BIGORNO Project

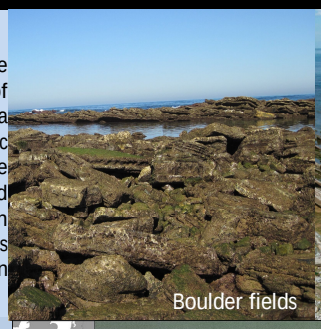
Intertidal biodiversity in the south of Bay of Biscay new research tools in a context of implementation of the Marine Strategy Framework Directive (MSFD)

MN. de Casamajor [1] L. Huguenin [1,2], J. Marticorena [1], Y. Lalanne [2], N. Bru [3], B. Liquet [3], M. Lissardy [1], F. D'Amico [3], I. Castege I.[4], E. Milon [4]

[1] IFREMER - Laboratoire Ressources Halieutiques d'Aquitaine - 1 allée du parc Montaury (FED 4155 MIRA), 64600 Anglet France,
[2] UNIVERSITÉ DE PAU & PAYS ADOUR, UFR Sciences et Techniques de la Côte Basque (FED 4155 MIRA), 64600 Anglet, France,
[3] UNIVERSITÉ DE PAU & PAYS ADOUR, Laboratoire de Mathématiques et de leurs Applications de Pau UMR CNRS 5142 (FED 4155 MIRA), 64600 Anglet, France,
[4] CENTRE DE LA MER de Biarritz, Plateau de l'Atalaye, 64200 Biarritz

Context

The aim of the BIGORNO project is to implement new tools to assess the rocky intertidal biocenoses in the southern marine subregion of the Bay of Biscay by integrating fauna communities assessment in front of habitats. Algal communities are already monitored in WFD (Water Directive Framework). The rocky Basque coast is a good experimental sampling site in an enclave locality of the extreme south of the Bay of Biscay with specific environment conditions (swell, rainy climate and low tide conditions) and meridional biodiversity. The acquisition of knowledge is essential for comprehension of biological structure and monitoring fauna should be relevant in the MSFD context of functionality approach. A spatially stratified random sampling plan on boulder fields and flat benches was applied in 2015 and 2016, both on upper and lower mediolittoral zones of the rocky Basque coast. Three stations were defined according to the presence of habitats, but also in relation to the WFD reference stations : Guéthary, Flots bleus (Saint-Jean-de-Luz) and Socoa (Fig.1).



Objectives

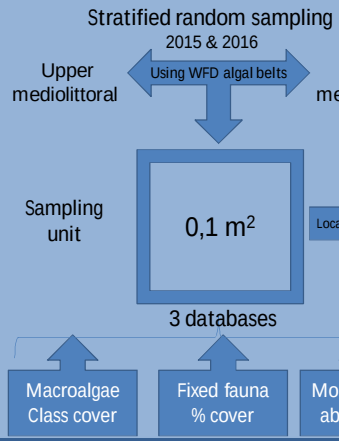
The aim of this project is to reply to the research questions essential to improve the sampling strategy:

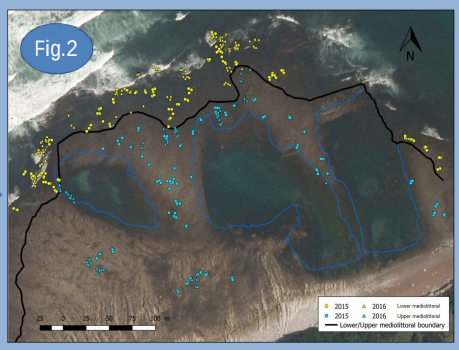
- Does spatial distribution of fauna depend on algal belts on the French Basque coast ?
- Considering the microhabitats (upper and lower mediolittoral zones) what are the variabilities associated to fauna distribution?
- What are the species that can be considered as indicators of microhabitats?

► Improvement of information available on biodiversity for those habitats and sampling procedure for long term monitoring.

► To achieve these objectives a multidisciplinary approach is needed between biologists, statisticians....to collect information available for integration of fauna in the protocols implemented within the framework of the MSFD.

Sampling strategy (exemple of « Guéthary » and boulder fields habitat)





Guethary rocky shore showing stratified sampling plan applied on boulder fields

Data analysis

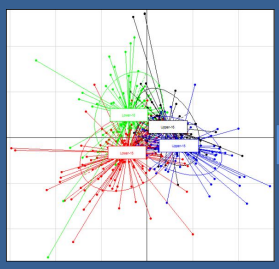
1- Spatial distribution of fauna in front of algal belts:
PLS-DA and Sparse PLS-DA on fauna matrix

2- Spatial characterization and temporal distribution of benthic communities:
Principal Component Analysis (PCA) on factor axes
Multiple Correspondence Analysis (MCA) on flora
COrrespondence Analysis (COA) on mobile fauna
PCA for mobile fauna

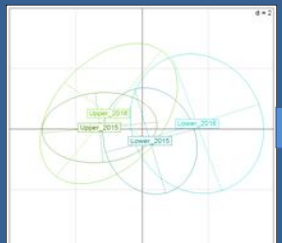
3- Definition of indicator species of this habitat:
Package "indicspecies", decision tree and Sparse PLS-DA

All analyses were performed on R ® software

Some preliminary results and discussion (fauna)



PLS-DA



PCA

Fauna distribution is dependent on algal belt on Basque coast

Spatial distribution of benthic communities is dependent on microhabitat in 2015 and 2016

Results are the same for the sampling station « flots bleus »

Among 127 taxa/combinaison

Indicators taxa for lower mediolittoral
Porcellana platycheles Xantho spp Lepadogaster lepadogaster Paguridae Ophioderma longicauda Hydrozoa Spirorbinae Spirobranchus sp

Indicators taxa for upper mediolittoral
Eriphia verrucosa Patella spp Phorcus lineatus Pachygrapsus marmoratus Chtamalus spp Mytilus spp

The two statistical methods used to identify the characteristics species give consistent results

Have to be improved by ecological approach

In a context of implementation of the MSFD, these various analysis improve our knowledge on biocenoses of the south of Bay of Biscay.

At the interface between land and sea, intertidal biocenoses are particularly vulnerable to global change linked to microhabitat distribution in front of rise of sea level

Information on spatial distribution of benthic communities provide useful information to implement descriptor of the MSFD as sea floor integrity, non-indigenous species, eutrophication and biodiversity.

These results allow us to take into account biogeographic specificities to harmonize protocol metrics at the scale of the sub-area Bay of Biscay.

Funded by :