

From nano- to macroplankton: complex examination of Isfjorden plankton size structure using optical and traditional methods

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Abstract: The expected restructuring of plankton communities in the Arctic towards an increasing contribution of small individuals simultaneously with decreasing individual plankton sizes are among the most pronounced and probably also negative effects of the observed climate warming. In this study we aimed to assess the entire plankton size structure obtained with both the innovative and conventional methods to examine possible effects of different environmental conditions on the reorganisation of plankton communities in the largest but scarcely described Spitsbergen fjord. Our investigations were conducted along 60 km transect crossing waters of strong environmental gradient from Billefjorden – the deepest, innermost part of Isfjorden, bounded with glacier branches, up to Adventfjorden – the central part, strongly influenced by Atlantic water inflow. The water samples for chlorophyll *a* concentrations, nano-, pico- and microplanktonic protists were taken by Niskin bottles ; meso- and macrozooplankton with plankton nets at 3 to 6 stations located along the transect of automatic optical measurements. Full particle-size (between 1 μm to 10 mm) measured for the first time by Laser In-Situ Scattering and Transmissometry (LISST-100x) and Laser Optical Particle Counter (LOPC) in 2015, demonstrated a good agreement between the overlapping size classes of LISST and LOPC. Moreover, application of combined innovative and traditional methods allowed for the integration of operational instruments data with those possessed with microscopy techniques. Different environmental conditions in our survey allowed us to improve the overall knowledge on the possible effects of various hydrographical scenarios on restructuring of plankton communities sizes in the high Arctic fjord.