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Plankton variability in the ICES area

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In the North Atlantic Ocean, zooplankton diversity, biogeography, and phenology are responsive to environmental variation associated with changes in natural climatic factors and anthropogenic forcings. Natural forcings include fluctuations in solar energy, volcanic eruptions, and decadal to millennial scale internal oscillatory variation. In contrast to natural oscillations, human activities (especially greenhouse gas emissions) often appear to drive the ocean system in a unidirectional manner. Environmental time-series and spatial monitoring data are essential to observe and understand these changes in marine zooplankton populations over seasonal, interannual, decadal, and longer time scales. During 2000-2009, substantial changes occurred in zooplankton species' distribution and abundance across the North Atlantic. The extent and direction of responses varied from site to site, and driving forces and climate change effects varied among regions. The length of time-series observations also affected the result: short time-series may give biased results. Since many zooplankton species occur across the North Atlantic Basin, determining the correlation length scales of population fluctuations, discriminating between local and remote forcings, and understanding the underlying mechanisms require a basin-scale approach. Importantly, most sites record only biomass or total abundances by functional groups, yet species data are necessary to recognize biogeographical shifts and pheneological changes.

Beginning in 2001, the ICES Working Group on Zooplankton Ecology (WGZE) has produced a summary report on zooplankton in the ICES area based on time-series data from national monitoring programs. The most recent report includes data updated to 2009 from 40 stations (9 in Northwest Atlantic, 16 in Northeast Atlantic, 9 in Baltic Sea, 6 in Mediterranean Sea), as well as the CPR time-series for North Atlantic standard areas. Complementing this effort is a global collection of zooplankton biomass and total copepod abundance time-series data compiled by the SCOR Working Group 125. These data and analyses are invaluable for documenting changes in zooplankton diversity, biogeography, and phenology; interpreting changes in relation to hydrographic parameters, and differentiating natural and anthropogenic drivers of the observed variation.

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