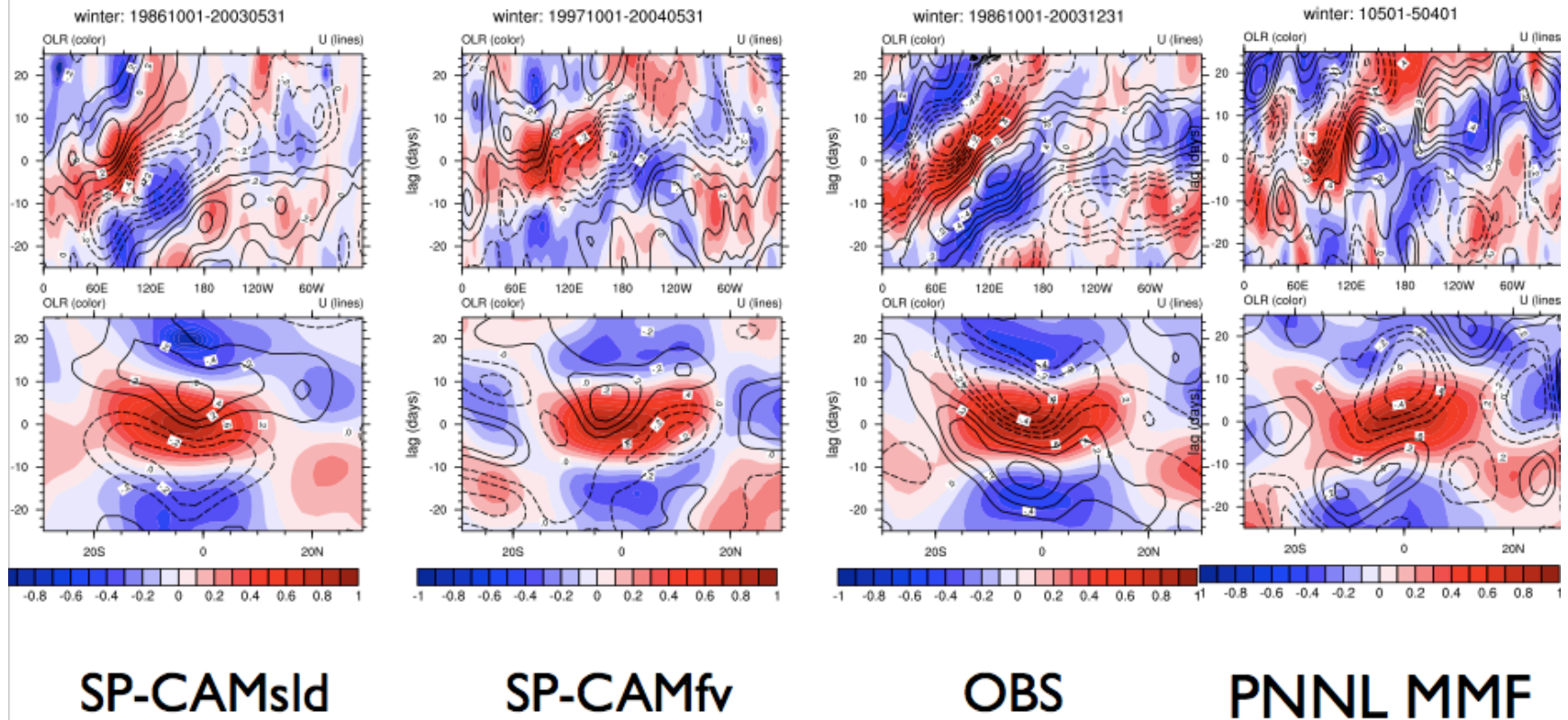


PNNL MMF



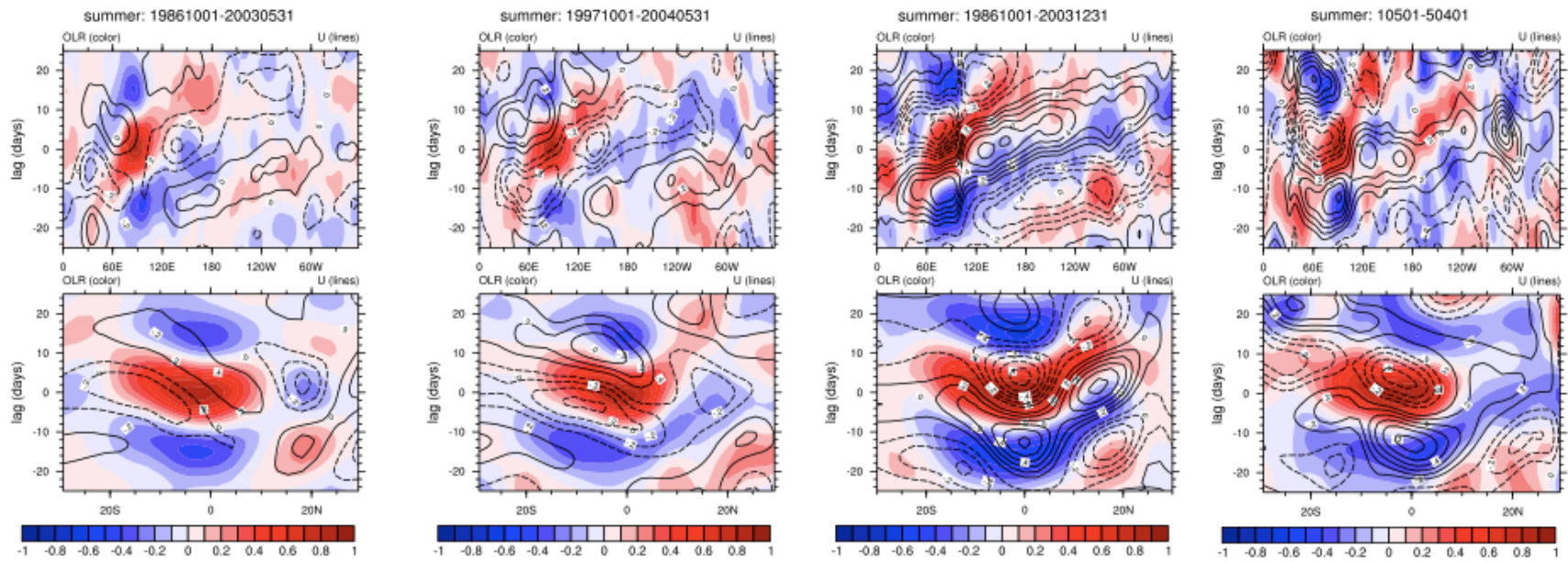
Intraseasonal Variability in Newer Versions

Wind, OLR lag-correlations, winter



Intraseasonal Variability in Newer Versions

As above, but for summer.



SP-CAMslid

SP-CAMfv

OBS

PNNL MMF

Sensitivity to Dynamical Core

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ORIGINAL PAPER

A comparison of East Asian summer monsoon simulations from CAM3.1 with three dynamic cores

Ting Wei · Lanning Wang · Wenjie Dong · Min Dong ·
Jingyong Zhang

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Abstract This paper examines the sensitivity of CAM3.1 simulations of East Asian summer monsoon (EASM) to the choice of dynamic cores using three long-term simulations, one with each of the following cores: the Eulerian spectral transform method (EUL), semi-Lagrangian scheme (SLD) and finite volume approach (FV). Our results indicate that the dynamic cores significantly influence the simulated fields not only through dynamics, such as wind, but also through physical processes, such as precipitation. Generally speaking, SLD is superior to EUL and FV in simulating the climatological features of EASM and its interannual variability. The SLD version of the CAM model partially reduces its known deficiency in simulating the climatological features of East Asian summer precipitation. The strength and position of simulated western Pacific subtropical high

- EUL: more accurate, efficient implicit time step; no pole problems.
- SLD: more economic; higher accuracy advection, esp. vertical advection.
- FV: local discretization in physical space; efficient use of memory.