Data Assimilation in the Exclusive Economic Zone: The Coastal Transition Zone Assimilation Studies

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Analyses of hydrographic and acoustic Doppler current profiler (ADCP) measurements from the Coastal Transition Zone (CTZ) experiment are used to provide initial/boundary conditions for baroclinic regional ocean models. The CTZ field programs were held in 1987 and 1988 at the shelf break off the coast of Northern California near Pt. Arena. This region is within the Exclusive Economic Zone and includes deep water and steep topography. An intense (60 cm s⁻¹) meandering baroclinic jet flows roughly parallel to the coast and through the assimilation domain. This provides a challenging test for the open boundary conditions of the regional model. In addition to the hydrographic and ADCP data, satellite imagery and float tracks are part of the CTZ data set. ADCP data permits determination of the absolute flow field to the depth of the hydrographic data (500m) and eliminates the need for a level-of-no-motion assumption. ADCP data is found to be important in determining the flow field and in producing accurate assimilations. Comparison with independent data indicates that the analysis and assimilation fields are good estimates of the flow. The combination of dynamics (the model) and a subset of the data (no ADCP) produces better field estimates than the subset of the data alone. Including topographic effects improves assimilations up to the limits of the data caused by the absence of deep flow measurements. Addition of wind forcing generally increases the accuracy of the assimilations. Assimilation methodology will be described and the results of sensitivity studies will be interpreted. The particular implications for Coastal Prediction Systems will be discussed.