

ATS/CIRA Colloquium

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Ocasio**

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3 p.m. Thursday, Mar.3

**ATS 101 Hosted by Kelly
Gordon**

African Easterly Wave Tropical Cyclogenesis: The Role of Mesoscale Convective Systems and Water Vapor

Tropical cyclogenesis (TCG) is the process where a tropical cyclone seedling that is coupled to deep convection develops into a tropical cyclone (TC). African easterly waves (AEWs) are an example of such TC seedlings, and, just like TCs and mesoscale convective systems (MCSs), they are high-impact weather events that affect the livelihood of communities over Africa and the tropical Atlantic. A major hindrance to progress on the TC genesis topic is our limited understanding of the interactions between mesoscale processes and the TC seedling. Another hindrance is the fact that these interactions are in large part driven by the most abundant yet most varying greenhouse gas in the atmosphere: water vapor. This research assesses the multi-scale and moisture-dependent nature of AEW TCG in both observations and in global high-resolution simulations. First, I will demonstrate that the phasing and relative propagation between AEW and MCSs affect the likelihood of TCG. Succeeding, a discussion on the key large-scale monsoonal features over Africa that relate to TCG in the Atlantic. In the second part of the talk, I will focus on the pre-Helene (2006) TCG case in Model for Prediction across Scales-Atmosphere (MPAS-A) simulations. I will show that MPAS-A is capable of reproducing the growth of the case and that its TCG was driven by moisture and convection co-located with the wave vortex, characteristic of moisture modes. Finally, concluding remarks will include the broader impacts of this work in the prediction of TCG and how it will change with the warming climate.

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