

A review of the physical and biological conditions in the Barents Sea

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The Barents Sea represents the most important shelf sea connection between the Arctic Ocean and the Nordic Seas, and the amount of Atlantic water entering the Arctic Ocean through the Barents Sea is believed to be comparable to what is entering through the Fram Strait. Atlantic water, with relatively high temperature, is also an important factor contributing to the high biological productivity of the Barents Sea.

Time series of temperature in standard sections in the Barents Sea reveal that the Barents Sea climate has both long and short-term regular periods. (Fig. 1). After a warm period in the 1930s and 1950s, the Barents Sea cooled in the 1960s and 1970s. Since then there has been an increasing trend in the temperature. The 1990s started out warm, followed by a short relatively cold period in 1996-1998. During the last years of the decade there was a gradual build-up towards higher temperatures, with very high anomalies during late autumn and early winter. In comparison with other decades during the last century, the 1990s were colder than both the 1930s and 1950s.

The temperature variability in the standard sections may be compared with the horizontal distribution of temperature and reveals that all sections give a fairly good representation of the climate fluctuations in the areas occupied by Atlantic water masses. The relation between the climate variability in the Barents Sea and the North Atlantic Oscillation (NAO) is important in some periods. Although the NAO has a significant effect on the Barents Sea, especially during extreme NAO events, local forcing seems to be dominating. The local sea level pressure distribution influences both the total inflow to the area and the distribution of the waters within the Barents Sea. Different phases of sea level pressure may cause an alternation between the amount of water carried in the two branches going respectively east and north, and thereby have a significant effect on the climate of the Barents Sea.

Time series of sea temperature are statistically analysed and compared. Comparing statistical analyses of the Kola section with analyses of Norwegian coastal stations shows that synchronies, anti-synchronies, and similar cyclic patterns in time series from different regions may be responses to large-scale atmospheric fluctuations, as represented by the NAO. The results indicate antisynchrony between northeast and northwest Atlantic sea temperature fluctuations. Furthermore, since the mid 1960s/early 1970s and into the mid 1990s, Barents Sea temperature has been closely linked to the NAO, while the connection during the preceding decades was a lot weaker. If heat transport in the ocean, e.g. northwards along the Norwegian coast, is an important cause of sea temperature variability, one would expect time series from downstream locations to lag those earlier in the current system. The advective signals found are, however, weak.

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Figure 1. Temperature in the Kola Section, with 5 and 30 years running means

