Geophysical Research Abstracts
Vol. 15, EGU2013-4739, 2013
EGU General Assembly 2013

Unravelling the concomitant role of zooplankton motion complexity and swimming speed in the localisation of food patches

Luciana Sabia (1,2), Marco Uttieri (2), Giacomo Zagami (1), and Enrico Zambianchi (2)

(1) Universiy of Messina, Department of Animal Biology and Marine Ecology, Salita Sperone 31 – 98166 Messina, Italy, (2) University of Naples "Parthenope", Department of Environmental Sciences, Centro Direzionale di Napoli - Isola C4, Naples, Italy (marco.uttieri@uniparthenope.it)

In aquatic ecosystems, phytoplankton cells are often aggregated in dense horizontal patches, representing a feeding hot-spot for zooplankters which concentrate their swimming and grazing activities there. The correct localisation of these patches is thus fundamental to appropriately identify food-rich areas. Outside these layers, swimming motion must trade-off between the search of the patch, the energetic costs associated with active movement and the predation risk. Through the implementation of an individual-based model (IBM) we investigated the concomitant effect of motion complexity (evaluated in terms of three-dimensional fractal dimension) and swimming speed in determining the effectiveness in finding a patch measured in terms of the First Passage Time (FPT), i.e. the time required for an animal to reach a target located at a given distance, and of the total travelled distance ΔTOT. The simulations account for the dependence of the FPT and ΔTOT on the relative distance between the starting point of the track and the patch, as well as for the domain size. Our simulations indicate that that less tortuous tracks are more efficient in finding a patch, representing a behavioural optimisation even when the organisms are moving in absence of driving environmental stimuli.