

A Study of Summer Leaside Rainfall Maxima over the Island of Hawaii

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ABSTRACT

The Kona area on the island of Hawaii stands out due to its pronounced summer leaside rainfall maxima. The primary physical processes for the summer rainfall maxima in Kona are analyzed by comparing it with winter rainfall. The annual and diurnal cycles in Kona are investigated by employing the Fifth-generation Pennsylvania State University-NCAR Mesoscale Model coupled with the advanced land surface model from June 2004 and February 2010.

During the summer, the nocturnal rainfall maximum adjacent to the Kona coast is larger than in winter because of the stronger, moister westerly reversed flow and offshore flow in summer. Comparisons between winter trade-wind days and winter mean show that the leaside Kona rainfall offshore in winter mainly occurs under trade-wind conditions. Moreover, the model results also attest to the impact of moisture content on the Kona leaside rainfall offshore.

Comparisons between winter and summer trade-wind days indicate that upslope flows on the Kona slopes are stronger and the moisture content from the westerly reversed flow is higher in summer than in winter. The rainfall maximum on the lower Kona slopes is more pronounced in summer than in winter as a result of enhanced orographic lifting due to stronger upslope flow in the afternoon hours and the moister westerly reversed flow offshore, which merges with the upslope flow inland.