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Investigating seasonal changes of the calanoid copepod *Temora longicornis* swimming behavior using statistical analyses

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Although they are considered as planktonic animals, all small scale copepods exhibit independent motion in the water column. Moreover, they possess mecano and chemioreceptors making them very good "nano-biodetectors". They are thus very sensitive to the chemical, physical and biological factors variations in a diluted, very heterogeneous and variable environment. At the individual scale, these various factors play a fundamental role in the contact probability of the various protagonists for important events such as reproduction, food research and predation. So, in an inhomogeneous environment, their ability to minimize the expenses of energy due to the movements is crucial for their survival.

The objective of this work is to characterize the individual behavioral answers to stress, of Eastern English Channel characteristic copepod, *Temora longicornis* (Müller, 1792). This ecosystem undergoes the proliferation of seaweed planktonic algae between April and May, *Phaeocystis globosa*, due to an eutrophication of the coastal ecosystem. Phytoplanktons produce polymeric substances and fibers which have the potential to modify the physical environment by increasing viscosity. Consequently variation in viscosity may directly affect predator–prey and sexual partner encounter rates motility and swimming speed of these microorganisms.

In order to determine the influence of this bloom on *Temora longicornis*, behavior

analyses were realized in winter and in spring. In laboratory, using infrared sensitive numerical camera, long films are directly recorded for adult males and females. From a total of 10 hours of video (about 900 000 frames), tracks are stored in an array object consisting of and x and y coordinates in successive video frames.

Sequences are then investigated by means of new statistical approaches using methods from the fields of information theory and statistical physics.

Using this approach, we characterize *T. longicornis* behavior and influence of external conditions on their various strategies of environment exploration. We consider for this several approach such as generalized entropy analysis, symbolic dynamics, fractal and multifractal approaches.