

A French environmental specimen bank of marine bivalves : archive of trace chemical contamination.

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Since 1979, the French Marine Monitoring network (RNO) has been regularly collecting blue mussels and oysters at some 100 characterized sites along the French shore. The bivalves are used as quantitative bio-indicators of coastal chemical contamination. Since 1981, the collected samples have been stabilized and archived in a sample bank. The sample collection is thus a continuously lengthening record of coastal contamination.

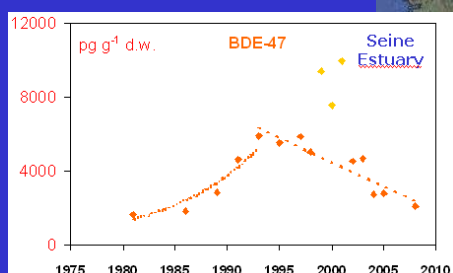
Sample preparation

Bivalves are collected by technicians from the Ifremer network of coastal laboratories. In order to eliminate their faeces and pseudofaeces, molluscs are depurated for 24 hours in decanted sea water from the sampling area. They are then sized, shucked from their shell and frozen in pools of 20-50 animals. At the Dépt of Biogeochemistry and Ecotoxicology, the samples are thawed, grinded, homogenized, and freeze-dried under contamination-controlled conditions.

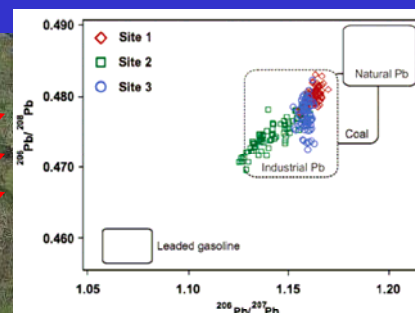
An aliquot of the powder obtained is devoted to trace chemical contaminant analysis, and the remainder is archived in 100 ml vials and permanently stored in a dark and cool dry place, for future use.

Three examples of studies conducted using the sample bank are shown below :

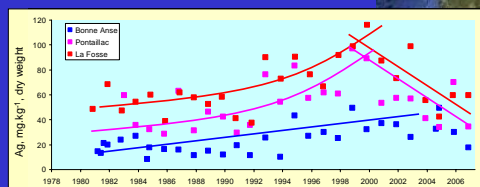
- 1- Analyses of emerging contaminants like Poly Brominated Diphenyl Ether (PBDE's) document the rise then fall of their concentrations at the mouth of the Seine Estuary (impact of regulations).
- 2- Analyses of silver at the mouth of the Gironde Estuary that can now be analyzed because of improved analytical techniques.
- 3- Analyses of geochemical tracers of contamination sources (Pb isotopes).



1. Emergence and evolution of PBDE contamination of mussels from the Seine Estuary between 1981 et 2008. Analyses were conducted in 2006 and 2008.



3. $^{206}\text{Pb}/^{208}\text{Pb}$ ratios as a function of the $^{206}\text{Pb}/^{207}\text{Pb}$ ratios for mussels from 3 sites along with rectangular zones identifying the Pb isotopic signatures in French leaded gasoline, industrial emissions, coal combustion, and natural sources.



2. Evolution of silver concentrations in oysters from 3 stations of the Gironde Estuary between 1981 and 2006. Analyses were conducted in 2006.

Sample location map and environmental results (ex.: Mercury distribution) available at: <http://wwz.ifremer.fr/var/envlit/storage/documents/parammaps/contaminants-chimiques/index.html>
Time series available at : http://wwz.ifremer.fr/envlit/resultats/surval_1
Then follow the menu « Résultats par paramètre »

This ESB archives about 9000 samples and grows by nearly 100 / year. Since 1981 the sampling frequencies on each monitoring station have been : 4/year (1981-2002), 2/year (2003-2007), 1/year (since 2008).
Sample availability : Contact Didier Claisse.

References :

- 1- Modified after Johansson *et al.* 2006. Polybrominated diphenyl ethers (PBDEs) in mussels from selected French coastal sites : 1981-2003. *Chemosphere* 64, 296-305.
- 2- Chiffolleau 2009. Eel-scope project. French Research agency (ANR).
- 3- Couture *et al.* 2010. Seasonal and decadal variations in lead sources to eastern north Atlantic mussels. *Environ. Sci. Technol.* 2010, 44, 1211-1216.