



# Augmented Saipan Daily Rainfall Measurements to Inform a Study of Well Head and Well Salinity Variations



Funded by:  
US Geological Survey, Water Institute Program

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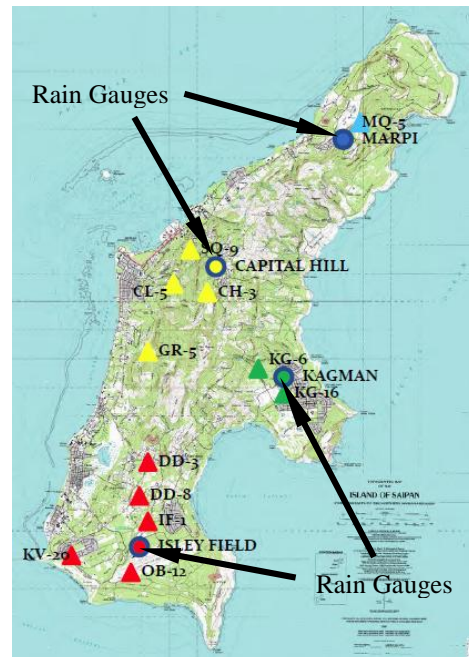
There are now only two locations on Saipan where there is a direct measurement of daily rainfall: the Saipan International Airport and at the Emergency Management Office on Capitol Hill. These sparse rainfall records are the only data available to support studies of the contamination of Saipan groundwater by sea water. There are no rain gauges at several important well sites (e.g., Marpi). Many of Saipan’s wells have a sea salt concentration that severely degrades the taste and smell of the water supply, and may even pose a health risk. Over the past year (i.e., 2014), personnel at the water lab of the Saipan Commonwealth Utilities Corporation (CUC) compared groundwater salinity levels to rainfall. This USGS-sponsored project yielded some observations that were as one might expect; for example, higher salinity in wells closer to the coast. Another key observation was counter-intuitive and remains unexplained: the salinity in some wells actually *increased* after heavy rainfall events! During the course of the CUC study, a test rain gauge was installed at the CUC water lab. This rain gauge obtained very high rainfall values compared to the official values of rainfall recorded at the airport and on Capitol Hill. It is possible that very large gradients of rainfall during isolated heavy storms might be partially responsible for the observed unusual salinity changes in the wells. The magnitude of the differences in rainfall measured at the CUC water lab versus the other two rainfall sites is extraordinary, and needs further validation with a dual-rain gauge configuration.

The principal investigator (PI) at UOG will undertake a follow-on project during 2015 to try to clarify some of the findings of the

2014 USGS-sponsored CUC well chloride study.

The objectives of the respective phases of this project are:

1. Continued data acquisition regarding spatial and temporal distributions of rainfall, well head and salinity;
2. Analyses of spatial and time-series data on rainfall, groundwater levels, and chloride concentrations;
3. Verify that the rainfall gradients on Saipan are really as large as the measurements during 2014 from the one rain gauge at the CUC lab suggests,
4. Determine whether salinity increases after heavy rainfall are associated with any unusual distributions of the rainfall.



Saipan wells and rain gauges.