### Introduction

Biological performances (growth & reproduction) of intertidal bivalves mainly rely on environmental factors such as water temperature and food sources. However, both nutrients and quality of bivalves food sources are complex due to the variability of growth performances of oysters among culture sites at a large temporal and spatial scale. It is necessary in this context, insights for new operational tools to characterize trophic features of coastal ecosystems are needed.

The aim of the present study is to couple natural isotopic tracers (carbon & nitrogen) and Dynamic Energy Budget theory (Kooijman, 2000) to describe quantitatively and mechanistically bienergetic processes and isotope dynamics in oyster tissues under varying environmental conditions (temperature, food sources).

### Methods

1. **Isotopes: food sources and organism**

Potential food sources available for *Crassostrea gigas* and bivalves in general have important spatial and time variability (Fig.1) and it is, thus, difficult to characterize and quantify their contribution to the bivalves diet. Figure 1 (A) show that each source has its own isotopic signature which can slightly vary in time variability (Fig.1) and it is, thus, difficult to characterize and quantify their contribution to the bivalves diet but with slight enrichment of heavier isotopes, since lighter ones are preferentially used in metabolism. This enrichment classically called, trophic-step fractionation, can vary with temperature, availability (%) of these sources over sites and year seems to be much more variable, as it has been shown by the statistical model proposed by Marin Leal & al (2008).

2. **Conceptual aspect**

A) In the context of Dynamic Energy Budget theory, reserves (E) and structural (V) mass, can be considered as “generalised compound”, rich mixture of compounds, molecules,… that do not change in chemical composition. This concept rests fully on the strong homeostasis assumption. It is then possible to define a typical “reserve compound” and “structural compound” in the basis of C-mole notation such as CNV and CNH respectively. The isotope dynamics in oyster tissues will be based on the mass balance of CN13 and CN18 (Kappa 1-Kappa 2).

B) DEB theory assumes a set of three transformations in organism in which fractionation can occur:

- Flux of matter from reserves to structure will be “split in two”: one part will be used for building blocks construction, (anabolism) the other one will be used to “fix” building blocks
- Maintenance processes (turn over of structure) use a part of “structure blocks” and reserves to regenerate structure.

3. **Experimental aspect**

An experiment in controlled mesocosms will be done in the Experimental Station of Argenton (France, Brittany). This experimental approach will consist of testing different factors & scenario as, constant food conditions (composition and quantity, e.g algae paste), sudden diet changes (composition, quality and quantity), starvation, constant and variable temperature, in order to validate the model assumptions.

### References