



# Recent threats on coastal ecosystems by new pollutants: a multiple trace elements study

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# Introduction



Some previously poorly studied trace elements can now be considered as chemical pollutants further to the recent modification of their production and uses.

## Bioindicators :

- monitoring of the ocean health status ;
- pollutants biologically accessible.

Group 1	Group 2	d transition elements										Group 13	Group 14	Group 15	Group 16
3 Li 6.941	4 Be 9.012											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999
11 Na 22.990	12 Mg 24.305	21 Sc 44.956	22 Ti 47.90	23 V 50.941	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.933	28 Ni 58.71	29 Cu 63.546	30 Zn 65.37	31 Al 26.98	14 Si 28.086	15 P 30.974	16 S 32.064
19 K 39.102	20 Ca 40.08	39 Y 88.906	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.4	47 Ag 107.87	48 Cd 112.40	31 Ga 69.72	32 Ge 72.59	33 As 74.922	34 Se 78.96
37 Rb 85.47	38 Sr 87.62	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.22	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60
55 Cs 132.91	56 Ba 137.34											81 Tl 204.37	82 Pb 207.19	83 Bi 208.98	84 Po (210)
87 Fr (223)	88 Ra 226.025	89 Ac 227.0	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub				



## 1<sup>st</sup> objective:

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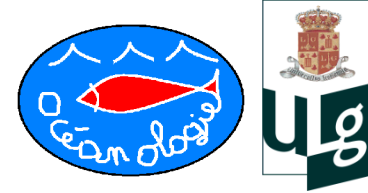


Some previously poorly studied trace elements can now be considered as chemical pollutants further to the recent modification of their production and uses.

- potential use of *Paracentrotus lividus*, *Posidonia oceanica* and *Mytilus galloprovincialis* as bioindicators ;



## Sampling strategy:



- ❖ spatial variability (**Marseille**, **Calvi**, **Naples**)
- ❖ seasonal (march, june, november) and interannual variability ;
- ❖ trace element distribution in organism tissues.





## 2<sup>nd</sup> objective:

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Some previously poorly studied trace elements can now be considered as chemical pollutants further to the recent modification of their production and uses.

- bioconcentration and the biomagnification processes ;
- potential use of *Paracentrotus lividus*, *Posidonia oceanica* and *Mytilus galloprovincialis* as bioindicators ;





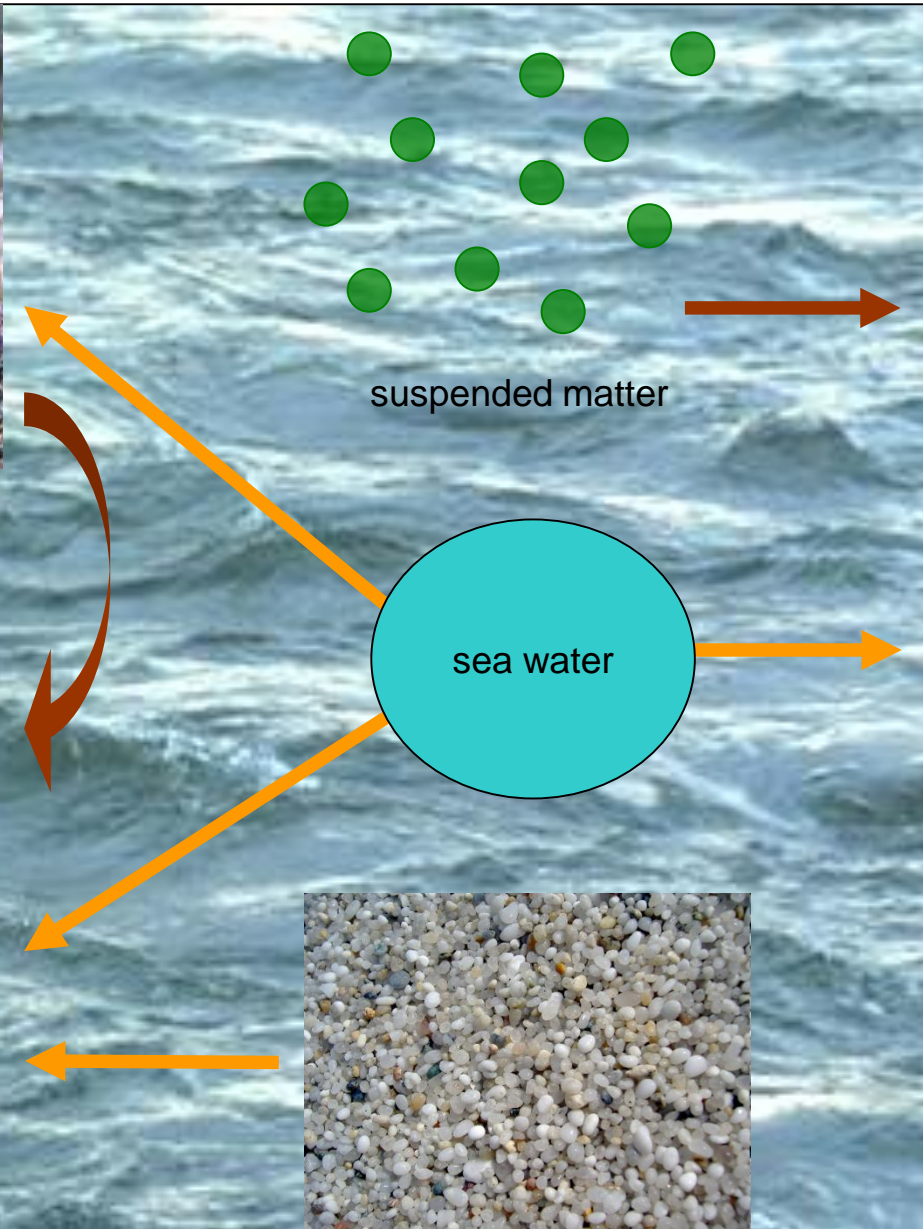
# Bioconcentration and biomagnification pathways



*Paracentrotus lividus*



*Posidonia oceanica*



suspended matter

sea water

sediment



*Mytilus galloprovincialis*



## 3<sup>rd</sup> objective:

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Some previously poorly studied trace elements can now be considered as chemical pollutants further to the recent modification of their production and uses.

- dynamics of absorption and excretion of selected elements in experimental mesocosms ;
- bioconcentration and the biomagnification processes ;
- potential use of *Paracentrotus lividus*, *Posidonia oceanica* and *Mytilus galloprovincialis* as bioindicators ;



## 4<sup>th</sup> objective:

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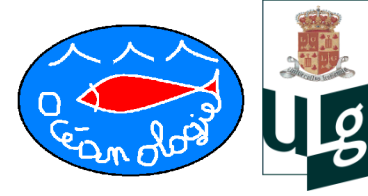


Some previously poorly studied trace elements can now be considered as chemical pollutants further to the recent modification of their production and uses.

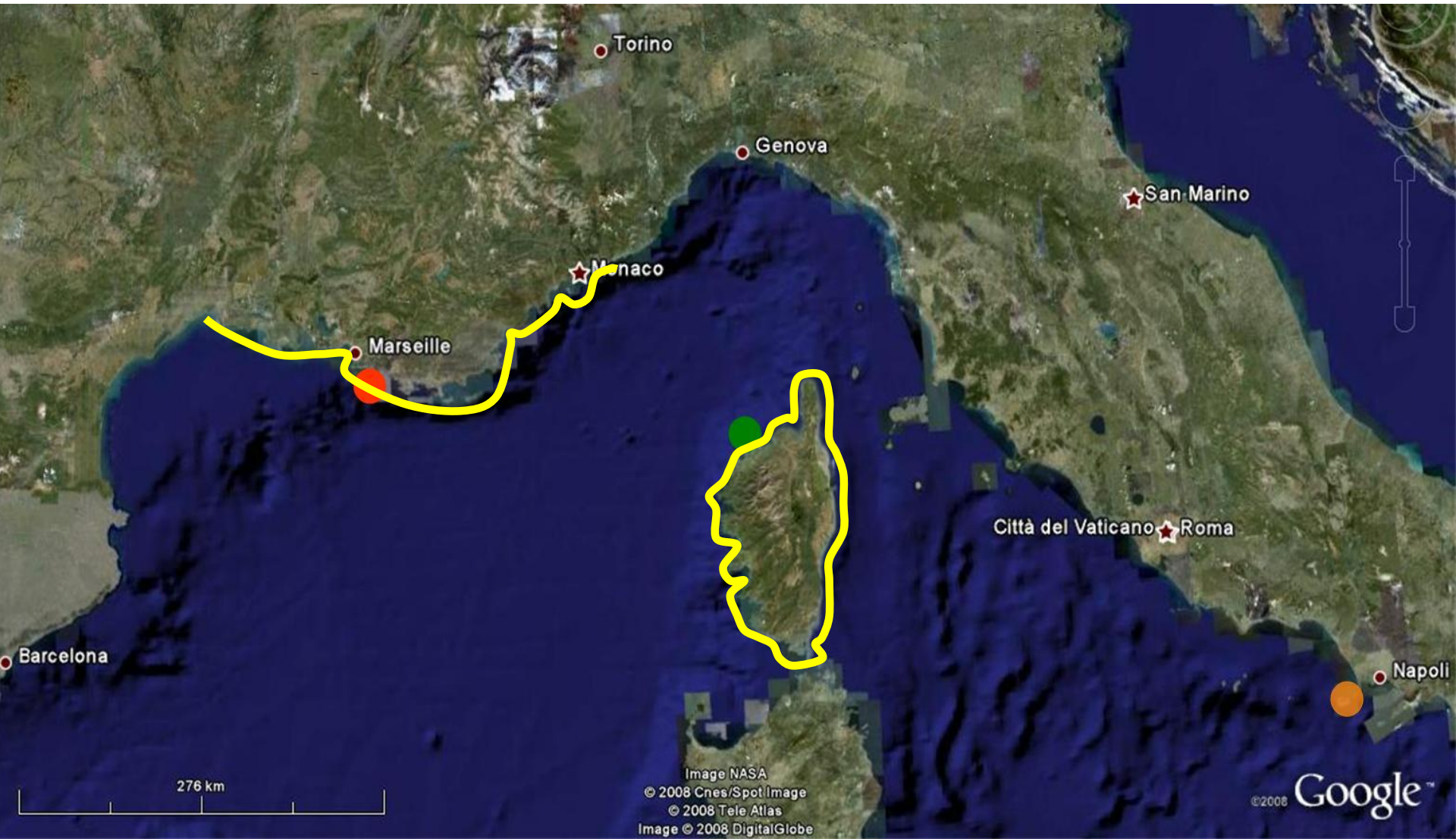
- cartography of the seagrass bed health status of PACA and Corsica coasts (trace element, biometry, stable isotopes and C:N:P ; collaboration with the IFREMER);
- dynamics of absorption and excretion of selected elements in experimental mesocosms ;
- bioconcentration and the biomagnification processes ;
- potential use of *Paracentrotus lividus*, *Posidonia oceanica* and *Mytilus galloprovincialis* as bioindicators ;



# Sampling strategy:



❖ 42 sites sampled in april 2007





## 5<sup>th</sup> objective:

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Some previously poorly studied trace elements can now be considered as chemical pollutants further to the recent modification of their production and uses.

- lepidochronological analyses.
- cartography of the seagrass bed health status of PACA and Corsica coasts (trace element, biometry, stable isotopes and C:N:P ; collaboration with the IFREMER);
- dynamics of absorption and excretion of selected elements in experimental mesocosms ;
- bioconcentration and the biomagnification processes ;
- potential use of *Paracentrotus lividus*, *Posidonia oceanica* and *Mytilus galloprovincialis* as bioindicators ;



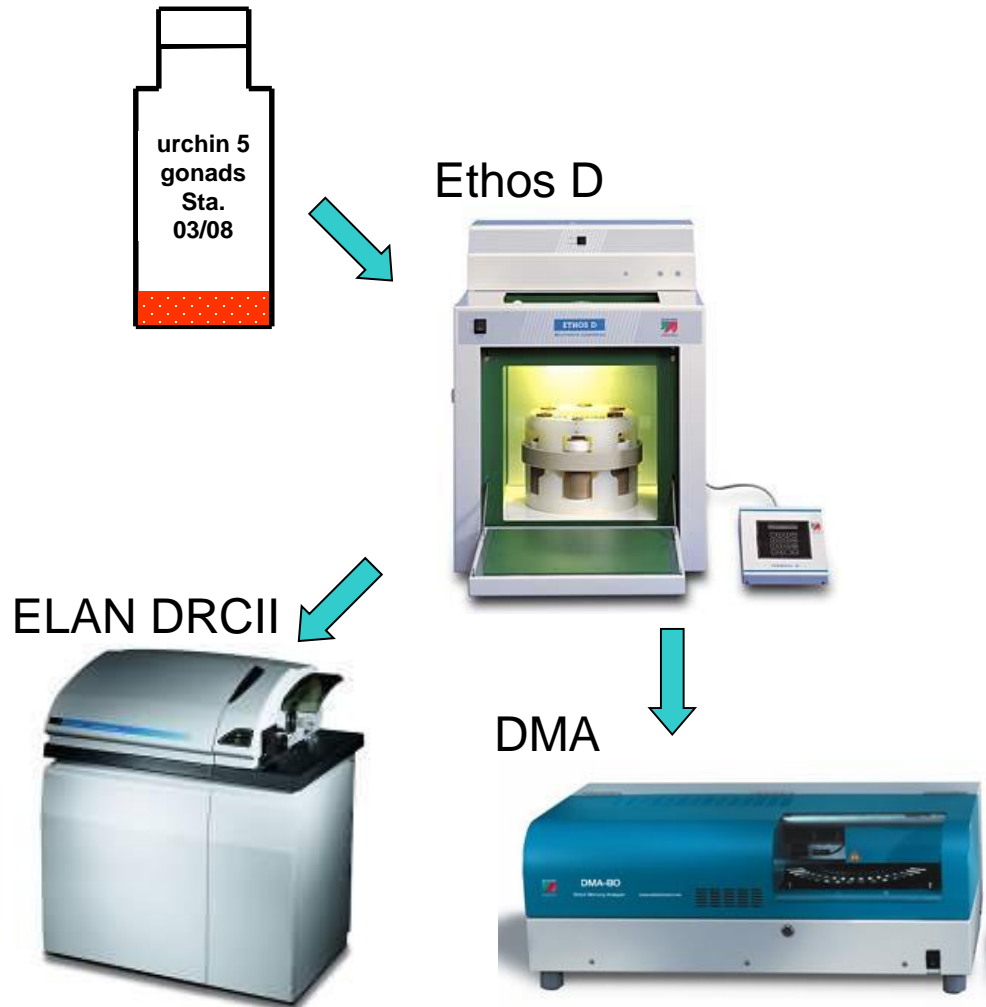
## Conclusion:

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- biodindicators for trace element pollution ;
- environmental accessibility and bioamplification ;
- contamination dynamics ;
- cartography of the seagrass bed health status ;
- lepidochronological analysis.



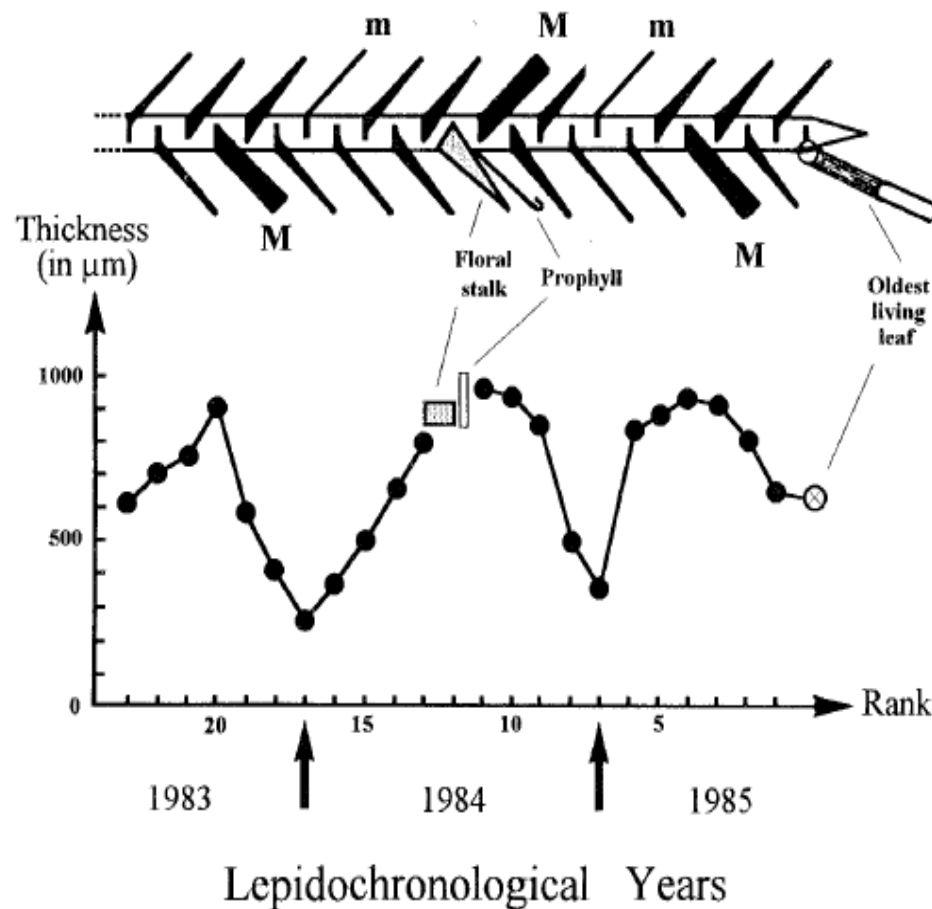
# Laboratory analyses



## Analytical steps:

- homogeneous sample
- ↓
- acidic digestion in a microwave oven
- ↓
- measures :
  - inductively coupled plasma mass spectrometer
  - Hg analyser

# Lepidochronology



- similar to dendrochronology ;
- relate past trace element pollution of the environment

Pergent-Martine and Pergent (1994).