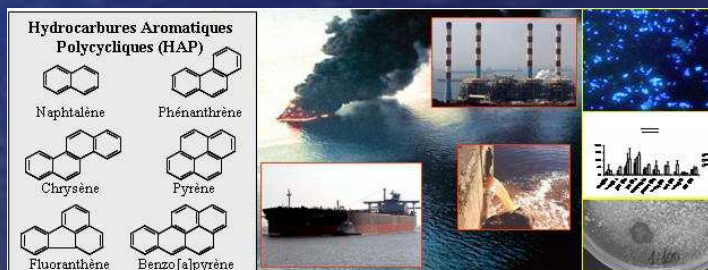




Development of a miniaturized UV fluorometer for monitoring anthropogenic inputs in the coastal oceanic waters

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*5th Workshop EGO, 2011, March 14-16, 2011, Telde, Gran Canaria
Topic 2. Developments on glider, sensors, and gliderports (on-board capacities, ground-segment)*

co-projects

- **FUI- Sea Explorer (2008-2011)**

Building labellisé par le pôle mer PACA. Industrial project FCE (Pi H. Thomas, ACSA-Underwater-gps).

- **ANR- IBISCUS (2010-2012)**

Indicators of biological and chemical contaminations from Urban inputs - Labellisé au pôle mer PACA. Projet EC2CO (2009-2010) et ANR-ECOTECH (2010-2013) (Pi M. Goutx, University/CNRS-LMGEM) : Research institute/Companies collaborative project

- **ADEME-OSEO VASQUE (2010-2012)** labellisé par le pôle mer PACA. Industrial project (Pi H. Thomas ACSA).

- **PABIM 2 (2010-2013)**

Autonomous platforms : Instrumentations et measurements. Project Mercator / Coriolis. Pi : F. D'Ortenzio (LOV), M. Tedetti (responsable CDOM/FDOM)

- **MOOSE** (Mediterranean Ocean Observing System on Environment)

Assessment of petroleum hydrocarbons and bacterial indicators of waste water sewages

is necessary as regards :

1/European policy for PAHs and microbes

2/ Management of coastal areas under urban anthropogenic pressure

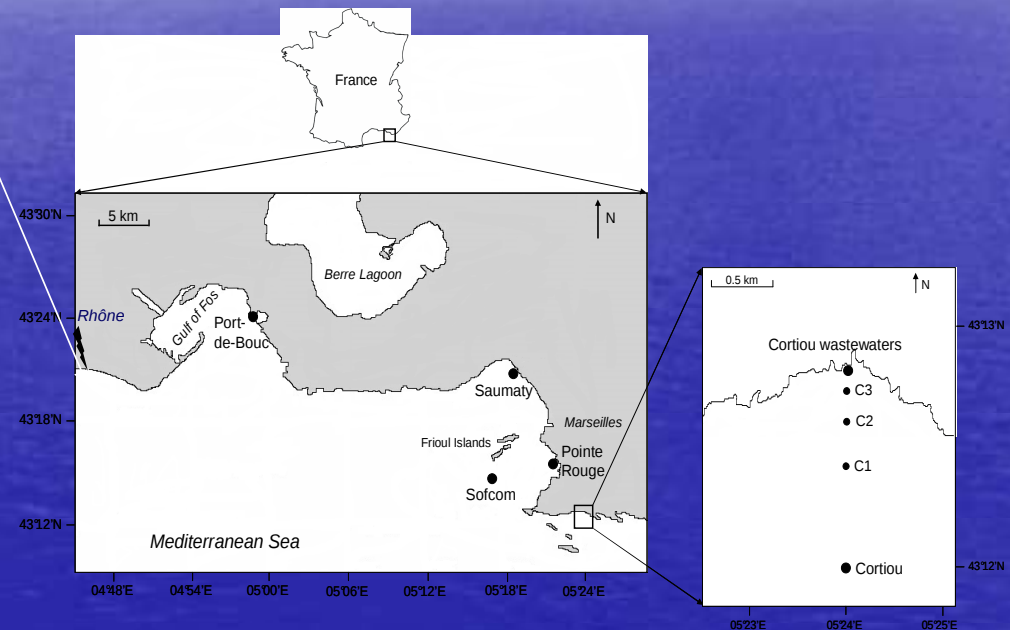
➤ Needs developments of new tools



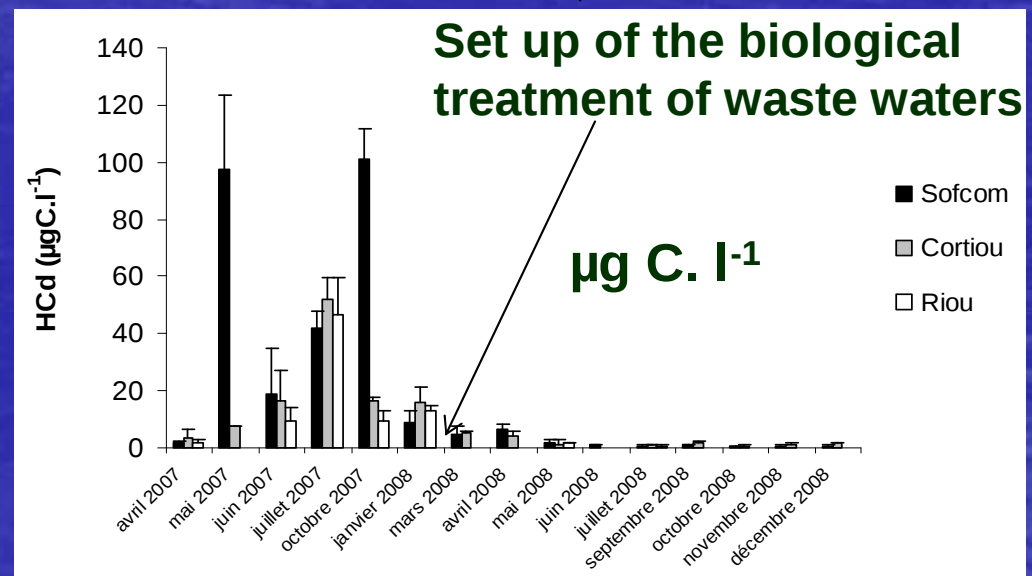
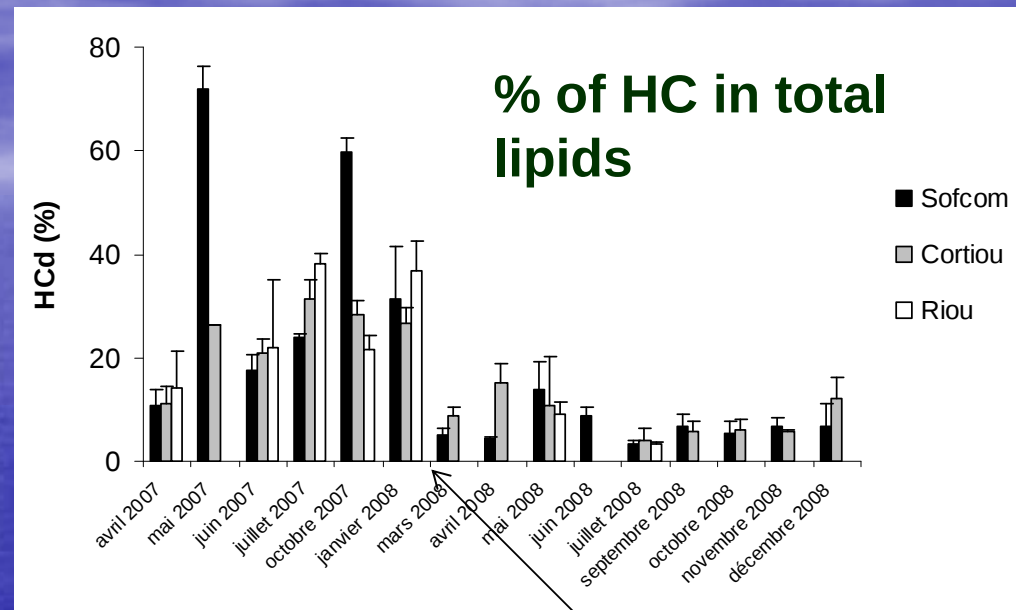
The bay of Marseille, France

Previous project studied total hydrocarbon concentrations in coastal Mediterranean (Marseille bay)

- The Rhône river ($\sim 1000 \text{ m}^3 \text{ s}^{-1}$) releases 16 t PAHs Y^{-1} , (Fernandes et al., 1999).
- Industry in the North and tourism in the South part of the Bay
- The most important data sets are on sediments, suspended particles and mussels (mussel watch)(Ifremer, RNO).
- However, there is very little data in the dissolved phase, few measurements in the microlayer and the subsurface $20\text{-}500 \text{ ng l}^{-1}$ (Barcelone) et $10\text{-}120 \text{ ng l}^{-1}$ (Banyuls) (Guitart et al., 2007)



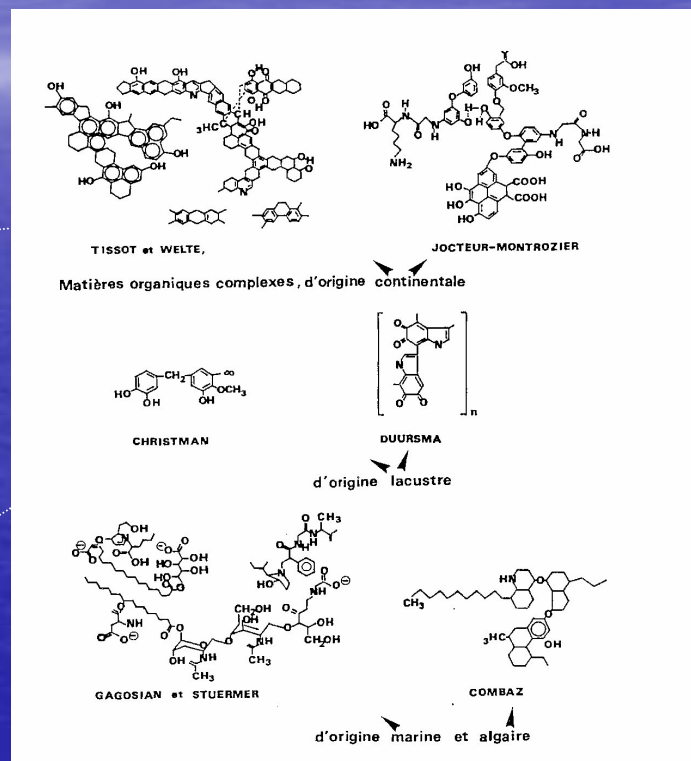
...showed high seasonal and episodic variabilities of total hydrocarbon (HC) concentrations



Objectives for development of new sensors

- To resolve the spatio-temporal variability
- To improve the continuous monitoring of pollutants

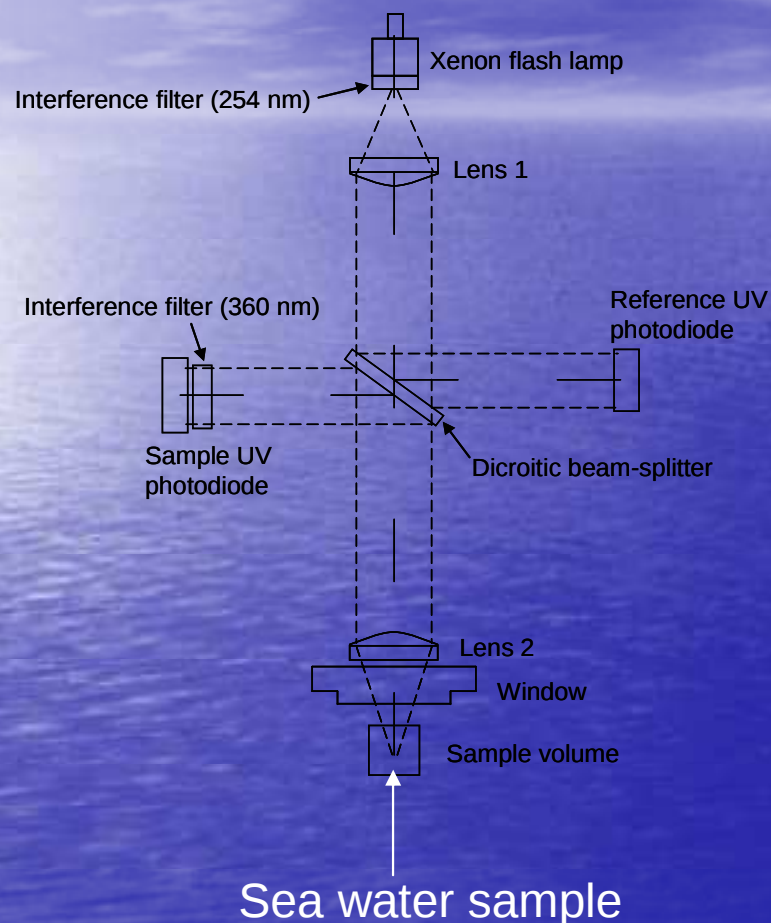
LMGEM- COM (Marseille) : Development of miniaturized sensors for the measurement of the fluorescence of pollutants



Fluorescent organic
matter

In Mediterranean coastal waters, rivers and urban activity release large amounts of dissolved material that can be assessed through its fluorescence properties.

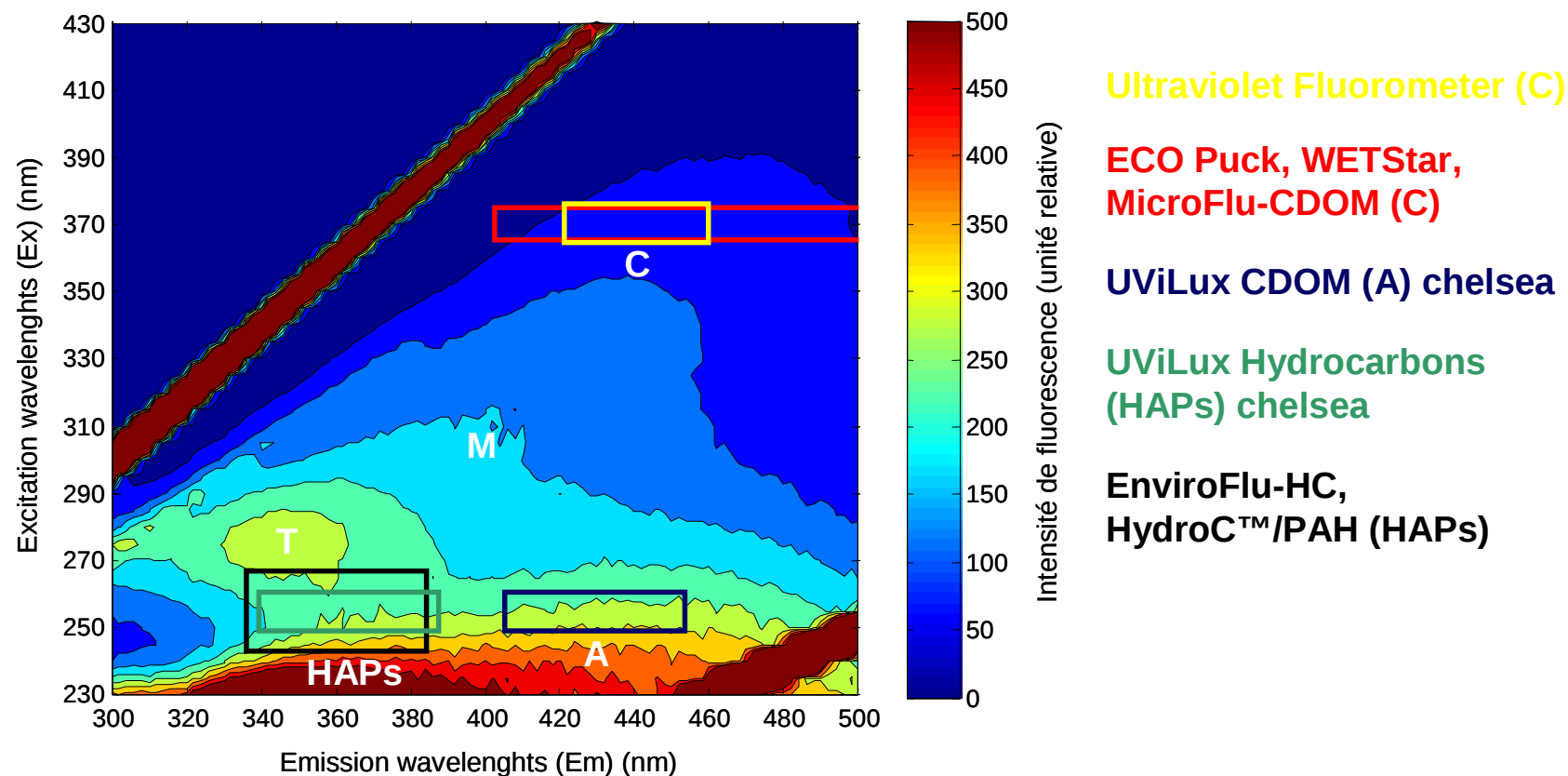
Aromatic compounds (either natural or pollutants) fluoresce



Laboratory Spectrofluorimetre

Fluorescence is measured in laboratory by using a spectrofluorimeter that provides excitation/emission matrices

Excitation/emission matrix of samples in Marseille bay, overlaps of available submersible fluorometers



Peak A : Humic like (terrigenous)

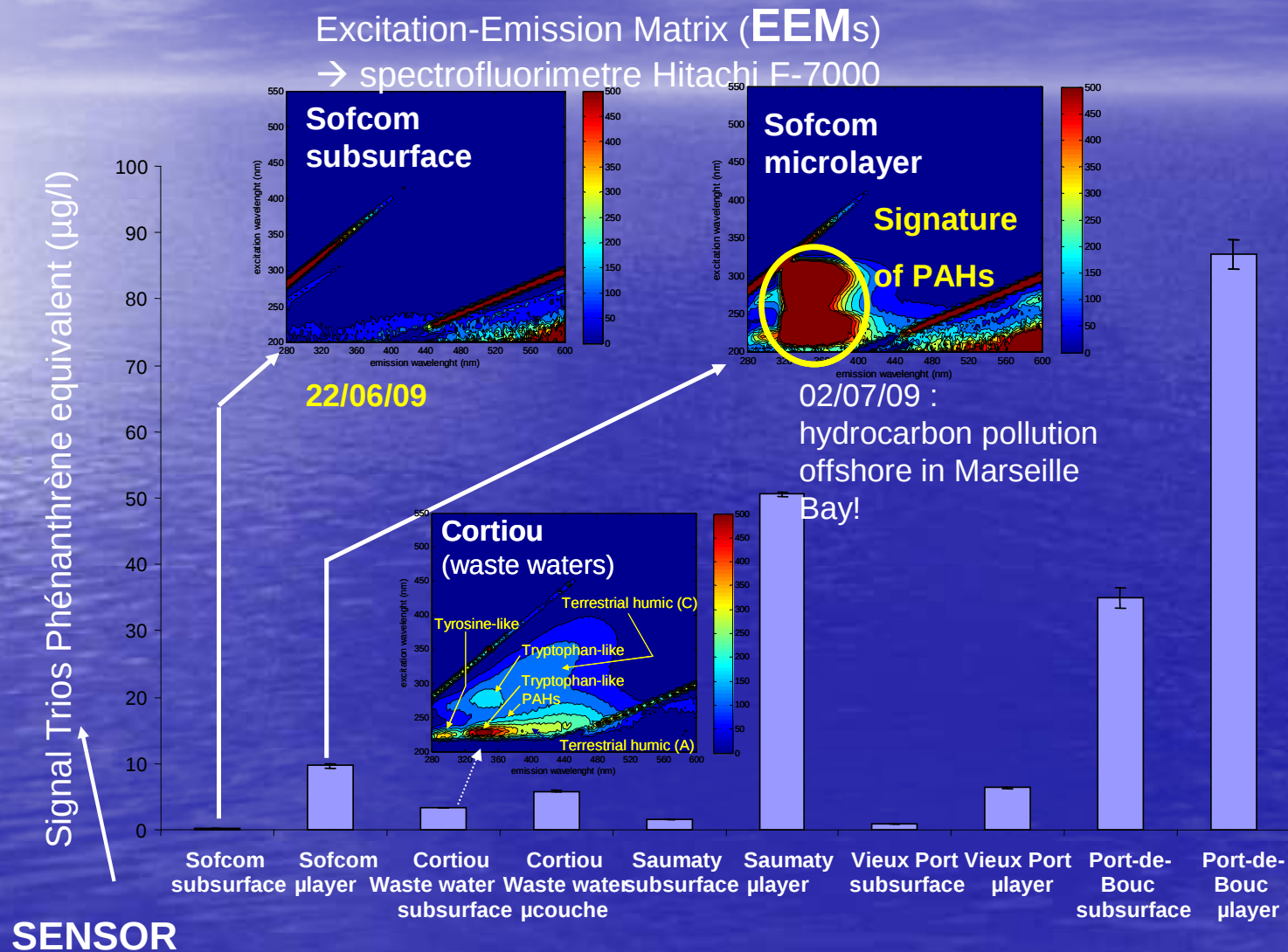
Peak C : Humic like (terrigenous, ageing)

Peak M : Humic like (marine)

Peak T : tryptophan-like, protein-like
(bacteria of fecal matter, waste waters)

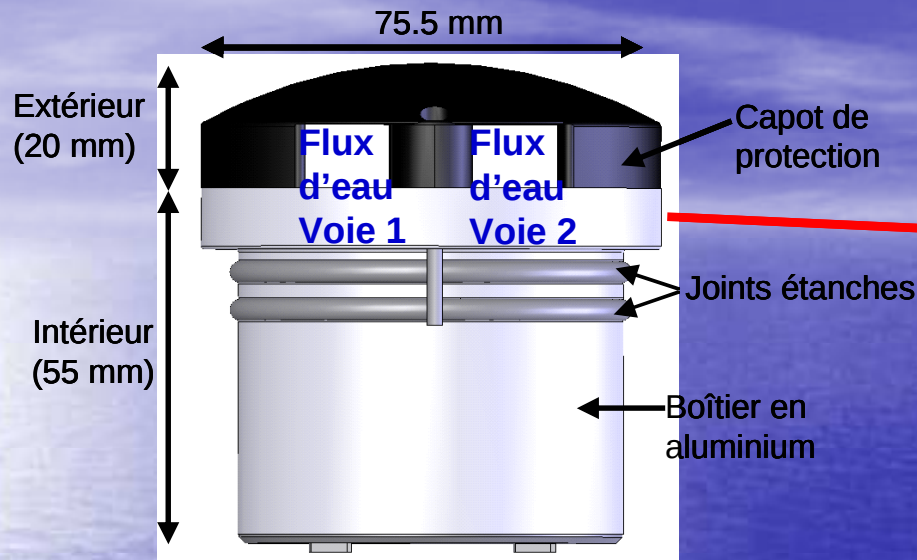
Peak PAHs : Polycyclic aromatic
hydrocarbons

Comparison of hydrocarbon conc. (PAHs) measured by spectrofluorimetry (EEMs) and data obtained through TRIOS sensor deployment (histogram)



(Tedetti et al. 2010, Mar. Poll. Bull.)

Development of miniaturized sensor : MiniFluo-UV



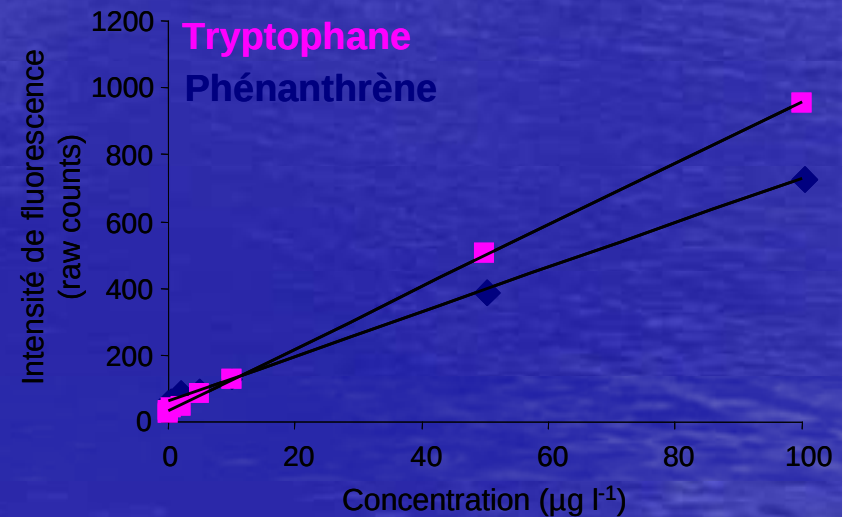
Glider Sea Explorer



Collaboration
MicroModule

ACSA, IFREMER,
ACRI, LOV, COM

- 2 optic pathways : phenanthrene (λ Ex/ λ Em : 255/360 nm) and tryptophane (λ Ex/ λ Em : 280/340 nm)
- Miniaturized and low energy requirement → integration on all type of platforms (buoy, CTDs, gliders, AUVs)
- Laboratory MiniFluo-UV : has been validated on standard solution and natural samples
- glider MiniFluo-UV : cruises planned summer 2011

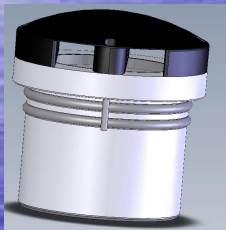


Tedetti et Goutx (2011), National patent under validation

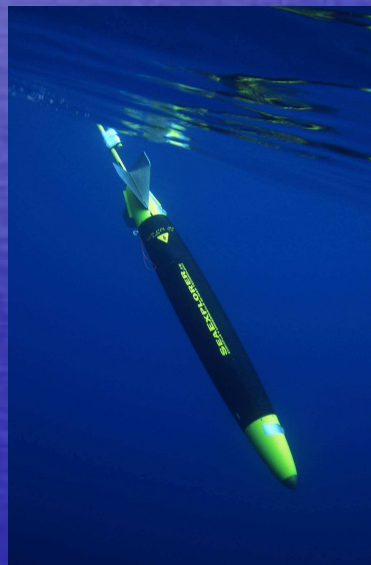
COUPLING SENSORS WITH AUV

A promising tool for monitoring pollutants in marine areas submitted to urban inputs :

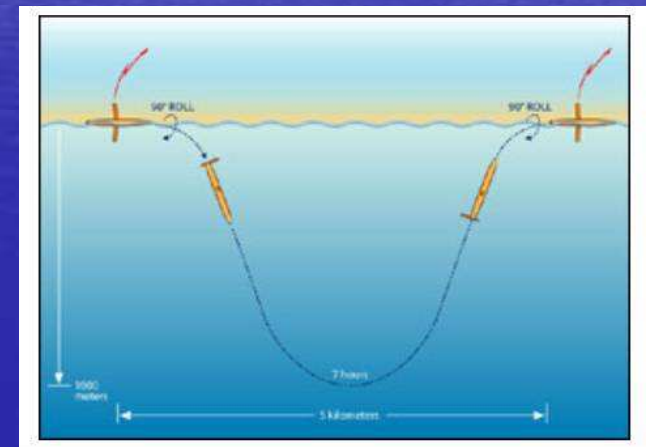
actual challenges



to develop
specific miniaturized
sensors for anthropized
environment

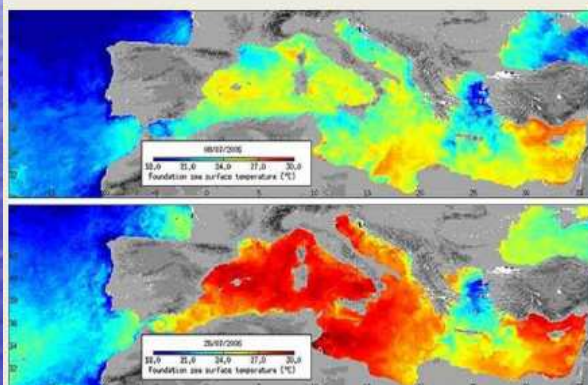
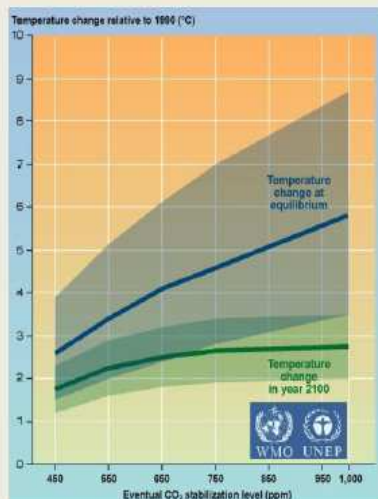


Sea explorer and
Vasque gliders



High frequency
measurement

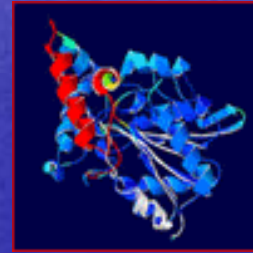
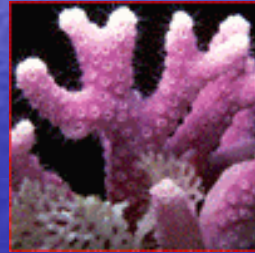
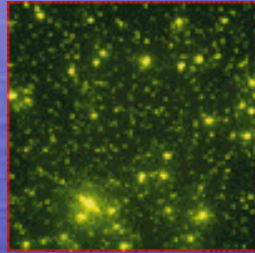
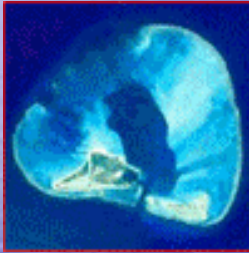
Mediterranean Ocean Observing System : an ongoing challenge



11-13 février 2008 à la Citadelle de
Villefranche-sur-Mer

Coordonné par l'INSU et organisé par l'Observatoire
Océanologique de Villefranche-sur-Mer

WORKSHOP NATIONAL MOOSE



Thank you for your attention ...