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Internal wave driven shelf edge fluxes in the Celtic Sea

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The internal tide and wave field dominate the dynamics of the Celtic Sea in the northeast Atlantic during the summer months. In addition to stimulating a well recognised vertical nutrient flux through shear mixing along the base of the pycnocline, the internal tide is responsible for the horizontal exchange of energy, mass, heat and salt between the deep-ocean and continental shelf. We present results from a 2012 field campaign where a series of moorings were specifically laid out to capture the generation, propagation and dissipation of the internal tide across the shelf break and onto the shelf. Our measurements reveal remarkable variability in water column structure, currents and fluxes owing to the highly corrugated and irregular shelf edge bathymetry. Our calculations are used to estimate the internal tidal contribution to fluxes and exchange for the whole Celtic Sea sector of the NW European Shelf. Understanding and quantifying the different physical exchange processes is essential if these regions are to be adequately accounted for in both physical and ecosystem models of shelf seas.