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Statistical downscaling of rainfall extremes for the Hawaiian Islands (Invited)

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The trend towards dryer conditions over the Hawaiian Islands in the past decades has raised interest in the question whether Hawaii will experience more droughts or more extreme rainfall events under global warming in the upcoming decades. In this study, we combined the diagnostic analysis of the weather pattern from the past 50 years with statistical downscaling methods in an attempt to estimate the potential future changes in the rainfall extremes. Using composite analysis methods we identify the main large-scale circulation pattern over the North Pacific that are associated with rainfall extremes. In the next step, we develop a statistical transfer model that allows to estimate the likelihood of extreme rainfall events for a given large-scale circulation pattern. In the final step, this transfer model is applied to selected model simulations from the IPCC AR4 report and the
changes in the occurrence of extreme rainfall events are estimated from the model-projected synoptic weather pattern. We discuss the associated uncertainties of these downscaled extreme event statistics and we discuss the limitations of the statistical downscaling methods.

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