CHARACTERISTICS AND WATER PROPERTIES OF MESOSCALE EDDIES IN THE REGION OF STATION ALOHA

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ABSTRACT

Mesoscale eddies in the central North Pacific Subtropical Gyre have important consequences on physical phenomena and significant influence on biological and geochemical properties (Robinson, 1983). This study focuses on eddies that pass through Station ALOHA, the ~monthly sampling site of the Hawaii Ocean Time-series (HOT) Program, located at 22° 45'N and 158°W, 100 km north of Oahu. Eddies are first identified as closed contours of sea level anomalies from gridded maps of merged satellite altimetry and then tracked using an eddy identification and tracking algorithm developed by Chelton et al. (2007). From October 1992-December 2006, 76 eddies (40 cyclonic and 36 anticyclonic) passed through the 2°x2° degree box surrounding Station ALOHA and are catalogued in a database which includes information about their statistics (amplitude, radius, translation speed and axial speed). Additionally, for eddies whose passage through Station ALOHA overlapped with a HOT cruise, vertical profiles of water mass properties and ADCP measurements are analyzed to gain additional information about the characteristics of these eddies. The eddies are subject to several types of interactions that disrupt them from equilibrium including interaction with other eddies, interaction with the topography of the Hawaiian islands and interaction with the surrounding mean flow. The presence of the Hawaiian Islands greatly affects eddy trajectories in this region. Water property anomalies are greater for eddies that form east of 148°W than water property anomalies for eddies that form near Station ALOHA (west of 156°W), indicating that the eddies formed east of 148°W encapsulate water from their source region and transport it within a bolus as they translate west. The eddies that pass

through ALOHA share similar characteristics to eddies in the larger surrounding region bounded by 15°-30°N and 170°-140°W.