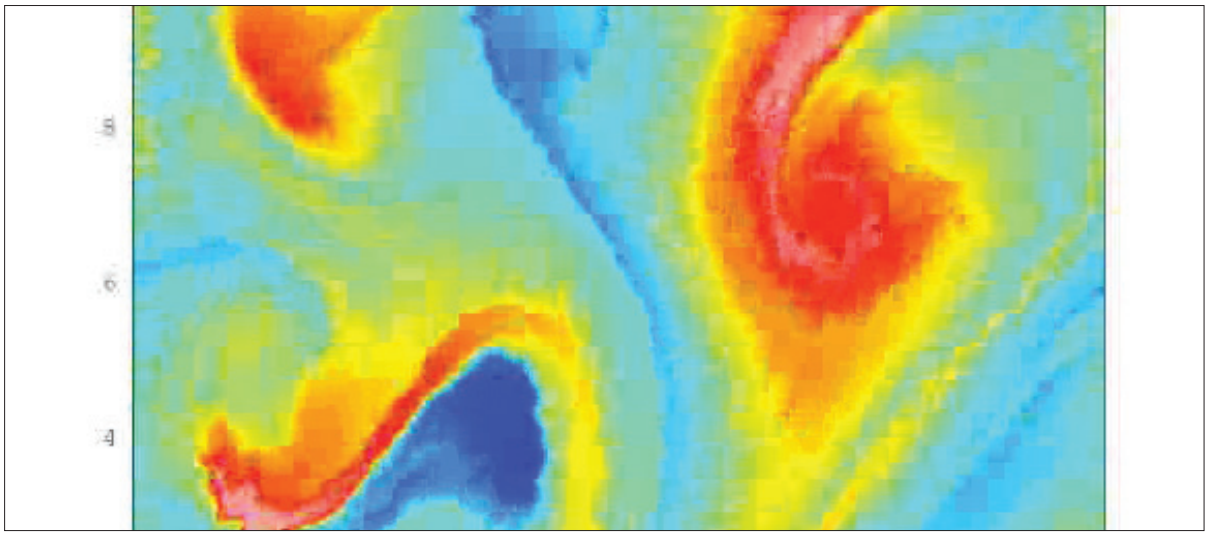
WIDG

Wright Laboratory

Tyler Lutz
Yale University

December 10, 2019 at 12:00 p.m. in WL-216

Nonlocal Mixing of a Stochastically Advected Passive Tracer



The effect of turbulent flows on the diffusion of a passive tracer is conventionally modeled in analogy to molecular diffusion. Tracer flux in the ocean, for instance, is often parameterized as an effective diffusivity multiplied by the local mean concentration gradient, where a rough measure of the effective diffusivity might be obtained empirically as a function of space and time. For cases in which the average eddy size is large relative to the typical length scales characterizing the mean concentration, however, it's more appropriate to think of the effective diffusivity as an integral kernel and the eddy flux as a convolution of that kernel over the mean concentration gradient throughout the whole domain. By sampling distant points in the domain, such mixing kernels capture the nonlocal contributions to tracer mixing associated with large eddies. In this work, we explicitly derive the mixing kernels that arise in a simple model of one-dimensional stochastic advection and deploy similar techniques to develop insight on a handful of more realistic one- and two-dimensional scenarios. In our 1D case, mixing kernels generically take the form of a sum of decaying exponentials, where the kernel width corresponds to the mean free path of tracer anomaly.

Host: Shilo Xia

Lunch is served in WL-216 starting at 11:45 a.m. RSVP requested.

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