Measuring sub-mesoscale lateral Stirring

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ABSTRACT: Oceanography is at an exciting time where numerical predictions and at-sea observations are approaching similar scales of resolution. This is an opportunity for better synergy between the two approaches, but also a challenge because traditional numerical parameterizations, developed for coarser models, need to be rethought as the resolution of the models becomes finer. A particular challenge is accounting properly for the processes that cause lateral mixing in the ocean, thought to be dominated by eddy stirring. The mixing acts on large-scale gradients on the scale of ocean basins, is driven by instability of the ocean currents, and finally cascades to turbulence at scales of centimetres, scales that will always be parameterized. This problem is important for predicting not just the heat and salt content of the ocean, but also biological tracers that are harder to include in data assimilation.

In this talk I outline efforts my group has participated in to observe both the processes that drive lateral mixing, and to quantify lateral turbulence using statistical approaches. Observationally, this is a difficult problem because the scales we measure are hard to cover quickly with a ship, and because the signatures of lateral stirring are often overwhelmed by internal wave signals. Our approach is to use in-situ ship observations using a fast-profiled CTD and the ship's ADCP, couple those observations with float and drifter data, and compare to numerical simulations to better understand the processes that drive lateral mixing, with an eye to parameterizing them in high-resolution models. I will also briefly discuss plans to augment these ship-based studies with glider observations on the west coast.

ALL ARE WELCOME!