

# **Kaua'i's 2018 record-setting rain was caused by a series of supercell thunderstorms**

April 21 2022, by Marcie Grabowski

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House destroyed by floodwaters near Waipā Garden, Kaua'i, Hawai'i. Credit: Corrigan and Businger (2022)

A record-setting rainstorm over Kaua'i, Hawai'i in April 2018 resulted in severe flash flooding and estimated damage of nearly \$180 million. The deluge damaged or destroyed 532 homes, and landslides left people along Kaua'i's north coast without access to their homes. In a recently published study, atmospheric scientists at the University of Hawai'i at Mānoa revealed that severe supercell thunderstorms were to blame.

The rainstorm inundated some areas with nearly 50 inches of rainfall in a 24-hour period, smashing the previous 24-hour U.S. rainfall record of 42 inches set in Texas in 1979. An interesting finding is that the rainstorm described in this paper was associated with a kona low and not a tropical cyclone as featured in previous U.S. rainfall records.

Terrence Corrigan, a doctoral candidate, and professor Steven Businger, both in the Department of Atmospheric Sciences at the UH Mānoa School of Ocean and Earth Science and Technology, sifted through copious weather radar data from NOAA's National Weather Service to unveil the factors contributing to this historic event. Their analysis revealed large changes in the direction and speed of the winds in the lower atmosphere. When these shifting winds collided with Kaua'i steep cliffs, thunderstorms with rotating updrafts were triggered. The scale of rotation seen in radar data and the strength of rainfall seen as reflectivity echoes are consistent with supercell thunderstorms.

"This finding was a surprise, which has interesting implications for other mountainous areas of the world," said Businger.



Waipā Garden rain gauge, northern slopes of Mount Wai'ale'ale in the background, Kaua'i, Hawai'i. Credit: Corrigan and Businger (2022)

"Updrafts with rotation are more intense and longer lived, and have been observed to produce large hail and tornadoes in Hawai'i," said Businger. "In this case, the updrafts were forced by Kaua'i's steep mountain cliffs, with the result that the thunderstorms were more vigorous and anchored to the terrain, thus setting a new US 24-hour [rainfall](#) record."

Although supercell thunderstorms are the least common type of [thunderstorm](#) in Hawaii, they have the greatest likelihood of producing [severe weather](#), including large hail, tornadoes, and strong straight-line

winds.

"Understanding the dynamic interaction of our tropical atmosphere and steep mountains will help weather forecasters better anticipate severe [weather](#) events and flash floods in our state and elsewhere."

Businger and Corrigan's next steps are to use computer models to simulate the interaction between various wind flows and terrain configurations to further shed light on the interaction of mountains and severe thunderstorms.

**More information:** Terrence J. Corrigan et al, The Anatomy of a Series of Cloud Bursts that Eclipsed the U.S. Rainfall Record, *Monthly Weather Review* (2021). [DOI: 10.1175/MWR-D-21-0028.1](https://doi.org/10.1175/MWR-D-21-0028.1)

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