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**Shengqian Chen\*** (sqchen@math.wisc.edu), 480 Lincoln Drive, Madison, WI 53705, and **S. N. Stechmann** and **A. J. Majda**. *Multi-scale asymptotics for atmospheric waves and precipitation*.

The lack of understanding of the tropical atmosphere is a major hinderance to improve the predictability of the global climate. In tropics, the Madden-Julian Oscillation (MJO) is the dominant component of intraseasonal (30-60 days) variability. The MJO is an equatorial wave envelope of complex convective processes, coupled with planetary-scale circulation anomalies. In this talk, I will present a new model that captures the mechanisms of the interactions between MJO and other tropical and extratropical waves.. By using the method of multis-scale asymptotics with different time scales, simplified asymptotic equations are derived for the resonant interaction of tropical and extratropical waves, such as Rossby waves. The reduced equations is an ODE system for wave amplitudes. The ODE system are shown to illustrate the initiation/termination of MJO. (Received September 18, 2015)