

Demographic modelling approach for assessment of environmental conditions which control the population of the invasive Ctenophore *Mnemiopsis leidyi* in the Mediterranean Seas.

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At the beginning of the 1980s predatory ctenophore *Mnemiopsis leidyi* (M.l.) invaded into the Black Sea, successfully established and gave huge blooms. As a result biodiversity of the representative of all levels of ecosystem greatly dropped as well as fishery stocks. In the following years, M.leidyi penetrated in all the seas of the Mediterranean basin with currents and with ballast water in the Caspian Sea. According to genetic analyses performed by Ghabooli et al. (2013) the distribution of genetic diversity and pattern of genetic differentiation determined the initial colonization of the Mediterranean, Azov, Caspian seas from the Black Sea. Ten years later, another ctenophore *Beroe ovata* (B.o.), a predator of M.l., spontaneously arrived in the Black Sea and the ecosystem started to recover its previous biodiversity (Shiganova et al., 2014). However, in recent years M.l. blooms are more and more observed in the other coastal areas of the Mediterranean basin. Therefore, the drivers (environmental conditions) of these blooms are still questioned and should be further studied in details.

The main objective is to understand the environmental conditions which favors blooms of the ctenophore *Mnemiopsis leidyi* and its dispersal in the Mediterranean basin, which is characterized by a strong anthropogenic impact and even in some areas the degradation of coastal ecosystems.

Modeling based on long-term field and experimental data of demographical and physiological parameters of M.l. help us to understand the conditions facilitated blooms in the Mediterranean basin based on the responses of underlying processes (growth and reproduction, predation) to environmental factors.

The demographic model (MBd) used for this purpose include the main developmental stages of both ctenophores, their duration in function of temperature and zooplankton concentration. It was considered that the timing of growth of both species M.l. and B.o. is crucial in their interaction. At first, demographic model (MBd) was validated for the Black Sea ecosystem basing on the unique database of long-term field data of ctenophores (including M.l. and B.o.), mesozooplankton, ichthyoplankton, bacteria in the Black Sea (1992-present). Then comparative analysis of the ecosystem conditions for the productive Black Sea and oligotrophic areas of the north-western Mediterranean Sea favorable for M.l. blooms have been performed using the developed modelling approach.

References :

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