

An Investigation of CO<sub>2</sub> Signals Caused by Weather Disturbances in Mamala Bay

A THESIS SUBMITTED TO  
THE GLOBAL ENVIRONMENTAL SCIENCE  
UNDERGRADUATE DIVISION IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF SCIENCE

IN

GLOBAL ENVIRONMENTAL SCIENCE

DECEMBER 2020

By  
ANTHONY N. BARRO

Thesis Advisors

DR. SETH BUSHINSKY  
DR. CHRISTOPHER SABINE

## ABSTRACT

With continued increase of atmospheric carbon dioxide concentrations due to human activity, it is important to maintain an understanding of the carbon dioxide (CO<sub>2</sub>) concentrations and cycles in coastal waters. Coastal CO<sub>2</sub> fluctuations are highly variable in comparison to open ocean systems, they also differ in roles as sources and sinks for atmospheric CO<sub>2</sub>. This study was an investigation on the effects of weather events, such as Kona-storms, on CO<sub>2</sub> concentrations and fluctuations in the coastal waters of Oahu's South-Shore. CO<sub>2</sub> data has been collected in the coastal waters of O'ahu with the use of Moored Autonomous Partial-pressure CO<sub>2</sub> (MAPCO<sub>2</sub>) sensors since 2008. These data were combined with hydrology data from the United States Geological Survey in order to detail weather disturbance effects on pCO<sub>2</sub> cycles in the near shore system of Mamala Bay, Hawaii. Biological processes dominate the short-term CO<sub>2</sub> fluctuations in the near-shore system, but these cycles can be disrupted by weather events and the effects that those weather events have on the biological activity in the system. We found that the disturbances were identifiable in the data record by CO<sub>2</sub> signals. High CO<sub>2</sub> signals and low signals were identified, the highest and lowest both correlated with weather disturbances prior to the signals.