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Living below the Kolmogorov length scale. Or why phytoplankton cells care about small scale turbulence.

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Phytoplankton organisms are typically smaller than 200 μm. At this small scale, water turbulence has direct effects of potential ecophysiological importance on phytoplankton: it interacts with the transport of molecules in and out of the cells, it causes mechanical cell damage and morphological adaptations, or it affects contact rates (and hence coagulation and predation processes) between suspended plankters. In the case of motile cells, their trajectories in the water column are modulated by both the organism swimming behaviour and the water motion. We will briefly illustrate the available information on these ecophysiological aspects, mostly investigated in the laboratory.

Further, we will present some of the important and open questions regarding the implications of small-scale turbulence for the phytoplankton in its natural environment, as for instance, the dynamics of algal blooms, and the interactions with heterotrophic organisms within the planktonic food web. Answering those questions needs the collaboration between physicists, chemists and biologists.