MMM SEMINAR SERIES

Stochastic Data Assimilation Approaches for Satellite Imagery

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The era of earth-observing satellites has revolutionised our understanding of our planet and the dynamical processes that shape it. In many real-world geophysical systems, however, estimates of turbulent mixing and transport are limited by the resolution of available observations. In this talk, I will describe a suite of stochastic filtering strategies for estimating mixing in turbulent geophysical flows from "superresolved" satellite imagery obtained by combining coarse observations with an efficient stochastic parameterization for the unresolved scales.

The method enhances the effective resolution of satellite observations by exploiting the effect of spatial aliasing and generates an optimal estimate of small scales using standard Bayesian inference. The technique is tested in quasigeostrophic simulations driven by realistic climatological shear and stratification profiles. Two applications are considered: calculating poleward ocean eddy heat flux from satellite altimetry, and estimating the three-dimensional upper ocean velocity field from superresolved sea-surface temperature imagery. In each case, the superresolved satellite observations result in a considerable improvement in estimates of turbulent fluxes compared with the raw observations.

This seminar will be webcast live at:
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Refreshments 3:15 PM
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