THE LAGRANGIAN PROPERTIES OF THE FLOW WEST OF OAHU

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Abstract

The presence of an island in the path of a major current or steady wind regime creates complex dynamics in the lee of the island where the flow has been disrupted by topography. In this study, two High Frequency Radars were established on the leeward side of the island of Oahu, in the subtropical Pacific gyre, from September 2002 until May 2003. Due to the high resolution of the High Frequency Radar velocity data, smaller dispersion patterns can be examined. Here, the Lagrangian Rate of Separation and velocity gradient tensor properties were used to identify coherent structures in the flow that affected dispersion in the velocity field in the lee of Oahu. A new method, called an Instantaneous Rate of Separation, was derived from the relationship between the Lagrangian Rate of Separation and the components of the velocity gradient tensor. The Instantaneous Rate of Separation correlated well with the Lagrangian Rate of Separation under most circumstances. Coherent structures were visible in the flow for most of the time period analyzed, with significant features noted during eddy events and localized fronts. During steady flow without unique velocity features, coherent structures were not easily visible in the flow patterns.