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Temporal variability of a dominant zooplankton species in the North Sea- A modeling study

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Zooplankton plays an important role in marine ecosystems and biogeochemical cycles. It is thus important to realistically describe zooplankton dynamics in ecosystem modeling studies. We have developed a life cycle model of a dominant North Sea zooplankton species (Acartia clausii). The model discriminates different life cycle stages, including subitaneous and dormant eggs. In addition, migration of adults is considered which depends on the physical environment. Several numerical experiments are conducted in order to test the sensitivity of zooplankton reproduction towards migration and the physical environment. The model results show a strong seasonal cycle in the migration and reproduction behavior of this dominant zooplankton species. The sensitivity experiments indicate that the ascending and descending behavior is crucial for the magnitude of egg production, particularly in the summer period. The physical conditions in spring, however, regulate the recruitment success. Finally, the results suggest that climate variability can lead to strong fluctuations in the zooplankton concentrations due to life cycle dynamics.