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The Fate and Fortune of the River Mersey Plume: Using Ocean gliders to validate and improve coupled coastal ocean models.

M. Palmer (1), C. O'Neill (1), C. Spingys (2), C. Mahaffey (2), and J. Polton (1)
(1) UK National Oceanography Centre (rolm@pol.ac.uk), (2) University of Liverpool, UK

The River Mersey is the major source of freshwater into the Liverpool Bay region of the Irish Sea. The region has been described as a region of freshwater influence (ROFI) since the dominant control on vertical stratification is local gradients in salinity. The River Mersey is fed by tributaries covering a wide variety of land uses, including heavily populated areas, arable and livestock farming, heavy industry and chemical processing plants, finally passing through the city of Liverpool. Understanding the fate of freshwater within this system is therefore vital not only to understand the physical structure of the coastal ocean but also to identify biogeochemical, pathogen and pollutant pathways. In this paper we combine data from the Liverpool Bay Coastal Observatory (cobs.pol.ac.uk) with data from a novel deployment of an ocean glider (Slocum) which was used to track the River Mersey plume over a three week period in February 2011. Glider data was successfully collected in water as shallow as 15m and provided high temporal and spatial resolution physical and biogeochemical data. This allows identification of the development and evolution of the physical structure of the plume and the biological response to nutrient rich Mersey water as it enters the coastal system. Glider and observatory data are used to test and improve the capabilities of coupled POLCOMS (3-D hydrodynamics) and ERSEM (ecosystem) models in reproducing the observed plume behavior.