Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10376, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10376
EGU General Assembly 2008

The Hawaii Ocean Time-series (HOT) program: 20 years of sustained ocean observations in the North Pacific Subtropical Gyre

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Since 1988, the Hawaii Ocean Time-series (HOT) program has examined the temporal variability of ocean biogeochemistry and physics in the oligotrophic North Pacific Subtropical Gyre (NPSG). On an approximately monthly basis, the HOT shipboard program measures a comprehensive suite of biogeochemical and physical properties at the deep-ocean Station ALOHA (22˚45'N, 158˚W). This sustained measurement program has yielded an unprecedented view of linkages in the ocean-climate system in the NPSG. Foremost among the HOT program accomplishments are characterization of the influence of time-varying ecosystem processes on the ocean carbon cycle, quantification of air-sea carbon dioxide fluxes and determination of critical factors controlling the export of bioelements from the surface ocean to the deep sea. Moreover, the emerging dataset provides a unique opportunity for examining the sensitivity of biological and physical processes to climate variability.

The nearly 20 years of measurements at Station ALOHA have identified important linkages between physical dynamics and ocean biogeochemical variability. Over seasonal to subdecadal time scales, local and basin-scale climate forcings modify ocean stratification, thereby influencing nutrient and light availability and controlling plankton biomass and productivity. Episodic modification of upper ocean physics and bi-

ology by mesoscale dynamics (eddies and planetary waves) also exerts important influences on ocean biogeochemistry and plankton community structure. To address the wide range of coupled physical-biological interactions known to control biogeochemical cycling in the NPSG, the HOT program continues to strengthen its ocean observing capabilities. Autonomous sensing platforms such as gliders and moorings have been integrated with the existing shipboard program during the past few years. In addition, the recently established ALOHA Cabled Observatory (ACO) provides both the power and bandwidth necessary for high frequency measurements of ocean physics, chemistry and bio-optics. In addition, through the integration of autonomous sensing platforms such as gliders and moorings with the ongoing shipboard program, HOT is developing a robust ocean observing network with Station ALOHA as its centerpiece. The emerging unified program continues to highlight the importance of sustained, long-term measurements for understanding ocean ecosystem dynamics.