Study finds heavy rainfall events becoming more frequent on Hawai'i Island

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Heavy rainfall events have become more frequent over the last 50 years on Hawai'i Island. Credit:UHM

A recent study by University of Hawai'i at Mānoa researchers determined that heavy rainfall events have become more frequent over the last 50 years on Hawai'i Island. For instance, a rare storm with daily precipitation of nearly 12 inches, occurring once every 20 years by 1960, has become a rather common storm event on the Big Island of Hawai'i – returning every 3-5 years by 2009.

In a paper published in the *International Journal of Climatology*, Ying Chen, a UH Mānoa graduate student at the time of the study, and Dr. Pao-Shin Chu, professor of atmospheric sciences at UH Mānoa and head of the Hawai'i State Climate Office, analyzed extreme precipitation

events and the frequency with which they occur on three islands in Hawai'i – O‘ahu, Maui and Hawai'i Island.

While heavy rainfall events have become more frequent over the last 50 years on the easternmost island in Hawai'i, the opposite behavior is observed for O‘ahu and Maui to the west. There, rainfall extremes have become less frequent in the last five decades. This study, therefore, also reveals a regional – that is, east to west – difference in how precipitation patterns are responding to a changing climate.

"In the past, the frequency of heavy rainfall events was assumed to be fairly constant. However, because climate is changing, the assumption of stable precipitation climatology is questionable and needs to be reconsidered," said Chu.

"Changes in the frequency of heavy rain events have repercussions on ecological systems, property, transportation, flood hazards, and engineering design – including sewage systems, reservoirs and buildings."

This study also provides clues about why and how the frequency of precipitation extremes has changed. Chu and Chen found a greater number of extreme rain events during La Nina years and the opposite during El Nino years.

In this study, the number of rain gauges used was limited – the researchers used information from 24 weather stations on the three islands. For future work, Chu hopes analyzing data from additional stations will provide a more detailed assessment of changing rain patterns across the Hawaiian Islands.

More information: Ying Ruan Chen and Pao-Shin Chu (2014) "Trends in precipitation extremes and return levels in the Hawaiian

Islands under a changing climate." *International Journal of Climatology*, 34, 3913-3925, DOI: 10.1002/joc.3950.