ENVIRONMENTAL CHANGES AT STATION ALOHA FROM EARTH SYSTEM SIMULATIONS

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ABSTRACT

Observations made at Station ALOHA as part of the Hawai‘i Ocean Time-series (HOT) program show long-term changes in biogeochemical conditions that are thought to be indicative of changes in the North Pacific Subtropical Gyre (NPSG). Whether these multi-decadal trends are in response to anthropogenic forcing or internal climate variability (e.g., ENSO, PDO, etc.) is unclear. Exploration of this issue will be done by comparing the trends in several biogeochemical parameters observed from HOT with changes simulated by an ensemble of climate change simulations. The ensemble consists of 33 simulations of changes in climate and ocean biogeochemistry performed with the Community Earth System Model Version 1 (CESM1) provided from the National Center for Atmospheric Research (NCAR). The simulations differ in internal variability, while maintaining anthropogenic forcing the same, making this ensemble ideally suited to explore the interaction of natural and human causes in the observed changes. Statistical analysis of the trends from HOT were made. Statistical analysis such as min-max range, mean, standard deviation and interquartile range were performed. While the observed trends of partial pressure carbon dioxide (pCO_2) follow the anthropogenic increase of carbon dioxide (CO_2) in the atmosphere, the drivers of the changes in other parameters (e.g. chlorophyll, etc.) are not clear. Implications for projecting future natural and man-made changes in the NPSG were also explored to see when internal variability would not have an effect on the changes to the parameters analyzed.