



## Interannual variability in abundance of North Sea jellyfish and links to the North Atlantic Oscillation

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**ABSTRACT:** Pronounced interannual variability in the abundance of medusae of the jellyfish species *Aurelia aurita*, *Cyanea lamarckii*, and *Cyanea capillata* (Phylum Cnidaria, Class Scyphozoa) in the North Sea was evident in data arising from the International Council for the Exploration of the Seas International 0-group Gadoid Surveys between 1971 and 1986. Possible climatic forcing of jellyfish abundance, via the North Atlantic Oscillation (NAO), was investigated with data on medusae from four areas of the North Sea (east of Scotland, north of Scotland, east of Shetland, and west of northern Denmark). There were significant inverse relationships between medusa abundance and the NAO Index (December-March) in two regions: west of northern Denmark (*A. aurita*  $r^2 = 0.70$ ,  $P = 0.003$ ,  $n = 10$ ; *C. lamarckii*  $r^2 = 0.74$ ,  $P = 0.002$ ,  $n = 10$ ) and east of Scotland (*A. aurita*  $r^2 = 0.53$ ,  $P = 0.008$ ,  $n = 12$ ). Fluctuations in the abundance of *A. aurita* and *C. lamarckii* medusae might be linked to hydroclimatic changes induced through atmospheric effects (as encapsulated in the NAO Index) on wind stress, temperature, and currents. These fundamental hydroclimatic changes alter the timing of spring phytoplankton blooms and zooplankton community composition. Predation by an abundance of medusae on zooplankton and ichthyoplankton could affect the North Sea ecosystem through top-down and bottom-up mechanisms. Because the NAO is presently in a high phase, climatic conditions could be serving to depress the abundance of medusae: a future reversal of the NAO might favor jellyfish and weaken the persistence or recovery of fisheries.

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