

ATS/CIRA Colloquium

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Visiting ATS from the University of Reading

**Tropical Atmospheric Madden-Julian Oscillation:
Strongly Nonlinear Free Solitary Rossby Wave?**

Hosted by Eric Maloney

Friday, Sept. 1, 2017

ATS room 101

Discussion will begin at 11:15 a.m.

Refreshments will be served at 10:45 a.m. in the weather lab

The Madden-Julian oscillation (MJO), a planetary-scale eastward propagating coherent structure with periods of 30-60 days, is a prominent manifestation of intraseasonal variability in the tropical atmosphere. It is widely presumed that small-scale moist cumulus convection is a critical part of its dynamics. However, the recent results from high-resolution modeling as well as data analysis suggest that the MJO may be understood by dry dynamics to a leading-order approximation. Simple, further theoretical considerations presented herein suggest that if it is to be understood by dry dynamics, the MJO is most likely a strongly nonlinear solitary Rossby wave. Under a global quasi-geostrophic equivalent-barotropic formulation, modon theory provides such analytic solutions. Stability and the longevity of the modon solutions are investigated with a global shallow water model. The preferred modon solutions with the greatest longevities compare overall well with the observed MJO in scale and phase velocity within the factors.

Link to colloquia page: <https://www.atmos.colostate.edu/colloquia/>