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Orientation: Ocean Observation and Global Change
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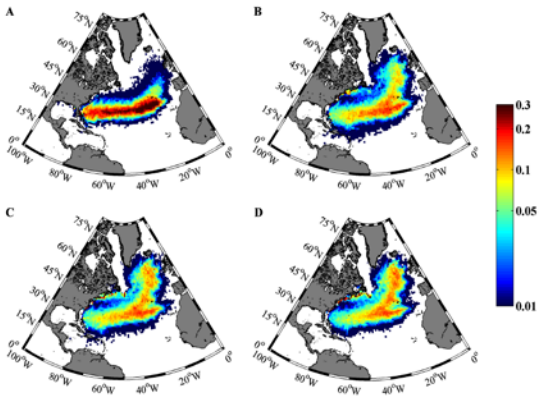
PHD PROGRAM IN MARINE SCIENCE, TECHNOLOGY AND MANAGEMENT



Final position of dispersed particles released in May over the period 1899-2010. (A) 5 m. (B) 35 m. (C) 70 m. (D) 100 m.

PhD project: **A particle tracking model to analyze transport in ocean**

Supervisor: Dr. Ramón Gómez Gesteira (University of Vigo)
Dr. Francisco Jose Santos González (CESAM; University of Aveiro)

Summary: The ocean currents transport all kind of materials like debris and organisms like nutrients or larvae from their origin to almost anywhere in the planet. The aim of this thesis is to contribute to the knowledge of the drift of particles into different ocean currents using lagrangian simulations. Lagrangian models are a useful tool to analyze pathways in the ocean by using a set of virtual particles, which are transported by the ocean currents. The changes in the probability of larvae crossing the North Atlantic Ocean over the period 1899-2010 was analyzed in the first study case using lagrangian trajectories of passive tracers. Virtual particles were released in the Strait of Florida where the main driving forcing is the Gulf Stream. In the second study case, the minimum migration duration of the European eel was analyzed in order to obtain similar results than those from the microstructure of eel otoliths, which are around 7-9 months. The lagrangian simulations were tested under different conditions like spatial and time resolution, depth, release area and also initial distribution. The continuous displacement of water masses due to ocean currents contributes to larval dispersion allowing connectivity among populations from different geographic areas. In the third study case, the connectivity among five populations of spiny lobster *Panulirus penicillatus* in the Indian Ocean was analyzed using numerical simulations of passive tracers over the period 1858-2008. Biological parameters of the spiny lobster as release depth and areas, larval duration and spawning season were selected and used in the lagrangian model. Finally, the sea surface temperature pattern in the Texas-Louisiana shelf as well as the influence of the plume formed by the Mississippi-Atchafalaya (MA) river system on it were investigated. The lagrangian model was one of the methods applied in this study case to analyze the current in the area under scope. Passive particles were released at each river mouth over the period 1993-2015.