

Climate-driven shifts of species ranges or just a bias? A case study of newly recorded molluskan species from the Barents Sea

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In recent years, there have been frequent reports of invertebrate species newly recorded from particular areas of the Northeastern Atlantic, and it has often been suggested that these are the result of changes in species ranges due to recent warming. These suggestions make three assumptions: 1) that we have a good knowledge of the fauna of these areas; 2) that new records of "southern" species are more frequent than new records of "northern" species; 3) that climate change is the only factor affecting species range. Publications, suggested climate-driven changes for marine invertebrates, report findings of a single or few species, therefore these suggestions remain unproved until they had not been tested on an unbiased entire dataset. These risks creating a fictional connection between climate change and changing species distribution, as well as risking overlooking other non-climatic processes in ecosystems. I tested these assumptions on published records of more than 30 benthic molluskan species which have been found alive for the first time in the Russian part of the Barents Sea since 2006.

Majority of records were made along the coast of the Kola Peninsula and adjacent waters. Some of the discussed species are warm-water species and may have extended their ranges northward in response to climate change. However, our baseline knowledge of the molluskan fauna of this area before 2006 is limited by the frequent lack of molluskan specialists to study the available material, by the frequent lack of detailed publication and by changes in sampling and processing methods. Also, while the main purpose of both past and present investigations of the Barents Sea has been to describe the general state of the bottom communities and quantitative distribution of benthos, accuracy of the assessment of species composition had almost never been tested. During the special study of the Russian museum collections I also found that almost none of materials collected during the older investigations are persisting now. "Southern" species are in fact not significantly commoner than new records of "northern" species as it was revealed by a series of chi-square tests. Also natural, non-climatic reasons are more likely be suggested as drivers in the case of reliably-observed range shifts.

Similar suggestions of climate-driven changes in distribution have been put forward for other Barents Sea benthic invertebrates; as mollusks have probably been better studied than these other groups, these suggestions should be treated with caution.

Keywords: *Gastropoda*; Mollusca; climate change; arctic; historical collections