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Longshore Coherence of Currents on the Southern California Shelf During the Summer

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ABSTRACT

Observations of horizontal currents and temperature made along a mid-shelf isobath during the summer on the Southern California shelf are used to determine longshore coherent length scales. The observations are characterized by weak atmospheric forcing and strong density stratification of the water column. For periods longer than a day, coherent longshore length scales of currents are around 25 km, while coherent length scales of temperature were longer than the instrumental array (57.5 km). For periods ranging from a day to an hour, near-surface motions were dominated by diurnal fluctuations which were coherent over lengths of 5 km, whereas near-bottom motions, dominated by semidiurnal fluctuations, showed evidence of a signal propagating up coast at phase speeds of order 1 m s^{-1} . The observed scales of motion in different frequency bands are used to estimate the dispersive properties of the shelf motions. The dispersion coefficient is found to vary with scale, as the current variance associated with larger, lower-frequency motions becomes available to dispersion, and this variation is compared to the behavior of dispersion coefficients deduced by Okubo (1971).

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