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Characterizing the transport dynamics of ocean turbulence through a novel lagrangian float time series analysis technique

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Often times transport in geophysical systems such as the ocean are parameterized either by an effective diffusivity, if the source is thought to be turbulence, or by a simple advection, if the source is thought to be a flow. In reality, the transport can be more complicated, needing to be characterized by some form of a fractional transport model which can incorporate both long time dynamics as well as PDFs which are non-gaussian. In this work we will present an analysis of the transport dynamics of the ARGO floats. Both the surface dynamics and the deeper water dynamics will be presented as will differences between latitudes and basins. We will we will apply several tools imported from the theory of non-Markovian, non-local stochastic processes to the characterization of the transport dynamics, and will end with exponents which may be used for higher fidelity modeling of the transport processes.

Complex geophysical systems such as the ocean and the climate that it is part of, need many measures to properly characterize their state and dynamics. These are needed both to understand the physical processes in the system and to enable more realistic comparison with models and improvements to those models. The techniques described here are one more of these methods for characterizing the systems.