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Will soles be more numerous and more connected in a warmer world?

Connectivity throughout the life cycle of fish remains a poorly charted question, especially during the early life stages. The case of the flatfish sole (Solea solea) is of particular interest because it is a heavily exploited species in the Northeast Atlantic Ocean whose interannual variability in recruitment is high. Effective fishery management requires the understanding of how spawning grounds and nurseries are connected, what processes influence larval retention/dispersal and how climate change will impact dispersal and connectivity patterns in the future. The dispersal pattern of sole larvae from the spawning grounds to the nurseries and larval survival/abundance are driven by hydrodynamic processes and (a)biotic environmental factors. A temperature increase could affect for instance the spawning period, the duration of the pelagic stage, the mortality of eggs and larvae, and the match-mismatch with prey fields. Modifications in the magnitude and direction of the wind regime might affect egg and larval retention and dispersal through changes in the hydrodynamics. Here we use a particle tracking model coupled to a 3D hydrodynamic model (LARVAE&CO) of the English Channel and the North Sea (between 48.5°N-4°W and 57°N-10°E) to investigate the impact of climate change on larval dispersal, connectivity pattern and recruitment at nurseries through a hypothetical increase in sea surface temperature and wind regime. The impact of five scenarios inspired by the 2040 scenario of the Intergovernmental Panel on Climate Change (IPCC) at the scale of the North Sea is discussed and compared with interannual variability over the period 2003-2011.