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# Thermocline mixing in the seasonally stratified Celtic Sea

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Although the shelf seas account for only a small fraction of the world ocean surface, they are thought to make a disproportionately large contribution to the worlds open ocean CO2 storage via processes often referred to as the shelf sea pump. An important and perhaps rate limiting process in continental shelf sea CO2 drawdown is mixing across the thermocline.

In an attempt to improve understanding of the climatology of vertical mixing across the thermocline, we present direct measurements of the rate of dissipation of turbulent kinetic energy ($\varepsilon$) from which vertical mixing rates are inferred for a number of summer stratified locations in the Celtic Sea. We identify that thermocline mixing is dominated by localised shear instability driven by internal tide and near-inertial shear and by association with flow over rough topography. Despite relatively low levels of energy dissipation attributable to these processes when compared to that of the barotropic tide, they are more efficient mixers due their proximity to the high density gradient and are potentially more significant.

These results offer a clear advance on the first order paradigm for continental shelf sea water column structure, which prescribes to mixing dominated by boundary layer mixing processes.