



Modelling transport and reproduction of the invasive comb jelly *Mnemiopsis leidyi* in the North Sea

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Mnemiopsis leidyi is an invasive comb jelly fish species that originates from the Gulf of Mexico and the US east coast. It has high bloom potential, and can survive in a wide variety of environmental conditions. It was first introduced in Europe through ballast water discharges in the Black Sea, where it was associated with the anchovy stock collapse in the 1990's. From there, it has spread through the Mediterranean Sea. Since the mid 2000's it has been observed in ports and estuaries along the English Channel, the North Sea and the Baltic Sea. In the North Sea, *M. leidyi* blooms occur in the Scheldt estuaries, the Wadden Sea, and in ports and canals. In winter, *M. Leidyi* has been observed at sea in the German Bight. A particle tracking model was modified to include a simple reproduction mechanism, using food fields from the coupled hydrodynamics-ecosystem model GETM-ERSEM. The model was used to study the potential spreading and bloom potential of *M. Leidyi* in the southern North Sea under present and increased temperature conditions. Under present conditions, the model suggested that *M. Leidyi* can survive in the North Sea, and can be transported over distances of several hundreds of km, enabling connectivity between estuarine populations. It could not, however, bloom at open sea because of temperature constraints. These constraints were lifted for increased temperature scenarios, suggesting increased bloom potential under climate change conditions.