

Spatially-resolved influence of temperature and salinity on stock and recruitment variability of commercially important fishes in the North Sea.

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The North Sea is a complex shelf sea ecosystem, which has undergone strong changes over the last decades. Commercially important fishes represent the largest fish community in the North Sea and therefore play a key role in the functioning of the whole ecosystem. This ongoing study aims to improve our understanding of the variability of these fishes. We applied cross-correlation analyses to reveal the relations between North Sea hydrography (temperature and salinity) and fish stock parameters (recruitment, spawning stock biomass and pre-recruit survival) of 12 commercial fishes. A recently published optimally-interpolated North Sea hydrography enabled us to take spatial aspects of hydrography changes into account. The hydrography data covered the period from 1948 to 2013 and therefore allowed us to analyze the longest assessment time series so far. We found strong negative correlations between temperature and recruitment of cod, plaice and sole. The strongest correlations with plaice and sole were found in the German Bight, whereas the correlation in other spawning/nursery areas appeared to be insignificant. The strongest correlation with cod was found in the northwestern North Sea. Although some of these correlations are already known, the spatial resolution of hydrography all over the North Sea in the present study contributes to our understanding of the driving mechanisms. Furthermore, we found positive correlation between temperature and spawning-stock biomass of herring and positive correlation between salinity and sprat spawning stock biomass and recruitment. These results seem to be novel and we suggest here possible mechanisms underlying these correlations.

Keywords: North Sea, temperature, salinity, commercially important fishes, recruitment, stock biomass

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