

VARIABILITY OF THE INTERMEDIATE WATERS
NORTH OF OAHU

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Abstract

Hydrographic data taken from station ALOHA at 22°45' N, 158°W over the past four years reveal that the region is often the site of intrusive interleaving of varying water types near the salinity minimum of the intermediate waters. This interleaving is associated with saline laminae, or blobs, 5-30 km long (submesoscale) and 5-100 meters thick (finestructure). The temporal variability of the intermediate waters is investigated using traditional statistics and Principal Component Analysis. It is found that the salinity minimum shows a relative maximum in water type variability, caused mainly by the episodic appearance of saline, finestructure intrusions. Fluctuations between saline and fresh water types are correlated with low and high oxygen concentrations, respectively. Salinity increases sharply towards the south in the Hawaiian Islands region, and oxygen gradually decreases. Moreover, data from three additional stations indicate that intrusive variability may be restricted meridionally. Thus, stirring processes local to the Hawaiian Ridge could explain the observations. Based on this circumstantial evidence, it is suggested that flow below the thermocline and along the ridge supports instabilities which stir scalar properties across stream, producing submesoscale, finestructure features of up to 100 meters thick. Subsequent diffusive instabilities may explain interleaving on smaller scales, of order 10 meters in the vertical.