

ABSTRACT

Rainfall maps produced with data from widely dispersed official government weather stations are generalized maps covering broad geographical areas that provide little detail at larger scales. Little research has been completed in producing surfaces at smaller extents due to the lack of available data. A non-traditional method of obtaining additional data is through Volunteered geographic information (VGI), which presents data from non-authoritative sources that often supplement traditional data sources, and make analyses not previously considered, now possible. This thesis used citizen collected rainfall measurements, VGI, to create rainfall surface representations of a small geographic area located within the Kona Districts on the Big Island of Hawaii. The geostatistical methods of ordinary kriging, co-kriging, and Empirical Bayesian Kriging (EBK) were used to interpolate these rainfall point location averages and create rainfall surface maps. Prediction error statistics were generated that corresponded to each surface representation and were used to determine the most accurate method. The resulting maps that were created for the study area were at least as good as those produced by traditional authoritative sources. An examination of a cluster of citizen rainfall gauges within a smaller sub-region of the study area was used to create rainfall maps with greater spatial variation compared to maps created from government stations. EBK provided the most accurate results nine out of twelve times, while using the least amount of input.