

**Diel Vertical Migration in Zooplankton: Looking for the Optimal Survival Strategy.**

Anastasia Nikishina, Andrew Morozov, Ludmila Artemieva

Diel vertical migration (DVM) of zooplankton is a well-known phenomenon in the World Ocean. The availability of food and the threat of predation are considered to be the main drivers of DVM. The assessment of simultaneous impact of these two stressors on zooplankton behavior is a complex task. We propose DVM model presenting zooplankton behavior as a result of top-down and bottom-up controls. The general approach to DVM modelling is based on the assumption that animals maximize a certain criterion (for example, expected reproductive value, venturous revenue, predator avoidance) when choosing their migration behavior. Thus the predicted DVM may be strongly affected by the choice of a particular optimization criterion. In our model the optimal strategy of DVM is obtained as an outcome of selection in the underlying equations of genotype/traits frequency dynamics. Zooplankton population in the studied model consists of 3 cohorts; each cohort has its own parameters of growing and mortality due to predation. The obtained optimal trajectories of DVM differ for different cohorts, and in the same time the migration behavior of one cohort has an influence on the optimal survival strategy of others. To verify comparability the model predictions and field observations we used our data on copepod diel vertical migration (mainly *Calanus* spp.) in different seasons in various natural conditions (the amount of food and predators).

**Keywords:** Zooplankton diel vertical migration, optimal strategy modelling, copepods

**Contact author:** Anastasia Nikishina, Shirshov Institute of Oceanology, RAS, Moscow, Russia, [Anastasia.nikishina@gmail.com](mailto:Anastasia.nikishina@gmail.com)