

# Winter distribution of *Mnemiopsis leidyi* (Agassiz, 1865) in the southern North Sea and first record in French waters

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## INTRODUCTION

The native habitats of the invasive lobate ctenophore *Mnemiopsis leidyi* extend all along the western Atlantic coastal waters (Purcell *et al.* 2001). First records of *M. leidyi* in northern European waters came from Kiel Bight (western Baltic Sea) in 2006 (Javidpour *et al.* 2006). Shortly after, it was observed in the Skagerrak (Hansson 2006) and in the coastal waters of the North Sea (Faasse & Bayha 2006, Boersma *et al.* 2007). In September 2009, we recorded for the first time *M. leidyi* on the French coast of the North Sea during a regular zooplankton survey at Gravelines station (Figure 1). Maximum abundance was of 61 ind.m<sup>-3</sup>. The possible subsequent expansion of *M. leidyi* into the North Sea is a major concern since this region is one of the most productive fishery areas of the world. Indeed, less than 10 years after its introduction in the Black Sea in the early 80's, *M. leidyi* exhibited massive densities that coincided with the collapse of stocks of planktivorous fishes (sprat, anchovy, and horse-mackerel), probably caused by a combination of over-fishing, food competition from the zooplanktivorous ctenophore, and predation of *M. leidyi* on fish eggs and larvae (Bilio and Niermann 2004). In the present study the distribution of overwintering *M. leidyi* (January- February) was investigated in the North Sea from 2009 to 2011.

## MATERIAL & METHOD

Sampling effort extended from the eastern English Channel to latitudes up to 56°N. Ctenophora individuals were determined, counted and measured alive from samples collected with a **Methot Isaac Kid plankton net**, specialized for fish larvae collection (black conical net of 13 m long, opening diameter 2 m, mesh size 1.6 mm except last meter 500 µm). Temperature, salinity and chlorophyll a concentration were recorded continuously along the research vessel trajectory.

## RESULTS

Recurrent patches of *M. leidyi* (max. 308 ind. per 1000 m<sup>3</sup>) were observed off The Netherlands and the Danish coasts and were composed of large individuals (from 1 to 6 cm). Highest densities were observed in areas where temperature and salinity were lowest (figure 3). At stations where *M. leidyi* was present, temperature was comprised between 1.2 and 6.8°C, salinity between 27.2 and 35.5, and Chlorophyll a was < 0.2 µg.l<sup>-1</sup>.

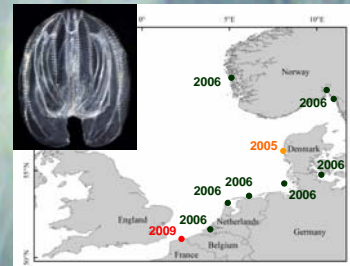
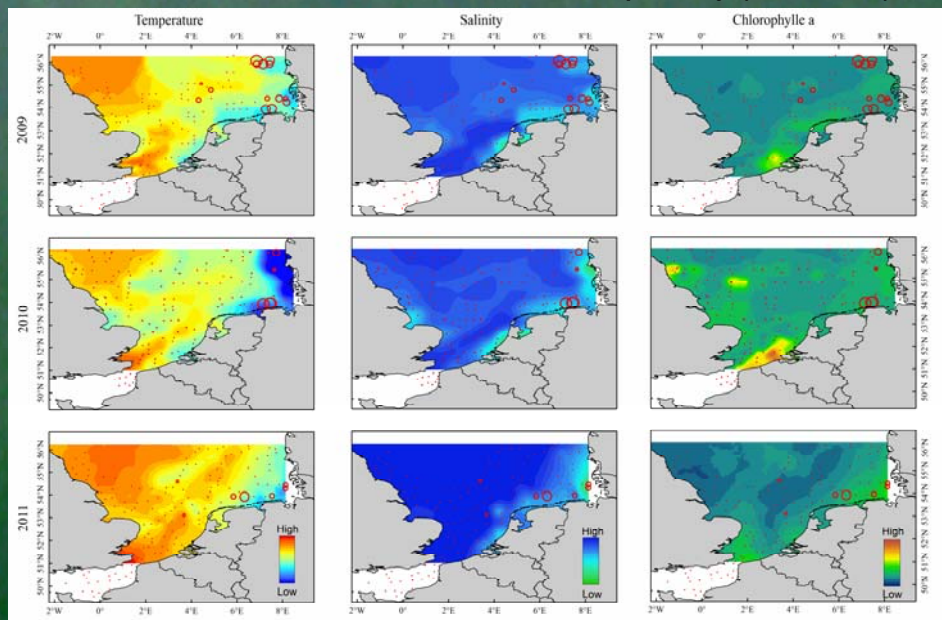
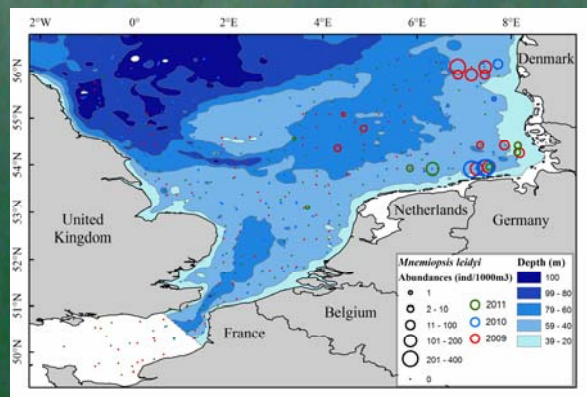


Figure 1: First observations of *Mnemiopsis leidyi* along the eastern coasts of the North Sea.



Figure 3: Temperature (°C), salinity and chlorophyll a (µg.l<sup>-1</sup>) during January-February 2009 to 2011 in the North Sea with distribution of *Mnemiopsis leidyi* (ind. 1000 m<sup>-3</sup>)

Figure 2: Distribution of *Mnemiopsis leidyi* (ind. 1000 m<sup>-3</sup>) overwintering in the North Sea from 2009 to 2011



## CONCLUSION

The present study demonstrated that *M. leidyi* is capable of surviving off shore in the North Sea during winter even at temperatures less than 2°C. The densities observed were lower than in the Baltic Sea (up to 90 ind. m<sup>-3</sup>, Javidpour *et al.* 2006). Nevertheless *M. leidyi* has already reached the French coast of the southern North Sea. Growth of *M. leidyi* population is often found to be food limited (Purcell *et al.*, 2001), but whether this is also the case for the overwintering species in the North sea remains to be studied. Future studies on its trophic interaction with native planktonic organisms of this region are strongly recommended to evaluate its possible ecological and economical impacts.

## REFERENCES

Bilio & Niermann 2004 Marine Ecology Progress Series 269: 173-183; Boersma *et al.* 2007 Helgoland Marine Research 61: 153-155; Faasse & Bayha 2006 Aquatic Invasions 1: 270-277; Javidpour *et al.* 2006 Aquatic Invasions 1: 299-302; Purcell *et al.* 2001 Hydrobiologia 451: 145-176

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