

COMPARED TEMPORAL TRENDS OF SELECTED PERSISTENT ORGANIC CONTAMINANTS (PCDD/Fs, PCBs, PBDEs) IN MARINE MUSSELS FROM THE FRENCH COASTS

Munsch C., Guiot N., Héas-Moisan K., Johansson I., Tronczyński J.
 Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER)
 Laboratory of Biogeochemistry of Organic Contaminants
 Rue de l'Île d'Yeu, BP 21105, 44311 Nantes Cedex 03, France
 e-mail: cmunsch@ifremer.fr

OBJECTIVES

- ▶ The temporal trends of the contamination levels of Persistent Organic Pollutants (POPs) have been studied in marine mussels (*Mytilus edulis* and *Mytilus galloprovincialis*) at selected sites along the French coastlines.
- ▶ Archived mussel samples collected within the French Monitoring Network (RNO –Réseau National d'Observation) from year 1981 to year 2005 were analysed for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/Fs), polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs).
- ▶ The temporal variations during the past 24 years and the regional differences in the contamination of marine mussels were determined. These new results extend a previous study on levels and temporal trends of PBDEs and PCBs¹.

SAMPLING and ANALYSIS

- ▶ The analysed samples were collected at selected French coastal sites located alongside the English Channel, the Atlantic Ocean and the Mediterranean Sea. The sampling stations are shown in **figure 1**.
- ▶ To avoid possible differences of contaminant concentrations due to seasonal variations related to the physiological state of the mussel, all samples were collected during the same period each year (from late November to early December) and using the same methodology.
- ▶ The analytical methods are described in detail elsewhere^{1,2,3}. QA/QC procedures were included within every batch of samples. The laboratory participates in the QUASIMEME intercomparison exercises.

RESULTS and DISCUSSION

PRESENT CONTAMINATION LEVELS (Fig.2 to Fig.4)

- ▶ The present contamination levels of PCDD/Fs, PCBs and PBDEs are shown in **figures 2 to 4**. The local differences in contamination levels are related to urban inputs and industrial activities.
- ▶ The highest levels for all contaminants are recorded at Villerville in the English Channel and at Toulon on the Mediterranean coast.
- ▶ Except for the higher concentrations found at these sites, the contamination levels of POPs determined in mussels from the French coasts are in the range of levels reported for other European countries^{1,2}.

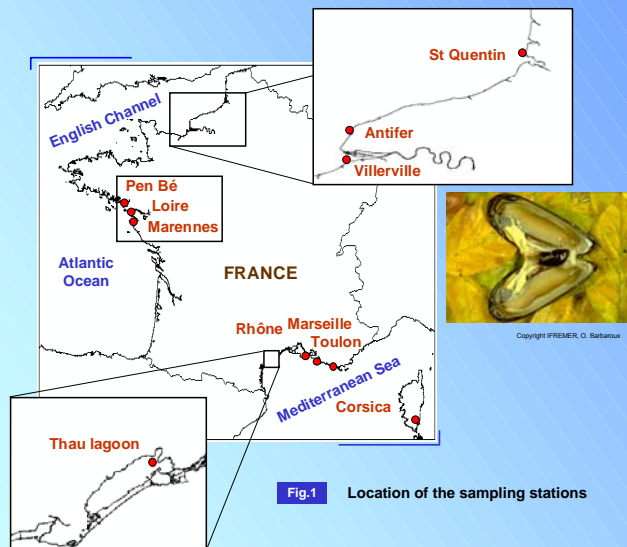
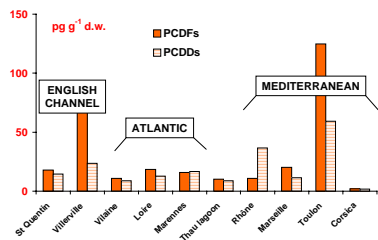


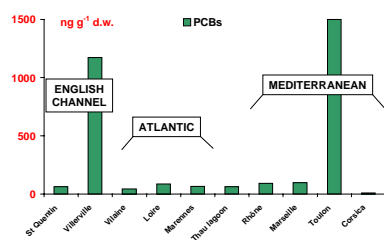
Fig.1 Location of the sampling stations

Concentrations (pg.g⁻¹ dry weight) of PCDDs and PCDFs⁽ⁱ⁾ in mussel samples collected in November 2004 Fig.2



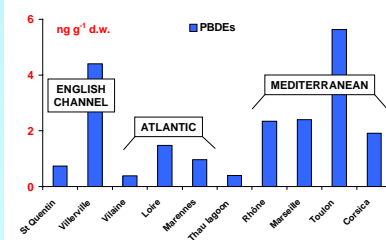
(i) : Sum of 10 PCDF congeners and 7 PCDD congeners
 Congeners below the detection limit counted as equal to zero

Concentrations (ng.g⁻¹ dry weight) of PCBs⁽ⁱⁱ⁾ in mussel samples collected in November 2004 Fig.3



(ii) : Sum of the 7 ICES congeners (IUPAC n°28, 52, 101, 118, 153, 138, 180)

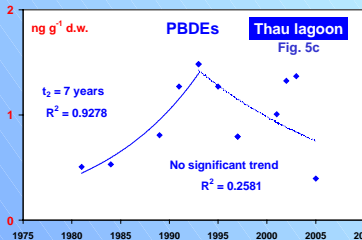
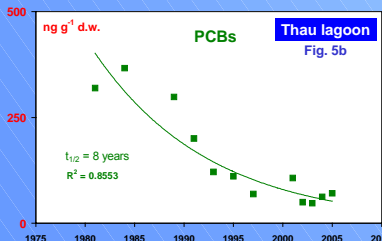
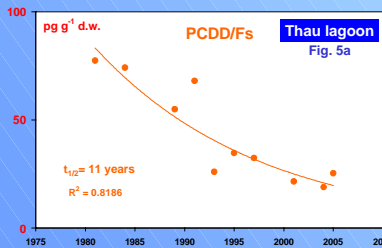
Concentrations (ng.g⁻¹ dry weight) of PBDEs⁽ⁱⁱⁱ⁾ in mussel samples collected in November 2004 Fig.4



(iii) : Sum of the 3 most abundant congeners (BDE 47, 99, 100)

- ▶ The concentrations of PCDDs, PCDFs and PCBs show a significant decrease over the studied period of time at most of the studied sites.
- ▶ At Thau lagoon, the time required for levels to decrease by a factor of two ($t_{1/2}$) is 11 years and 8 years for PCDD/Fs and PCBs respectively (**Fig.5a** and **5b**). The decrease rates observed in the mussel samples are related to the general decrease in usage and emissions of these compounds into the environment.
- ▶ PBDEs analysed in the same samples show a significant increase until the middle of the 1990's (with a doubling time of 7 years), followed by an undetermined trend (not significant) over time (**Fig.5c**).

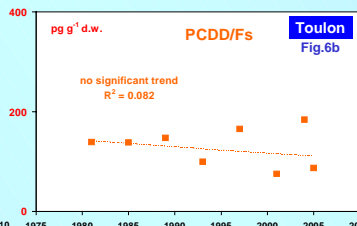
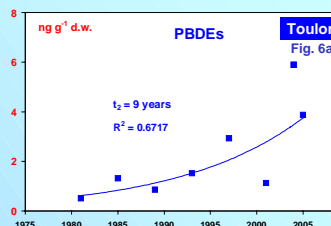
Temporal trends and rates of PCDD/Fs⁽ⁱ⁾, PCBs⁽ⁱⁱ⁾ and PBDEs⁽ⁱⁱⁱ⁾ in mussel samples from the Mediterranean coast (Thau lagoon) over the period 1981-2005 Fig.5



TEMPORAL TRENDS (Fig. 5 and Fig.6)

- ▶ At some sites, no significant decreasing trend is observed for either regulated contaminants or emerging compounds (**Fig.6**).
- ▶ Long-term monitoring studies are needed in order to determine the environmental rates and temporal trends of classic and novel organic contaminants in the marine environment.

Temporal trends and rates of PCDD/Fs⁽ⁱ⁾ and PBDEs⁽ⁱⁱⁱ⁾ in mussel samples from the Mediterranean coast (Toulon) over the period 1981-2005 Fig.6



References

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