Mapping Arsenic Movement due to Tsunami Events: Developing a Comprehensive Hot Spot Map of Arsenic Contamination in Wailoa State Park in Hilo, Hawaii

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The purpose of this project was to further test the principles of the “Windshield Wiper” Model and develop a comprehensive hot spot map of arsenic contaminants within Waiakea Pond and throughout Wailoa State Park. The first hypothesis and fourth principle of the “Windshield Wiper” Model stated that total arsenic concentration gradients within Waiakea Pond would directly compare to arsenic gradients of dry land locations collected in previous year’s research. The second hypothesis stated that Decision Units 2 and 3 contained the greatest gradients of arsenic to due tsunami distribution of arsenic contaminants proposed by the “Windshield Wiper” Model. Waiakea Pond was divided into 5 areas (Decision Units) with 3 layers of sediment tested in accordance to multi increment sampling methodology to yield representative samples. Samples were tested using an EDXRF machine. The first hypothesis and fourth principle was supported. Data from the hot spot map illustrated a relationship between pond gradients and land gradients of total arsenic. The second hypothesis was partially supported as Decision Units 1 and 2 contained the greatest arsenic concentration gradients. Data partially supported the third principle as concentrations were greatest nearest to the arsenic source on land, but greatest farthest away in pond sediment. The second principle was supported as greatest arsenic gradients were located farthest away from pond embankments. The first principle was refuted as greatest gradients were observed within the tsunami inundation zone. Future steps include further testing of the pond sediment for validation and introducing remedial techniques for soil and pond sediment.

Awards Won:

Third Award of $1,000

Arizona State University: Arizona State University Intel ISEF Scholarship