



When co-existence means separation – environmental niche partitioning of ecologically similar zooplankton species in the warming Arctic

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One of the fundamental challenges in modern studies of zooplankton ecology at high latitudes is to understand the processes that promote co-existence of morphologically and ecologically related species with different origin and that maintain high overall zooplankton diversity in a warming Arctic. The increased inflow of warm Atlantic Water into the Arctic Ocean is making marine ecosystems increasingly resemble those of the North Atlantic. Consequently, a mixture of resident and advected species coexist over large areas of the European Arctic. In this study, pairs of taxonomically and ecologically related species (small-sized copepods, large calanoid copepods, amphipods, euphausiids, and chaetognaths), essential for the functioning of Arctic ecosystems were thoroughly studied with regard to their existence and degree of niche separation of studied pairs. Individual species within each pair are characterized by different centers of distribution (Arctic or boreal). The design of our study, covering three core hydrographical regions of the Polar Front on the West Spitsbergen Shelf, was set up to study the pairs of sibling species that either co-occur in the same water (Hornsund fjord, Spitsbergen) or thrive in the water mass they originate from (Arctic and Atlantic domains). Our results demonstrate that vertical abundance distributions in each pair of species differ when species occur separately (waters from each particulate species originate) or from the vertical distribution patterns when they co-exist. This supports the hypothesis that environmental niche separation exists in sibling species of marine zooplankton sharing the same environment and highlights its role as a mechanism reducing interspecific competition.