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# Horizontal evolution of tidally modulated buoyant plumes and the subsequent genesis of non linear internal waves as observed with an AUV based microstructure profiler.

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The tidally modulated outflow of brackish water from a sea loch forms a thin stable surface layer that propagates into the coastal ocean as a buoyant gravity current, transporting nutrients and sediments, as well as fresh water, heat and momentum. The fresh intrusion propagates as an undular bore, and the introduced stratification supports trains of non-linear internal waves (NLIWs). In February 2011 an Autonomous Underwater Vehicle (AUV) was used on repeated reciprocal transects to make simultaneous CTD, ADCP and shear microstructure measurements of the evolution of these phenomena in conjunction with conventional mooring measurements. AUV-based temperature and salinity signals of NLIWs of depression were observed together with increased turbulent kinetic energy dissipation rates of over two orders of magnitude within and in the wake of the NLIWs. Repeated measurements over several tidal cycles allow a unique opportunity to investigate the horizontal structure of these phenomena, the interaction of each tidally driven pulse with ambient stratification and the remnants of previous plumes, as well as the genesis of and subsequent mixing induced by the NLIWs.