ASSESSMENT OF CHEMICAL CONTAMINATION OF FRENCH COASTAL LAGOONS USING PASSIVE SAMPLING TECHNIQUES

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Abstract

Since 2008, projects supported by french government agencies were dedicated to improve the assessment of chemical contamination of water bodies defined by the Water Framework Directive (2000/60/CE)(Munaron et al, 2012 [1]). Among these studies, the aim of PEPSLAG was to investigate the utility of passive samplers for sampling contaminants present at trace levels in coastal lagoons environments, and to realize a first assessment of the contamination on the French Mediterranean coastal lagoons.

Keywords: Pollution, Coastal waters, Pesticides, Metals, North-Western Mediterranean

The aim of PEPSLAG was to investigate the utility of passive samplers for sampling contaminants present at trace levels in coastal lagoons environments, and to realize a first assessment of the contamination on the French Mediterranean coastal lagoons. 23 transitional lagoons water-bodies were investigated along the French Mediterranean coast, using three passive samplers (DGT, POCIS and SBSE). Passive samplers were exposed in water during one (DGT) or three/four weeks (POCIS), between june and july 2010. A water sample was collected for SBSE extraction at each sample point.

141 contaminants from various chemical families (trace metals, pesticides, pharmaceuticals, alkylphenols, PAHs, PCBs...) were investigated and their concentrations compared to Environmental Quality Standard (EQS) defined until now.

Various analytical methods were used to quantify these contaminants: atomic absorption for metals in DGT, on-line extraction of SBSE and analysis of organochlorinated pesticides, PAHs and PCBs by GC-MS, off-line extraction of others organic contaminants sequestred in POCIS and analysis by HPLC-MS-MS (ESi+ and ESi -) or GC-MS... Several methods developted were previoulsly published (Roy et al, 2005 [2]; Togola and Budzinski, 2007 [3]; Tapie et al, 2011 [4]).

With passive sampling techniques used, concentrations of many dissolved contaminants were detected during analysis and measured.

The study showed the operational assets of these systems, as low quantification limits required by the WFD reached and ensure measurement of metals and organic contaminants at trace levels, which are generally difficult to quantify with classical methods, especially in marine waters. In this study, many usual contaminants that have an EQS did not overstep it except some insecticides and trace metals. In spite of this, many water bodies have been considered in a bad chemical quality according to WFD. These passive samplers represent a sensitive and promising tool for use in marine and coastal monitoring under the EU WFD and the future EU Marine Strategy Framework Directive. Indeed, information is needed about marine contamination and passive samplers could clearly help to better characterize the real exposure of marine organisms to complex mixtures of contaminants present at low concentrations.

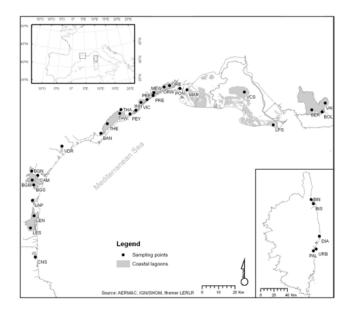


Fig. 1. French mediterranean lagoons sampled during the PEPSLAG project

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