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ScienceDirect
Progress in Oceanography 74 (2007) 95–97
Progress in Oceanography
www.elsevier.com/locate/pocean

Editorial

Ecological functioning of the Iberian seas: A synthesis of GLOBEC research in Spain and Portugal

The Global Ocean Ecosystem Dynamics programme (GLOBEC) was approved in 1995 as a core project of the International Geosphere-Biosphere Programme (IGBP), co-sponsored by the Scientific Committee on Oceanic Research (SCOR) and the Intergovernmental Oceanographic Commission of UNESCO (IOC). Since its creation GLOBEC has been the most significant international initiative investigating the impacts of climate variability and change on the structure and dynamics of the world's marine ecosystems. Its research focus is broad, built on the crucial interactions between zooplankton and fish, in the context of external forcing mechanisms of climate (bottom up) and exploitation (top down) on the marine ecosystem. Its goal is "to advance our understanding of the structure and functioning of the global ocean ecosystem, its major subsystems, and its response to physical forcing so that a capability can be developed to forecast the responses of the marine ecosystem to global change" (GLOBEC, 1997, 1999). GLOBEC contributes to the scientific basis for the application of the ecosystem approach to the management of marine resources, by structuring multi-scaled science field programmes characterised by a holistic ecosystem research agenda that pays particular attention to the linkages between elements of the marine food web (including humans). These field programmes include national, multinational and regional activities, which are listed and described in Ashby (2004).

GLOBEC has been particularly strong in the development of regional activities. These include the ICES-GLOBEC Cod and Climate programme (CCC), the PICES-GLOBEC Climate Change and Carrying Capacity in the North Pacific programme (CCCC), the Small Pelagic fish And Climate Change programme (SPACC) and the Southern Ocean GLOBEC programme (SO). In recent years, two more activities have been added to the family, the Climate Impacts on Oceanic Top Predators (CLIOTOP) and the Ecosystem Studies of Sub-Arctic Seas (ESSAS) programmes. In addition, several countries have developed GLOBEC national and multinational activities through their national funding agencies, providing essential field work and collecting new data (for details see (Ashby, 2004) or www.globec.org). This complex structure provides a unique infrastructure linking hundreds of scientists in pursuit of a focused and internationally-agreed upon research objective, which will culminate with the completion of the international GLOBEC programme at the end of 2009.

The scientific activities in GLOBEC Spain have been funded by national, regional or European agencies through individual projects, over the life of the programme. A 1st GLOBEC Spain symposium was held in 2001 in el Puerto de Santa María (Cádiz, Spain), leading to the formation of a Spanish GLOBEC committee and the listing and affiliation of individual projects to GLOBEC international (Ashby, 2004). The information in this volume is derived directly from these projects, coordinated through some of the members of the Spain GLOBEC committee who participated as editors. Following the recent GLOBEC-IMBER Spain symposium (Valencia, March 2007) the inventory of projects will be revised and updated, forming the core of the last phase of GLOBEC Spain.

In Portugal, GLOBEC activities are coordinated under the National Committee for IGBP, created in 1998 and now in the process of becoming the National Committee for Global Change to include the other global change research programmes. As in GLOBEC Spain, Portuguese GLOBEC activities were not

0079-6611/$ - see front matter
doi:10.1016/j.pocean.2007.04.002

funded by a single coordinated source, and by-passed the fragmentation inherent to the short term and individual competition funding modes by affiliating the projects SURVIVAL (''Assessing the impact of hydrodynamical forcing on the survival of small pelagic fish early life stages of western Iberia'') and PO-SPACC (''Portuguese small pelagic fishes and climate change program: a comparative retrospective analysis'') to GLOBEC International. These activities combined retrospective analysis and process studies around the European sardine (*Sardina pilchardus*), including historical data on fisheries statistics and wind time series as a proxy for upwelling conditions, and with process studies focusing mainly on larval transport and survival that included a strong physical oceanographic component. A special section on GLOBEC Portugal appeared in the GLOBEC international Newsletter 12.1 (April 2006), and its coordinator is a co-editor of this volume.

In 2005, GLOBEC initiated its integration and synthesis phase, with activities at national, regional and international levels. This volume aims to integrate knowledge acquired in GLOBEC programmes in Spain and Portugal, conducted through the geographically-connected, yet uniquely distinct marine ecosystems of the Iberian Peninsula. These ecosystems include the Cantabric Sea and Gulf of Biscay in the north, the upwelling area in the west, which extends towards the Canary Islands and the NW Africa upwelling system, the oligotrophic Mediterranean waters in the east and the dynamic transition between Atlantic and Mediterranean waters around the Gibraltar Strait in the south. The structure of the volume reflects this geographic framework, with a collection of papers describing the ecological functioning of these subsystems and their responses to their physical drivers. Some papers focus on combined physical forcing and ecosystem responses in specific sub-systems (e.g. García Lafuente and Ruiz, Macías et al., Mercado et al.), while others are pairs of papers, one focused on the physical drivers and another on the biological responses, such as the contributions from the western upwelling coasts (Relvas et al., Santos et al. and Queiroga et al.). The paper by Bode et al. takes a methodological focus by investigating the complete pelagic food web, while others focus on parts of the system, such as the zooplankton (Alcaraz et al., Saiz et al., Hernández León et al.) or small pelagic fish (Bernal et al., Sabatés et al., Palomera et al., Irigoien et al.). Two contributions focused on long time series of zooplankton in the Atlantic (Valdés et al.) and Mediterranean waters (Fernández Puelles et al.). Overall, the collection, which encouraged the development of integrative and synthesis visions, constitutes a significant contribution to the goals of GLOBEC international.

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Available online 19 April 2007