The ADCP method generally proved to be the most reliable technique for finding the cyclone centers, particularly when used in conjunction with the ships' underway SST and CTD records. ADCP data were not displayed in real-time during E-Flux I, so the CTD and optics package profile data were vital; however, ADCP data were displayed in real-time for E-Flux II and III. The ADCP data were used to produce near real-time vector maps using the Matlab m_map suite. These maps were used to track the positions of the centers of the eddies. Contours of other key variables collected during transects, which included horizontal currents, temperature, salinity, density (or sigma-t, σ_t), and chlorophyll *a* fluorescence, were also created in near real-time using Surfer software. These plots were used to determine the cyclones' spatial extents as well as to estimate distributions of chlorophyll *a* (i.e., the chlorophyll *a* maximum layer), mixed layer depth, key isopycnal surfaces, property maxima and gradients, and maximum velocity and shear zones.

During the experiments, drifters were deployed near the estimated centers of the eddy features. Following the experiments, drifter tracks were analyzed. By examining the drifter trajectories (i.e., using the geometric center of the roughly circular trajectories), useful complementary information concerning the movement of each eddy was derived.

Results

Overview

Some of the principal results of each of the three E-Flux field studies are presented next. First, it is worth re-emphasizing that the mesoscale eddies appearing to the west of Hawai'i are quite likely correlated with strong and persistent northeasterly trade winds that blow through the 'Alenuihaha Channel that separates the islands of Maui and Hawai'i. The trade wind airflow between these islands is accelerated because of the presence of the mountains Haleakala on Maui and Mauna Kea on Hawai'i as discussed by Patzert (1969) and Chavanne et al. (2002). Figure 1 shows a time series of wind velocity vectors, wind speed, and wind direction obtained from a site to the southwest of the 'Alenuihaha Channel (20.1^{0}N, 156.4^{0}W; noted with a blue triangle in Figures 2, 7, and 11). The location chosen for the display of wind time series is in the general area where cold-core mesoscale eddies or cyclones spin up as typified by the initial appearances of previous eddies and those observed during E-Flux I and III (Figures 2b and 11b). Relatively strong and persistent trade winds (northeasterly) occurred from late May 2004 through late April 2005 with only a few exceptions (Figure 1). The most notable exceptional period occurred from early December 2004 through early February 2005 when the E-Flux II cruise took place and no mesoscale eddies were observed despite intensive sampling. Interestingly, cold-core eddies were evident in satellite SST data downwind of the 'Alenuihaha Channel or to the west of Hawaii during persistent trade wind conditions during the periods of July 2004 (an unnamed cyclone occurred prior to the first E-Flux cruise – this feature drifted off to the west before Cyclone Noah formed), mid-August through mid-December, 2004 (Cyclone Noah was observed during the E-Flux I cruise), and early February through mid-April, 2005 (Cyclone Opal was observed during the E-Flux III cruise). These observations support the hypothesis that