## Projection of Changes in the Frequency of Heavy Rain Events Over Hawaii Based on Leading Pacific Climate Modes

### Regions
- Central North Pacific
- State Of Hawaii

### Essential Climate Variable
- Atmospheric Data

### Phenomena/Impacts
- Rainfall

### Spatial/Scale
- Grid

### Methodology
- Insitu
- Dynamical

### Sectors
- Health
- Fresh Water

### Description
This study investigates the frequency of heavy rainfall events in Hawaii during the wet season (Oct-Apr) 1958–2005 and their conditional dependence on the Pacific-North American (PNA) pattern and El Nino-Southern Oscillation (ENSO). Heavy rain events are defined by the 95% quantile in the rainfall distribution of the wet seasons. Twelve stations with daily reports of rainfall amounts were used to count the number of heavy rain days during wet seasons. Multiple linear regression (MLR) indicated that the PNA index (PNAI) and the Southern Oscillation Index (SOI) can explain a significant amount of the interannual to interdecadal variability for 9 out of 12 stations. Cross validation showed that PNAI and SOI together explain about 18–44% of the variability in the number of heavy rain events. Furthermore, the MLR model reproduces the trend toward fewer heavy rain events in the years after the Pacific climate shift in the mid-1970s. The MLR model was applied to the projected PNAI and SOI indices that were obtained from six IPCC AR4 climate models. The current suite of AR4 simulations based on the A1B and A2 emissions scenarios projects small and equivocal changes in the mean state of the SOI and PNAI during the 21st century. The covariance between PNAI and SOI in these simulations appears to be stable. To the extent that variations in the frequency and magnitude of ENSO and the PNA mode are responsible for modulating extreme rainfall occurrence in Hawaii, our results indicate small changes in the projected number of heavy rainfall days with large uncertainties resulting from disparities among the climate models.

### Url

### Lead Agencies
U of Hawaii/SOEST/IPRC, U of Hawaii/Dept of Geography, NOAA/CIRES/CDC

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