**Meteorology Seminar**

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**Title:** **Diagnosing the Atmospheric Phenomena Associated with the Onset and**

**Demise of the Mesoamerican Rainy Season**

**Major Professor: Dr. Mark Bourassa**

**Date:** **Thursday, March 28, 2019** **Time: 3:30 PM**

**Location:** Werner A. Baum Seminar Room (353 Love Building)

**(Please join us for refreshments served outside room 353 Love @ 3:00 PM)**

**ABSTRACT**

Mexico and Central America (Mesoamerica) are situated in a complex and unique geographical position with the Caribbean Sea to the East and the tropical Eastern Pacific Ocean to the West. The weather patterns of this region are driven by winds, temperatures, moisture, and orography of several mountain ranges. The Mesoamerican Rainy Season has traditionally been defined as May through November each year, and past studies often use monthly climatologies when analyzing the phenomenology associated with the rainfall. However, key crops grown in Mesoamerica such as bananas, coffee, corn, cacao, and rice require more detail on a daily-to weekly temporal scale. This study finds the dates of the onset and demise of rainfall regimes on a specific day using NASA’s Tropical Rainfall Measuring Mission (TRMM) rainfall for years 1998-2012, area-averaged over land. Using NASA’s MERRA-2 Reanalysis data, we also look at the phenomenology of the triggers of the rainy season onset and demise on the daily time-scale instead of the monthly scales used by previous studies.

We find that the Mesoamerican Rainy Season can be distinguished into two parts: the Early Spring Rainfall (ESR) associated with light rains and the Late Spring Rainfall (LSR) associated with heavy rains. Two algorithms are used to obtain these rainy season distinctions. A new algorithm was developed during this study, to calculate when the rainfall first starts to increase. The daily cumulative anomalies of rainfall are compared to the climatological rainfall to find the time of onset of the heavy rains. To better understand the phenomenology associated with the timing of the rainfall, we look at the monsoon trough, moisture flux convergence, and the weakening/strengthening of the winds associated with the Caribbean Low-Level Jet and Panama Jet.

The light rainfall begins, on average, in mid-March, approximately one month after the peak of the winter Caribbean Low-Level Jet and the Panama Jet. The ramp-up between the light rains and heavy rains is associated with a significant weakening of both jets and the northward progression of a monsoon trough off the western coast of Central America. The heavy rains begin, on average, in mid-May, and are associated with the timing when the Panama Jet goes to near zero magnitude. We find the rainfall onsets materialize first, which then change the wind patterns and regional moisture convergence. The rainfall onsets are followed by a positive total moisture flux convergence in the entire domain. At the demise of the rainfall, approximately in mid-November, the Panama Jet strengthens again and the total moisture flux convergence decreases significantly. The results of this study have positive implications in agriculture and water resources for Mesoamerica, as this information may help resource managers better plan and adapt to climate variability.