

ATS/CIRA Colloquium

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**Global-scale convective self-aggregation and the
Madden-Julian oscillation**

Hosted by Dave Randall

Friday, November 14, 2014

**ATS room 101; Discussion will begin at 11:15am
Refreshments will be served at 10:45am in the weather lab**

The Madden-Julian Oscillation is the dominant mode of tropical intraseasonal variability, but exactly why it occurs remains poorly understood. In the first half of this talk I will argue that the MJO is a large scale consequence of a tendency for convection to self-aggregate. Simulations with a super-parameterized model of a non-rotating atmosphere with uniform boundary conditions show that convection self-organizes into large (~4000km) clusters surrounded by dry regions. A moist static energy budget indicates this aggregation is driven by diabatic feedbacks. When rotation is restored the model simulates a robust MJO, and mechanism denial experiments confirm the importance of diabatic feedbacks to both aggregation and the MJO. Non-rotating simulations using a conventional model with a weak MJO show a much weaker tendency to aggregate. The second half of the talk will consider the MJO response to warming. Two sets of warming experiments with super-parameterized models show large increases in MJO activity in response to increased SST. Moist static energy budgets suggest the stronger MJO is driven by vertical MSE advection, which becomes increasingly destabilizing at high temperatures. The change in advection is due to a steepening of the mean vertical MSE profile in the lower troposphere, a thermodynamic consequence of warming.

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