Transport pathways of decapod larvae in the Canary-African Coastal Transition Zone: modelling and field observations.

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Abstract

Planktonic larvae constitute a vital component of oceanic food webs and represent the early life-history stages of ecologically and economically valued species. Thus, understanding biological and physical mechanisms involved with larval transport is of substantial interest to the fields of ecology, conservation and fishery management.

This study represents an attempt to elucidate the transport pathways of decapod larvae within the C-ACTZ, where larval assemblages are poorly known. The waters downstream of the Canary Island archipelago displayed intense mesoscale activity during the FAX99 cruise. SST images revealed the presence of 14 cyclonic and anticyclonic eddies as well as four upwelling filaments. Our results illustrate a close relationship between these mesoscale oceanographic structures and the distribution of decapod larvae using both field observations and transport modelling. Analysis of plankton samples showed that the C-ACTZ is an area where both Canary and African larvae may be present at the same time. On the other hand, predictions of larval transport are obtained from the Ichthyop Lagrangian transport model, which is forced by a high-resolution hydrodynamic model (ROMS) that reproduces the regional circulation. The simulations support the field observations and the key findings are: (1) Virtual larvae released in the offshore boundary of the upwelling front were advected westward offshore by filaments, reaching all the islands within 28 days; (2) Significant amount of simulated larvae are transported back to the African coast due to eddy circulation; (3) Most of the virtual larvae released from Gran Canaria and Fuerteventura are rapidly transported to the west/southwest by the Canary Current arriving the other islands, (4) while others are transported towards the African coast or (5) northward connecting with the Selvagen archipelago.

Our observations of larval transport introduce new insights for the general understanding of the metapopulation connectivity between the Canary Islands and the African coast.

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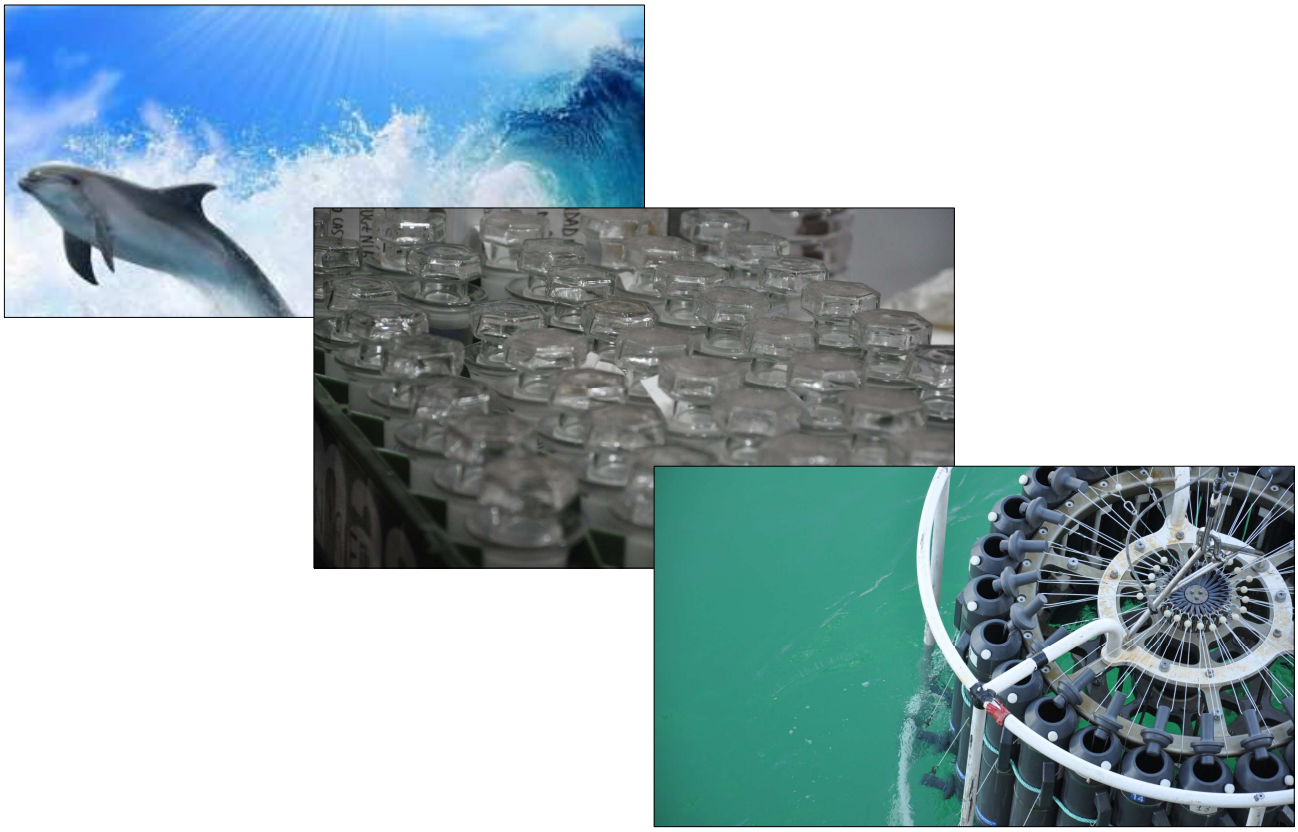

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