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## Department of Atmospheric Sciences M.S. Defense Announcement

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M.S. Defense Title:

# Hawaiian Winter Rainfall Variability during Two Types of El Niño

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**Time: 9:00AM**

**Location: Hawai'i Institute of Geophysics Building, HIG 309**

### Abstract:

Historically, Hawaiian winter (December through February) rainfall is known to be drier-than-normal during El Niño events due to the eastward shift in the subtropical jet stream core over the North Pacific and enhanced sinking motion associated with the local Hadley circulation over the central Pacific. Recent studies suggest that El Niño can be broadly separated into two types: (1) Eastern Pacific (EP) El Niño which has its largest sea surface temperature (SST) anomalies centered in the equatorial eastern Pacific, and (2) Central Pacific (CP) El Niño which has its largest SST anomalies centered in the equatorial central Pacific. When considering El Niño events according to these two types, will Hawaiian winter rainfall still be drier-than-normal?

This study first compares precipitation records between 1957 to present of 21 stations from Kauai, Oahu, Maui and Hawaii during the two types of El Niño winters. Results show that all stations are wetter during CP winters than EP winters. The comparison between EP, CP winters and climatology show that during EP El Niño winters the Hawaiian Islands have a drier-than-normal precipitation pattern, while during CP El Niño winters the Hawaiian Islands have a normal and, for some stations, slightly wetter-than-normal precipitation pattern. To find the mechanisms of these rainfall anomalies during CP and EP winters, further analysis is made on the subtropical jet stream, horizontal wind field, vertical velocity, outgoing longwave radiation, specific humidity, and moisture transport. Dynamical downscaling is adopted to show a detailed wind field distribution and rainfall simulation. Hawaiian Rainfall Atlas, which is a set of high resolution Hawaiian rainfall maps, is also analyzed to show spatial rainfall anomalies during the two types of El Niño.

Although more research needs to be done, the hypothetical contributions to the wetter conditions on the Hawaiian Islands during CP winters as compared to EP winters are: lower level southwesterly wind anomalies, less southward subtropical jet stream shift, weaker descending motion over the Islands, and positive specific humidity anomalies over the Islands.