HARMONIZATION OF SAMPLING METHODS AND TREATMENT OF ZOOPLANKTON TIME SERIES

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Abstract

Zooplankton is considered as indicator of the Global Change impact and may be used to forecast the combined effects of the physical and biological parameters operating at the sea basin scale. A concerted approach is necessary to obtain coherent data from biogeographical studies and retrospective analyses of historical time series. In order to build the ability to determine the composition of past and present assemblages of zooplankton in different Mediterranean geographic locations we propose here to harmonize the sampling, faunistical classification, statistical treatment and data archiving.

Keywords : Zooplankton, Sampling Methods, Time Series, Biometrics, Biodiversity.

Introduction

Climate Change has been a major concern in the last decade, not only for the scientific community but also for the general public. One of the major issues is to be able to propose scenarios of changes and foresee the variations that ecosystems will experience in the future. Global climate change is expected to impact the biodiversity, the structure and the functioning of plankton ecosystems [1]. In fact, zooplankton is known to be a good indicator of climate change because most of the species are not being commercially exploited, and the long-term changes observed in their stocks can, therefore, be attributed to changes in environmental conditions. As organisms living in suspension in the water column, they are good indicators of features and dynamics of water masses. In addition, they have a short life span that helps to relate population size to environmental conditions. And finally, plankton, with their non-linear responses to environmental changes, can amplify subtle environmental perturbations that otherwise would not be perceived. It is therefore necessary to study changes of past and present assemblages of zooplankton at interannual and longer time scales [3]). Because of the easy and low cost sampling, long term zooplankton time series are available in a number of locations.

In order to simplify the comparison of zooplankton time series we are proposing here to harmonize the collection methods, facilitate the transfer of samples to secure electronic archives, and share protocols for data summarisation and statistical analysis.

Since zooplankton is considered as indicator of regime shifts and its community composition impacts the fishery and the carbon cycle, a concerted approach is necessary to determine the variability of populations in time and space and the correlation with climate and fishery [2]. In order to intercompare the different series both quantitatively (biovolume, derived weight, community size spectra) and qualitatively (community structure, species assemblages, species ratio, indicator species) the different steps from sample collection, treatment and storing, to quantification, classification and data treatment in the different geographic locations should be coherent.

Methods

The proposed approach is based on the net sampling, sample digitization by the ZOOSCAN [4], the use of the free ZooProcess software for image treatment (www.zooscan.com) and the use of the free TANAGRA software (www.obs-vlfr.fr/LOV/ZooPart/ZooScan/article.php3?id_article=55) for numerical analyses. The proposed methodology allows a standardised non destructive treatment of samples including enumeration, morphometry and faunistical classification of samples for biogeographical or historical time series analyses.

Expected results

Using the proposed approach we are expecting to better define the changes in the range and spatial distribution of species, shifts in the location of biogeographical boundaries and provinces, change in the phenology of species (e.g. earlier reproductive season), modification in dominance (e.g. a key species can be replaced by another one), change in diversity, and also change in the structure and dynamics of ecosystem with possible regime shifts (fig. 1).

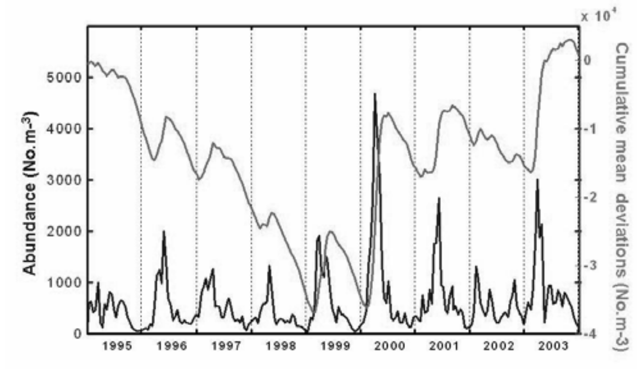

Fig. 1. Nine years time series of copepods (in blue) abundance concentration and (in red) cumulative deviation from the mean at Point B (Villefranche sur Mer, France) obtained using the Zooscan.

References

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