Geophysical Research Abstracts,
Vol. 11, EGU2009-1842, 2009
EGU General Assembly 2009

Strain induced freshwater pumping in the Liverpool Bay ROFI

M.R. Palmer and J. Polton
Proudman Oceanographic Laboratory, Liverpool, UK

Understanding the fate of freshwater run-off and corresponding nutrient and pollution loads is of critical importance for the development of accurate predictive models and coastal management tools. A key element of such studies is the identification and understanding of the interaction between stratification, current structure, turbulence and mixing. Here we present a new series of measurements made in the Liverpool Bay region of freshwater influence (ROFI) during spring 2004 where freshwater maintained horizontal density gradients and strong tidal currents interact to produce strain induced periodic stratification (SIPS). During stratification tidal current profiles are significantly modified such that the tidal flow deviates from the otherwise rectilinear E-W axis generating counter rotating upper and lower mixed layers which result in a net flow of near surface freshwater offshore. Additionally, this process produces a shear layer that is sufficient to drive local instability producing isolated patches of enhanced mid-water mixing several orders of magnitude above background levels O[10-3 m2s-1] measured using a 25 hour series of profiles of the FLY turbulence profiler. The regularity and persistence of this feature will have important consequences on the net flux of freshwater in the bay and would have implications on local coastal management strategy. We therefore investigate the long term effects of this process using the 6 year dataset collected nearby as part of Proudman Oceanographic Laboratory's Coastal Observatory and we test the ability of a state-of-the-art 3-D hydrodynamical model (POLCOMS) to reproduce observations.