Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

The Madden-Julian Oscillation of the Earth's Atmosphere[1]
DAVID RAYMOND, ZELJKA FUCHS, New Mexico Tech — The Madden-Julian oscillation (MJO) is the largest propagating weather disturbance on the earth, circling the Tropics to the east with a period of 30-60 days. It is intimately coupled to atmospheric convection, is the most widespread weather maker in the tropics, and has significant influence on mid-latitude weather. It is also known to trigger El Niño events. Because of the uncertainty in the treatment of convection in global models, its representation in such models is poor. Discovered only in 1971, there is still debate over the fundamental mechanism of the MJO. A pair of papers in 1987 proposed that the energy source for the MJO was surface heat fluxes from warm ocean waters. The existence of mean equatorial surface winds toward the west biases these fluxes in favor of eastward-moving disturbances. These models were abandoned because they did not reproduce the global scale of the MJO and for various other reasons. However, advances in our understanding of how convection interacts with tropical weather disturbances has led to linear instability models that predict the greatest MJO intensification rates to occur at global scales, suggesting that the abandonment of the biased surface flux hypothesis was premature. I shall outline our recent work on the subject.

[1]Work funded by the National Science Foundation.

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Date submitted: 11 Nov 2016 Electronic form version 1.4