

Long-term (1988-2014) dynamics in the winter zooplankton size distribution and corresponding environmental drivers from a so far unconsidered data series taken in the southern North Sea

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Zooplankton forms the key linkage between primary production and upper trophic levels. The energy flow through zooplankton strongly depends on size as often relatively fixed predator-prey size relations can be observed. Understanding the factors that influence secondary production are therefore crucial for understanding marine ecosystem functioning, foodweb dynamics and energy flows. Here we present a timeseries describing zooplankton dynamics (size-spectra and species composition) spanning the period from 1988 to 2014, taken from the eastern English Channel during winter. In contrast to the regularly explored spring bloom situation the winter period is generally undersampled, although it forms an important spawning period for several North Sea fish species like herring, cod, plaice or sandeel. Especially these early life stages are often influenced by bottom-up effects like match-mismatch events, which do not only include abundance, but also the right “sized” food to be available at the right time. Thus the samples were analysed using the Zooscan, giving accurate size measurements to be related to environmental drivers like temperature and phytoplankton abundance. The given spatial heterogeneity of zooplankton distribution in the diverse region reveals that the size distribution also varies in time and space. Applying the environmental driver – zooplankton size relationship to ecosystem models may reveal new possibilities in estimating zooplankton production in the southern North Sea. Hence, future investigations will use these findings to initiate numerical models of energy flow from algae through zooplankton towards higher trophic levels like fish.

Keywords: Size-spectrum, English Channel, Zooscan, Long-term timeseries analysis, Bottom-up effects

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