5702

Assessment of chemical contamination of french coastal lagoons using passive sampling techniques

Ifremer

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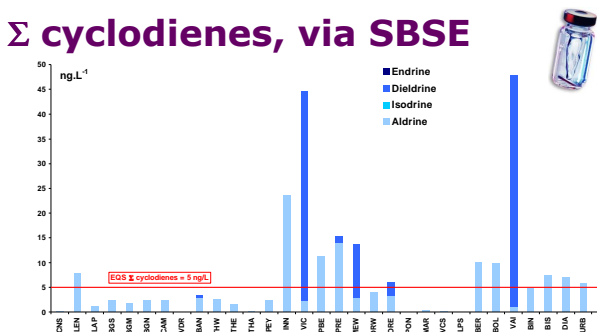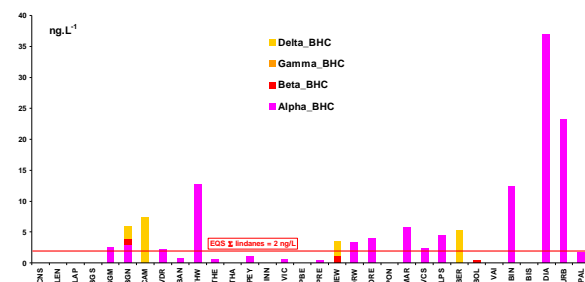
Objectives of the PEPSLAG Project

- Investigate the utility of passive samplers (DGT, POCIS and SBSE) for sampling trace levels contaminants present in marine coastal waters,

- Realize a first assessment of the contamination within the French Mediterranean lagoons.
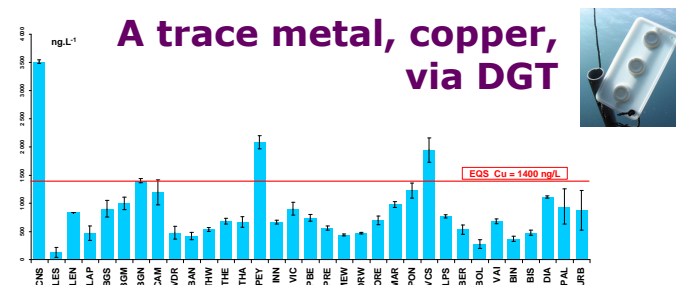
Materials and Methods

Passive samplers were set up in water during one (DGT) or 3/4 weeks (POCIS), between June and July 2010. During this exposure period, a water sample was also collected for SBSE extraction.
141 contaminants from various chemical families (9 trace metals, 73 pesticides, 21 pharmaceuticals, 6 alkylphenols, 20 PAHs, 12 PCBs…) were investigated and their concentrations were compared to Environmental Quality Standard (EQS) defined until now.
Field use of passive samplers, extraction protocols, quantification and calibration data used, were previously described in: Roy et al, 2005; Togola and Budzinski, 2007; Tapie et al, 2011 and Munaron et al, 2012.
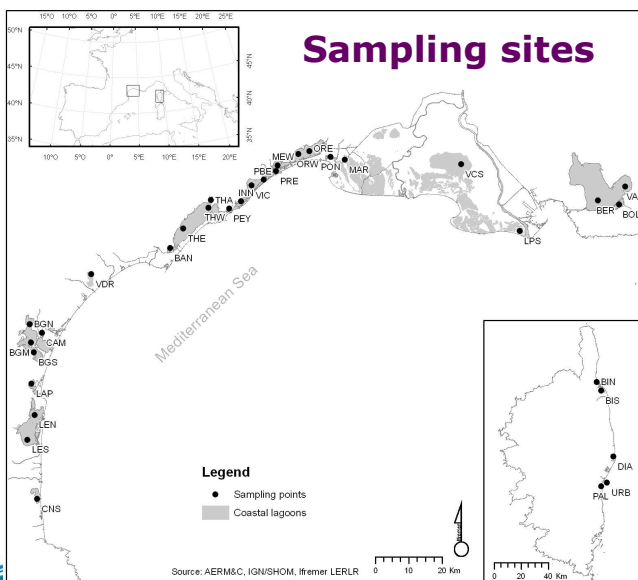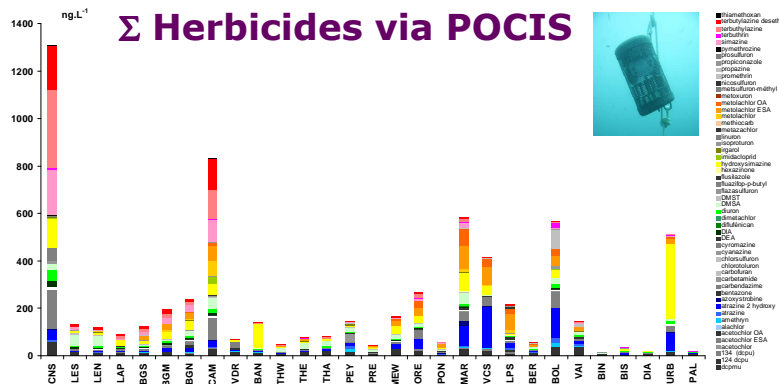
Sampling sites

Legend
• Sampling points
  Coastal lagoons

Source: AERM&C, IGN/SHOM, Ifremer LERLR

Insecticides, Σ lindanes (BHC) and Σ cyclodienes, via SBSE

ng.L⁻¹

Delta_BHC
Gamma_BHC
Beta_BHC
Alpha_BHC

EQS Σ lindanes = 2 ng/L

ng.L⁻¹

Endrine
Dieldrine
Isodrine
Aldrine

EQS Σ cyclodienes = 5 ng/L

A trace metal, copper, via DGT

ng.L⁻¹

EQS Cu = 1400 ng/L

Σ Herbicides via POCIS

ng.L⁻¹

thiamethoxan
terbutylazine desethyl
terbuthylazine
terbutrhin
simazine
pymetrozine
prosulfuron
propiconazole
propazine
prometrin
nicosulfuron
metsulfuron-methyl
metoxuron
metolachlor
metolachlor OA
metolachlor ESA
metolachlor
methiocarb
metazachlor
linuron
isoproturon
irgarol
imidacloprid
hydroxysimazine
hexazinone
flusilazole
fluazifop-p-butyl
flazasulfuron
DMST
DMSA
diuron
dimetachlor
diflufenican
DIA
DEA
cyromazine
cyanazine
chlorsulfuron
chlortoluron
carbendazime
carbetamide
pentazone
azoxystrobine
atrazine 2 hydroxy
atrazine
dimethyn
alachlor
acetochlor OA
acetochlor ESA
acetochlor
atrazin(dep)
b34 (dcpu)
124 (dcpu)
dcpmu

Conclusions and prospects

- Ubiquitous chemical contamination in lagoons due to high anthropogenic pressure
- Wide range of dissolved chemicals often detected at low concentrations
- Some chemicals overstep their EQS (lindane, endosulfan, cyclodienes insecticides, copper…)
- Passive samplers are useful tools to better characterize the chemical status of transitional water-bodies
- Quid of mixture effects of various chemicals on marine organisms ?

WFD Chemical Status of the french lagoons

French lagoons sampled - Sampling codes	Chemical status	Chemical(s) causing bad status
Canet - CNS		Cooper, Endosulfan
Leucate - LEN, LES		Cyclodienes (LEN)
La Palme - LAP		
Bages - BGS, BGM, BGN		Lindanes & Endosulfan (BGM, BGN)
Campignol - CAM		Lindanes
Vendres - VDR		Lindanes
Bagnas - BAN		
Thau - THW, THE, THA		Lindanes (THW)
La Peyrade - PEY		Cooper
Palavasiens Ouest - INN, VIC, PBE		Cyclodienes (INN, VIC, PBE), Endosulfan (VIC)
Palavasiens Est - PRE, MEW		Cyclodienes (PRE, MEW), Lindanes & Endosulfan (MEW)
Or - ORW, ORE		Cyclodienes (ORE), Lindanes (ORE, ORW), Endosulfan (ORW)
Ponant - PON		
La Marette - MAR		Lindanes
Vacarès - VCS		Cooper, Lindanes
La Palissade - LPS		Lindanes
Berre - BER		Cyclodienes, Lindanes, Endosulfan
Bolmon - BOL		Cyclodienes
Vaïne - VAI		Cyclodienes
Biguglia - BIN, BIS		Cyclodienes (BIS), Lindanes (BIN)
Diana - DIA		Cyclodienes, Lindanes
Urbino - URB		Cyclodienes, Lindanes
Palo - PAL		

Legend :		
	🔴	Bad chemical status : a chemical or more overstep its EQS
	🔵	Good chemical status : no chemical overstep its EQS