Developing a land-surface meteorological forcing dataset for the Hawaiian Islands

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New project

• Builds on previous work at the University of Hawaii (Tom Giambelluca) on meteorological mapping over the Hawaiian Islands

• Dataset characteristics:
  – Spatial resolution: 250 m (also 12-km)
  – Temporal resolution: hourly
  – Period of record: TBD

• Method
  – Temporal disaggregation of monthly maps (version 0)
  – Probabilistic mapping of meteorological fields
  – Incorporate WRF simulations, radar, satellite

• Status and timeline
  – Project just starting (in scoping phase)
  – Version 0: Fall 2015
  – Version 1: Spring 2016
Measurement and Mapping of Hawaiian Rainfall

- Earliest known RF observations taken in 1837 at Nuʻuanu Avenue and Beretania Street
- 106 stations by 1900
- Number of stations increased with the growth of plantation agriculture
- 422 stations by 1920
- Mapping of rainfall patterns began in earnest in the 1920s
The Rainfall Network

- We compiled a monthly RF database of 2,188 raingage sites
- 517,017 station-months (43,085 station-years) of data
- Average length of record: 40 years
The Rainfall Network

Number of station operating at any given time peaked at 1030 stations in 1968.
The Web Site

With the help of the EPSCoR Cyberinfrastructure Team at UH Hilo, we developed a web platform for the new rainfall atlas.

What is the Rainfall Atlas of Hawai‘i?

The Hawaiian Islands have one of the most diverse rainfall patterns on earth. The mountainous terrain, persistent trade winds, heating and cooling of the land, and the regular presence of a stable atmospheric layer at an elevation of around 7,000 ft. interact to produce areas of uplift in distinct spatial patterns anchored to the topography. The resulting clouds and rainfall produced by this uplift lead to dramatic differences in mean rainfall over short distances. Knowledge of the mean rainfall patterns is critically important for a variety of resource management issues, including ground water and surface water development and protection, controlling and eradicating invasive species, protecting and restoring native ecosystems, and planning for the effects of global warming.

Be sure to check out the interactive map! It may need a few minutes to load on your first visit.

MODIS Image of Hawai‘i, NASA Earth Observatory

The Rainfall Atlas of Hawai‘i is a set of maps of the spatial patterns of rainfall for the major Hawaiian Islands. Maps are available for mean monthly and annual rainfall. The maps represent our best estimates of the mean rainfall for the 30-yr base period 1978–2007. However, for many reasons, it is not possible to determine the exact value of mean rainfall for any location. Therefore, for every map of mean rainfall, we provide a corresponding map of uncertainty. Uncertainty tends to be greatest where we have the poorest information about rainfall, for example in remote locations far from the nearest raingage.

This web site was developed to make the rainfall maps, data, and related information easily accessible. The maps depict rainfall patterns by color and/or isohyets (lines of equal rainfall). The interactive map allows users to see the patterns of mean monthly and annual rainfall and corresponding uncertainty, zoom in on areas of particular interest, navigate to specific locations with the help of a choice of different base maps, and click on any location to get the mean annual rainfall and a graph and table of mean monthly rainfall. The locations of stations can also be shown on the interactive map. Clicking on a station gives both station and mapped estimates of monthly rainfall along with station metadata.
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Locate any point of interest on the interactive map and click to get mean annual and monthly rainfall statistics.
Clicking on a station gives both map and station estimates of mean annual and monthly rainfall statistics.
Thank You