When co-existence means separation – ecological niche partitioning between sibling zooplankton species in warming Arctic (TWINS)

The increased inflow of warm Atlantic Water into the Arctic Ocean (**Atlantification**), taking place as a consequence of climate change, 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. 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 aim of this project is to compare habitat and dietary preferences between pairs of highly abundant and widely distributed sibling zooplankton species (small-sized copepods, large calanoid copepods, amphipods, euphausiids and chaetognaths), essential to the functioning of Arctic ecosystems. Individual species within each pair are characterized by different centers of occurrence (Arctic or boreal). The proposed study, covering three core hydrographical regions of the Polar Front in the Barents Sea and on the West Spitsbergen Shelf, provides an ideal location to study species that either co-occur in the same water body (mixed waters) or thrive in the water mass from which they originate (Arctic and Atlantic domains). Samples will be collected from board of IOPAN ship r/v “Oceania” as well as during Institute of Marine Research (Bergen, Norway) monitoring cruises, in the scope of scientific collaboration.

This is the first study to incorporate two aspects of zooplankton ecological niche partitioning – spatial and trophic, and to include so many key zooplankton species that will be investigated at such a large regional scale. Habitat preferences will be assessed using the fine-scale patterns in the vertical distributions of zooplankton species compared with the abiotic and biotic drivers. The degree of the trophic niche overlap between each pair of sibling species will be identified using stable isotope analysis, and in addition we will test how isotope niche characteristics change in situations where species do or do not coexist. Finally, we will compare entire zooplankton communities and explore whether species-rich communities exploit a greater range of different trophic resources than ‘pure’ Arctic communities.

The scale of Atlantification across the Eurasian Arctic Basin and its possible effect on biota associated with ocean currents are active areas of research. Previous attempts to characterize the response of zooplankton communities to the increasing influence of warm Atlantic waters have mostly focused on the study of taxonomic diversity and community structure, but the actual range of co-existence between Arctic and boreal species and their ‘adaptations’ to it (habitat and trophic competition vs. separation) has not yet been studied, even though this is an important element of the puzzle of future global warming scenarios.

The results of the study will be published in high quality international scientific journals and presented on highly ranked international conferences. They will also provide a basis for a PhD thesis.