

ASSESSING THE ACCURACY OF AN ENVIRONMENTAL
MONITORING SYSTEM IN THE ALA WAI HARBOR

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I certify that I have read this thesis and that, in my opinion, it is satisfactory in scope and quality as a thesis for the degree of Bachelor of Science in Global Environmental Science.

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ABSTRACT

The ZAPS Technologies LiquiD station is an innovative instrument that uses light to monitor the overall quality of water in real time through a process called Zero Angle Photon Spectroscopy (ZAPS). The primary objective of this study was to evaluate the ZAPS LiquiD instrument to see if the real-time concentration data that it provides correlate with values obtained by manual discrete sampling and traditional methods of analysis. For this study, we compared chlorophyll-a, nutrients (NO_3^- and NO_2^-), total suspended solids (TSS) concentration and turbidity. For those parameters measured by the PacIOOS nearshore sensor at Hawai'i Yacht Club, O'ahu, data were taken for an additional comparison. For chlorophyll-a and TSS, the LiquiD sensor gave similar data to those analyzed in the laboratory while for nutrients, a dissolved constituent, the LiquiD overestimated values. Chlorophyll-a display considerable variability but the data from the various methods all fall within in the same range with 14% of LiquiD data showing extremely similar results to data examined by the lab. Laboratory TSS values yield similar results to those data from the LiquiD if sample water is filtered through cellulose acetate membranes and dried at a temperature above the boiling point of water. LiquiD sensor data for NO_3^- and NO_2^- was larger by about a factor of four and although absolute values do not match, a decent correlation was observed given by an R^2 value of 0.33. Turbidity values, although measured in different units that are not directly comparable, show comparable trends with an R^2 value of 0.46 for data generated by the PacIOOS and the LiquiD. Higher lab values for TSS and chlorophyll-a may be attributed to the long length and fouling of the intake line; however, for dissolved constituents, a sensor calibration may be the problem.