



## CEE691 Seminars in Civil and Environmental Engineering

### Rainfall Variability and Change in Hawaii

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**Location: Bilger Hall 335, Date: Wednesday, February 24, 2016, Time: 1:30 – 2:20 pm**

**Speaker:** Pao-Shin Chu received his Ph.D. degree from the University of Wisconsin-Madison in 1981. After serving as Project Associate at the Oregon State University in Corvallis, Oregon, he joined the UHM in 1985. He is currently the Hawaii State Climatologist and Professor in the Department of Atmospheric Sciences. Dr. Chu also manages the Hawaii State Climate Office and is a Chaired Professor at the National Central University in Taiwan. His research interests include climate variability and climate change and their impacts on rainfall, hurricanes, and wildland fire. He is also interested in prediction of hurricanes and rainfall and in dynamical downscaling. He has published 80 papers in journals and book chapters.

#### Abstract

In this seminar, I will present three different topics related to rainfall variations and changes in Hawaii. The first one is to address changing rainfall patterns during historical La Nina events. Traditionally, Hawaii receives greater-than-normal rainfall during the La Nina wet season. Recently, La Nina years experienced less-than-normal rainfall. A drying trend in Hawaii rainfall during La Nina years is evident. A change-point analysis determined that the shift in rainfall occurred in 1983, forming two epochs used for comparison. The first epoch (E1) runs from 1956 to 1982 and the second epoch (E2) from 1983 to 2010. Large-scale circulation over the North Pacific is compared to reveal differences in the eastern Pacific subtropical high and the subtropical jet stream from E1 and E2. A storm-track analysis indicates changes in major weather systems (Kona lows, midlatitude fronts, upper-level lows) that commonly bring rainfall to the State. The second part of the presentation is to focus on trends in rainfall extremes and return levels in Hawaii under a changing climate. A non-stationary generalized extreme value (N-GEV) distribution is used to detect trends based on annual maximum daily rainfall. The return-level threshold values are found to change with time. For example, a rare storm with daily rainfall of 300 mm (20-yr return period) in 1960 has become a rather common storm event (3-5 yr return period) in 2009 on the Big Island. The last topic will deal with projection of future rainfall variations in Hawaii using a dynamical downscaling approach. This is achieved by using a high-resolution regional climate model that is initialized with the output from global climate models such as CMIP5.