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Zooplankton intermittency and turbulence

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Planktonic organisms usually live in a turbulent world. Since marine turbulence is characterized by very high Reynolds numbers, it possesses very intermittent fluctuations which in turn affect marine life. We consider here such influence on zooplankton on 2 aspects.

First we consider zooplankton motion in the lab. Many copepods display swimming abilities. More and more species have been recently recorded using normal or high speed cameras, and many trajectories have been extracted from these movies and are now available for analysis. These trajectories can be complex, stochastic, with random switching from low velocity to high velocity events and even jumps. These
complex trajectories show that an adequate modeling is necessary to understand and characterize them. Here we review the results published in the literature on copepod trajectories. We discuss the random walk, Levy walk modeling and introduce also multifractal random walks. We discuss the way to discriminate between these different walks using experimental data. Stochastic simulations will be performed to
illustrate the different families.

Second, we consider zooplankton contact rates in the framework of intermittent turbulence. Intermittency may have influence on plankton contact rates. We consider the Particle Stokes number of copepods, in a intermediate dissipation range affected by intermittent fluctuations. We show that they may display preferential concentration effects, and we consider the influence on contact rates of this effect
in the intermediate dissipation range.