

***\*\*Please note special day and time\*\****

**ATS/CIRA Colloquium**

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**The Madden-Julian oscillation in the Super-Parameterized  
CAM: Air-sea interactions and the role of ENSO**

**Hosted by Charlotte DeMott**

**Monday, August 22, 2016**

**ATS room 101; Discussion will begin at 3:30pm  
Refreshments will be served at 3:00pm in the weather lab**

The Super-Parameterized Community Atmospheric Model (SPCAM) is a shining light among contemporary models in the dark abyss of simulated tropical variability, particularly for the Madden-Julian oscillation (MJO). In atmosphere-only mode, SPCAM simulates a robust MJO, which grows stronger when SPCAM is coupled to a dynamical ocean (SPCCSM). However, SPCCSM shows similar cold tropical SST errors to those that degrade the representation of the MJO in other models, such as the Hadley Centre model. The representation of air-sea interactions in SPCCSM is rather poor -- the diurnal cycle is absent and the top ocean layer is 10 metres thick, both of which limit the amplitude and propagation of the MJO in other GCMs. This raises the question of how SPCCSM manages to produce such an excellent MJO.

We employ a framework in which SPCAM is coupled to an ocean mixed-layer model, which allows the ocean mean state to be controlled. Under the observed ocean mean state, air-sea interactions only slightly improve the MJO in SPCAM; MJO activity remains below the level seen in SPCCSM. The SPCCSM ocean mean state substantially weakens the MJO, in contradiction to the strong MJO seen in the SPCCSM simulation itself. By sub-sampling the SPCCSM simulation, it is clear that SPCCSM produces a robust MJO only in El Niño years, when the warm tropical Pacific SST anomalies cancel the cold mean-state bias. We confirm this in our mixed-layer ocean configuration, concluding that sub-seasonal air-sea interactions are not important to the MJO in SPCAM.

These results suggest that experiments targeting air-sea interactions in the MJO must control for the effect of inter-annual variability on simulated tropical sub-seasonal variability.

Link to colloquium videos and announcement page: <http://www.atmos.colostate.edu/dept/colloquia.php>