ROCK CLIMBING

AND A NEW CONVECTION

PARAMETERIZATION

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WHO I AM…

- Kate not Katherine

- Phd Student with Dave Randall

- Work with models, tropical meteorology, and climate (in general)

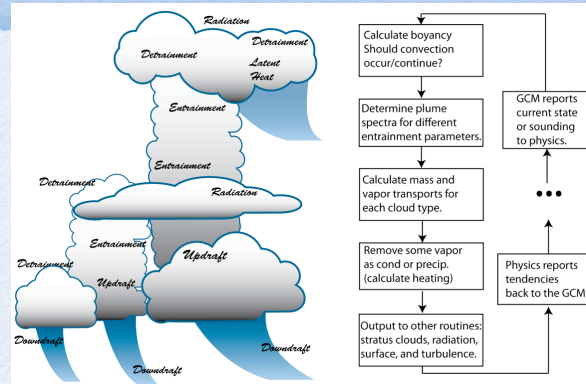- Outside of school: rock climbing, hiking, yoga, photography…

WHAT MY RESEARCH IS...

I'm working on developing a new convection parameterization to improve the simulation of the Madden-Julian Oscillation (MJO) in Global Climate Models (GCMs).

CONVECTION PARAMETERIZATIONS

- GCMs can only resolve structures much larger than their grid size (O~1000km). Clouds and convection operate on much smaller scales.

- The smaller scale processes are represented by simple statistical models in each GCM grid cell and column.

Madden-Julian Oscillation
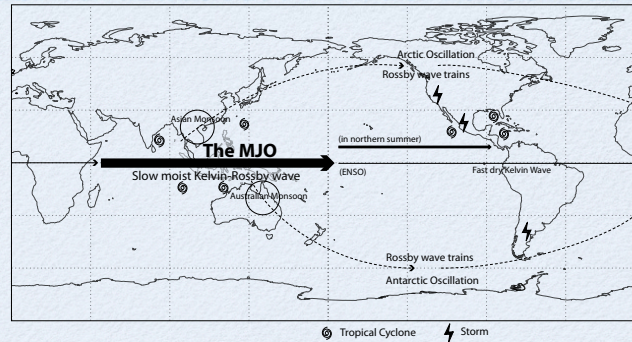
- Equatorial, eastward propagating wave-like disturbance in the Indian Ocean and Western Pacific.

- Global-scale disturbance (usually wavenumbers 1-3)

- Typically appears every 30-70 days and travels at 4-6 m s^{-1}

- And we don't really know why...

PROBLEMS IN GCMS

- Global Climate Models (GCMs) have had problems simulating tropical precipitation for decades.

- In particular, the MJO is missing or incorrectly simulated in many models.

- Associated problems include poor precipitation variability, tropical waves that travel too quickly, and double ITCZs
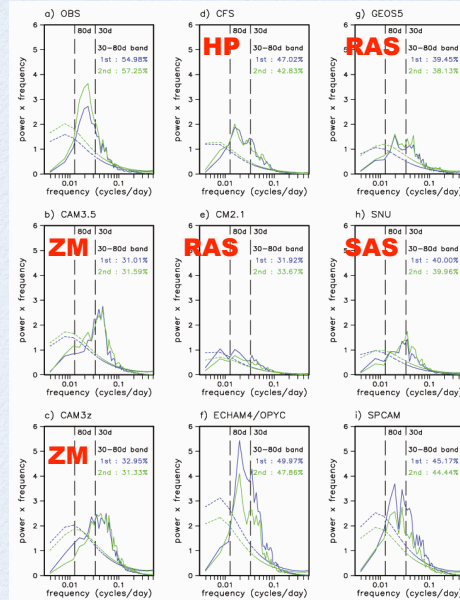
From Kim et al. 2009 Figure 7

PROBLEMS IN GCMS
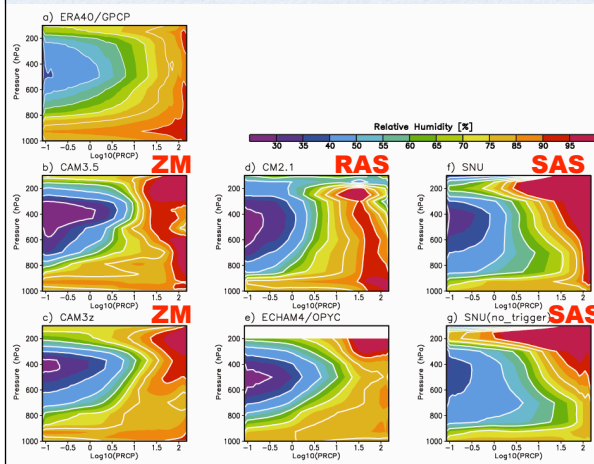
From Kim et al. 2009 Figure 13

- The convection parameterization (CP) is blamed for many of these problems.

- Recent studies show that many CPs do not correctly couple clouds and moisture in the tropical troposphere
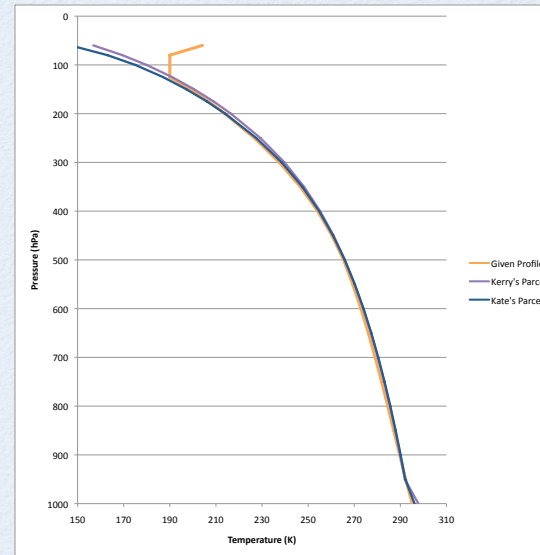
MY RESEARCH

- GOAL: Create a new convection parameterization based on Emanuel (1991) that allows a GCM to simulate an MJO.

- Sub-GOAL: Focus on improving the interaction between convection and moisture.

- Sub-GOAL: Keep it simple, understandable, and relatively efficient.

RESULTS SO FAR!

- I can lift a parcel!

- My CAPE: 85.14 J/kg

- KE CAPE: 69.0 J/kg

- Is that an improvement?

WHY THIS IS IMPORTANT...

- Helps answer questions.

- Helps with weather prediction.

- Helps with long-term climate modeling.