



Advection of the jellyfish *Pelagia noctiluca* (Scyphozoa) studied by the Lagrangian tracking of water mass in the climatic circulation of the Adriatic Sea

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Massive occurrences of large scyphomedusae create a general concern for the ecology and economy of the impacted areas. Due to high abundances and predatory impact, medusae have the potential for altering the normal pelagic food-web structure. In addition, they represent a health hazard to humans and may have serious negative effects for fisheries and tourism. Over the last two centuries, massive outbreaks of scyphomedusa *Pelagia noctiluca* were recorded on average at 12 year intervals in certain parts of the Mediterranean Sea (Goy et al. 1989). Scyphomedusae have life history traits that favour their capability for high dispersal rates and *Pelagia* population peaks were sometimes accompanied by an expansion outside of its usual distribution range. During 1977-1986 and 2004-2006 a massive presence of *Pelagia noctiluca* was recorded in the northern Adriatic.

A 3D Lagrangian tracking method has been applied in a model of climatic circulation of the Adriatic Sea (Zavatarelli and Pinardi, 2003). By following the paths of water parcels for several months, parcels which have their origins in several positions (northern, middle and southern Adriatic) and where origins also exist in neighbouring locations, it has been demonstrated using this method that there are many confluences, divergences with bifurcations, upwellings and downwellings of the flow, with a vertical migration of particles for up to 700 m (southern Adriatic). Their path follows the western Adriatic current flowing southward along the Italian coastline. However, they may leave this coastal strip of confined flow if they are located at its outer edge and may be caught in one of the cyclonic vortices which are typical for the Adriatic Sea. This largely increases the time spent by a water parcel in the Adriatic. The tra-

jectory situation looks even more complicated if particles are released near the eastern coastline (they may flow northward or turn towards the central part of the basin). This method of Lagrangian tracking of water parcels has been applied in a study of the transport of scyphomedusa *Pelagia noctiluca*. The results from tracing transport pathways suggest that this jellyfish is inflowing into the Adriatic at the eastern side of the Otranto Strait and that there is a connection between the Adriatic and Mediterranean metapopulations. This connectivity is also supported by genetic studies (Ramšak et al. 2007). A simple model using a Leslie matrix was developed and used to simulate *Pelagia* population dynamics over time. The “sample *Pelagia* population” will be placed “in a water parcel” and tracked along its path and the outcome will be compared to observational data.

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Ramšak A., K. Stopar, A. Malej. 2007. Dispersal ecology of scyphomedusae *Pelagia noctiluca* and *Rhizostoma pulmo* in the European Southern Seas. International biogeography Society, Tenerife, Canary Islands, 9-13 January 2007.

Zavatarelli M and N. Pinardi 2003. The Adriatic Sea modelling system: a nested approach. *Ann. Geophys.*, 21, 345-364.