Global Climate Model Discussion

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Objectives, models, model output to be collected, and preferred model simulations.

Global Climate Models often Have Significant Mean State Biases Over MC

ACCESS1.3 model (Boreal winter?)





Unified Model (JJAS)









Bush et al. (2015)



Highlights parameterization issue

And Diurnal Cycle Biases.....



SP-CAM

Amplitude of diurnal cycle in precipitation over MC also reduced in SP-CAM relative to CAM3. TRMM



Pritchard and Somerville (2009)

And Problems in Simulating Subseasonal Variability



Lag correlation of equatorial precipitation onto Indian Ocean reference point

CMIP5 Analysis Website: http://climate.snu.ac.kr/mjo_diagnostics/index.htm

Courtesy of Min-Seop Ahn

Global Model Resources

Existing:

MJOTF-GASS diabatic heating YOTC hindcasts ar

- 2 day hindcasts with timestep by timester
- 20 day hindcasts with 3 hour physical ten
- 20-year simulations with some 6 hour phy

•S2S operational forecast database

- Limited physical output. Only 6 hour prec
- •ISVHE datasets
 - Hindcast dataset targeting the MJO and relationships
 Iimited output to study physical processes

•CMIP5 database

Basic intercomparison of mean state bias



Global Model Resources

Potential experiments (some in collaboration with S2S-MJOTF effort):

- ad hoc experiments with specific models
 - Coupled vs. uncoupled
 - Sensitivity to topography and land-surface type
 - Idealized planets with various island configurations
 - Soil moisture initialization and parameter sensitivity
 - Constraining diurnal cycle

How to Use YMC to Improve Global Models?

An overall YMC objective is to "Integrate observations with model development to assist process-oriented model diagnoses, improve model representations of key processes, and optimize current model applications to the region."

- •Use of validated high resolution models to diagnose and improve global models.
- •Key process-oriented diagnostics that will be derived from field observations to directly diagnose global models

•Coordinated model sensitivity experiments to understand aspects of model construction that most strongly affect MC simulations.

•How much detail do we need at this point? Is lip service enough?

Questions from MJO Task Force- S2S Collaboration

- What is the current skill of operation systems at predicting the passage of precipitating/active phases of the MJO into and across the MC, including aspects such as reliability?
- What processes determine whether individual MJOs propagate through the Maritime Continent?
- How is the simulated propagation of the MJO through the Maritime Continent related to biases in models?
- How does the partitioning of variability from diurnal to seasonal, including equatorial wave characteristics, influence the MJO and MC interaction?
- Does the above partitioning depend on model resolution, and is accordingly affected by the use of explicitly resolved convection versus parameterized convection?
- How does the ocean-atmosphere coupling in the context of the MC influence the MJO and MC interaction?
- How does topography versus land-sea contrast play a role in the MJO and MC interaction?
- How do land-atmosphere interactions (temperature, soil moisture, diurnal cycle) influence the MJO and MC interaction?
- How is forecast skill associated with the MJO over the MC influenced by the above science elements?

- LIDAR to assess diurnal cycle of BL
- Surface flux measurements to assess partitioning of fluxes and diurnal cycle.
- Basic precipitation statistics
- Dynamical and physical tendencies?