

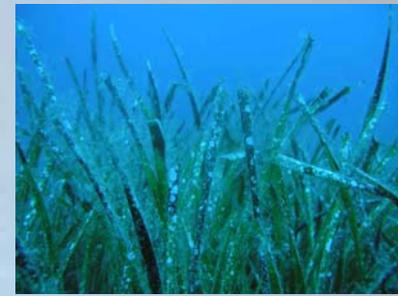
# Spatial heterogeneity at small scale in the microbenthic loop of *Posidonia oceanica* meadows

Université  
de Liège

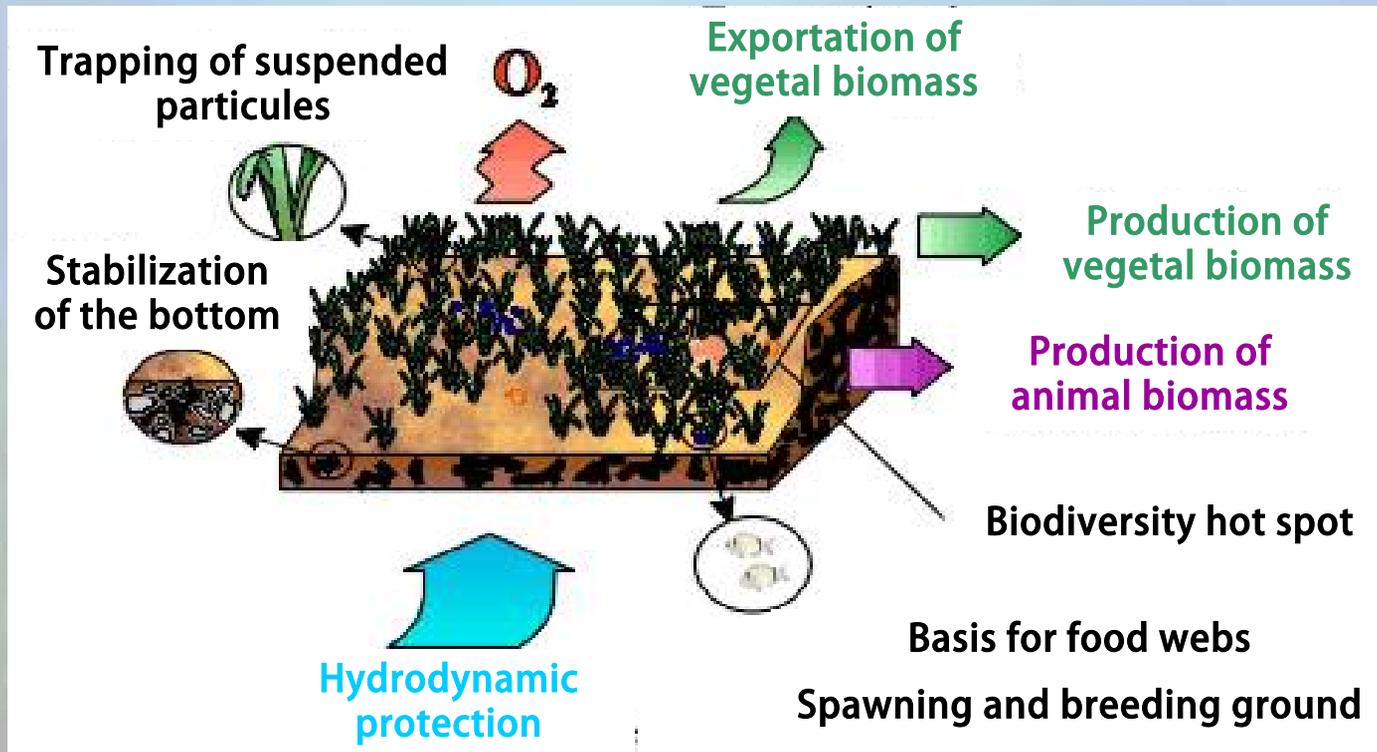


**Dorothee PETE, Fabian LENARTZ, Branko  
VELIMIROV, Jean-Marie BOUQUEGNEAU and  
Sylvie GOBERT**

# Introduction



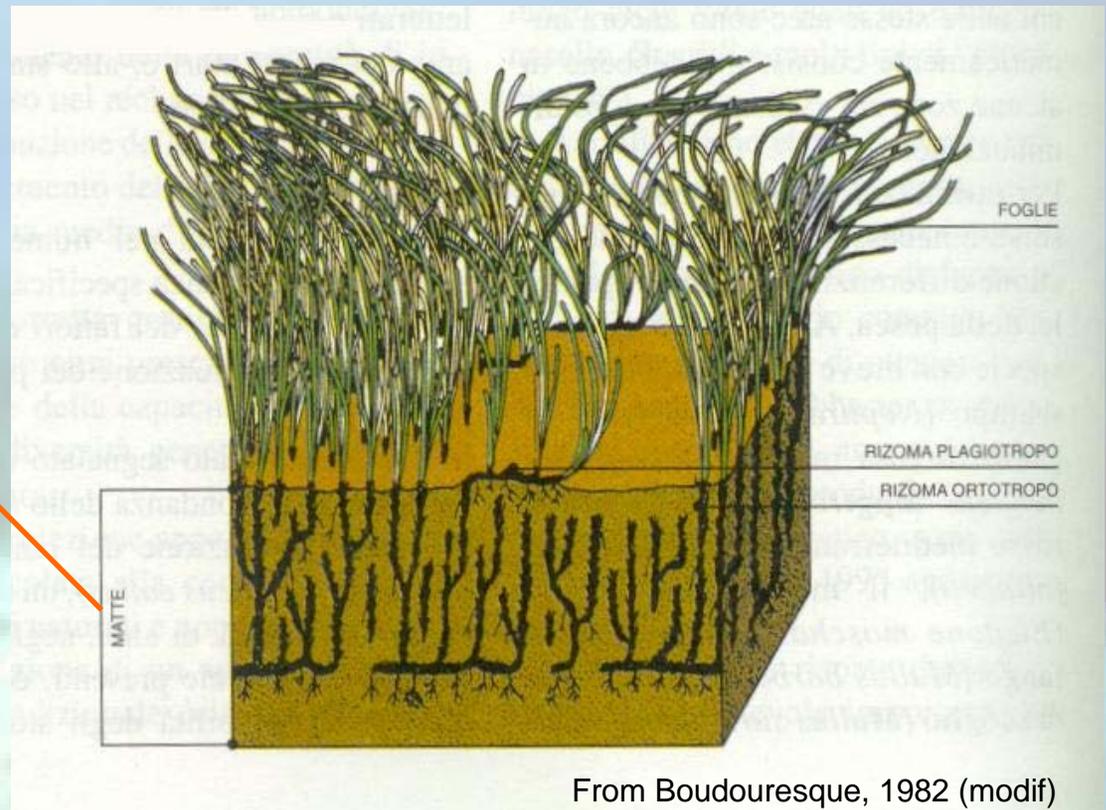
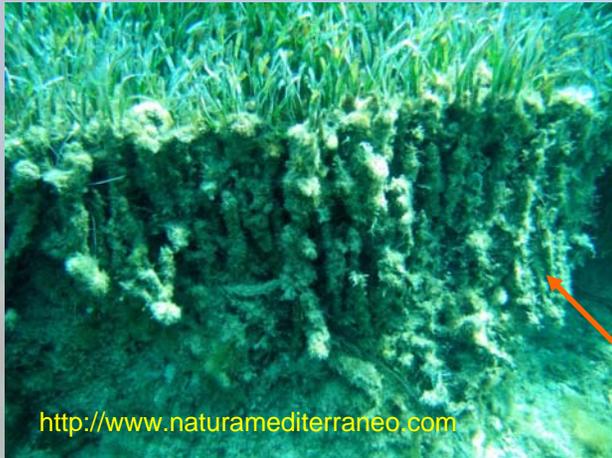
- *Posidonia oceanica* = endemic seagrass of the Mediterranean Sea



- *Posidonia oceanica* = used as a descriptor of environmental quality

# Characteristics of the sediment compartment

- Sediment compartment = "matte"
- O<sub>2</sub> produced by roots
  - ➔ Oxidic conditions
- Important biodiversity



# Interests of the sediment compartment in environmental studies

- Sediment = receptacle for organic and inorganic pollutants
    - ➔ modification of its physicochemical properties (redox potential, nutrients content, granulometry,...)
    - ➔ modification of trophic webs
  - Organisms with a rapid turnover and which spend all their life cycle in this compartment
    - ➔ inevitably affected
    - ➔ good indicators of environmental perturbations????
- BUT** in *P. oceanica* meadows: not well known...

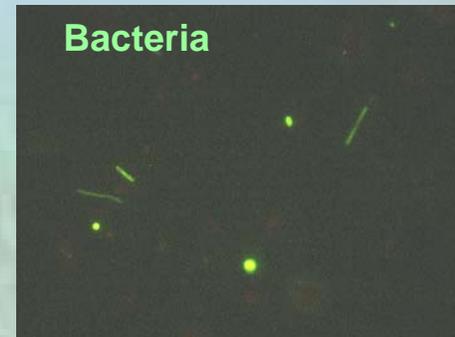
# Our aims

- Using the microbenthic loop of *P. oceanica* to find an early holistic indicator of anthropogenic perturbations.

**BUT** problems of sampling strategies (important variability between samples)...

- Understand small scales variations in this microbenthic loop

Organic matter



# Sampling strategy



STARESO

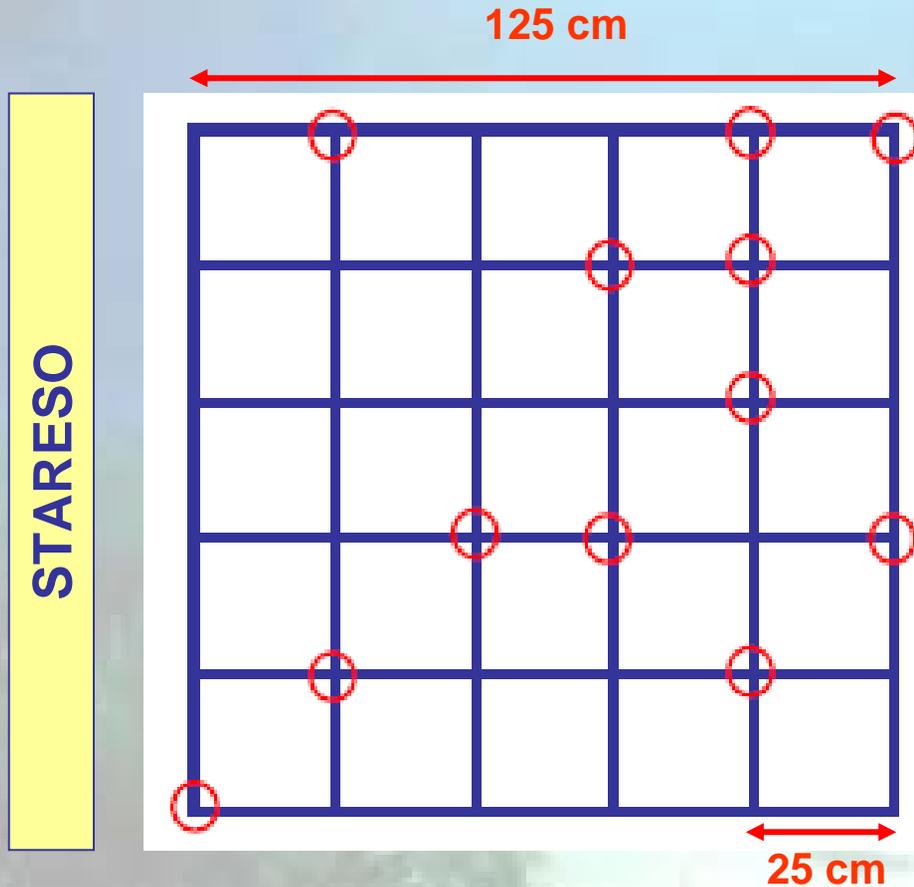


- Healthy meadow
- No anthropogenic pollution
- Low hydrodynamism

Golfe d' Ogliastriccia

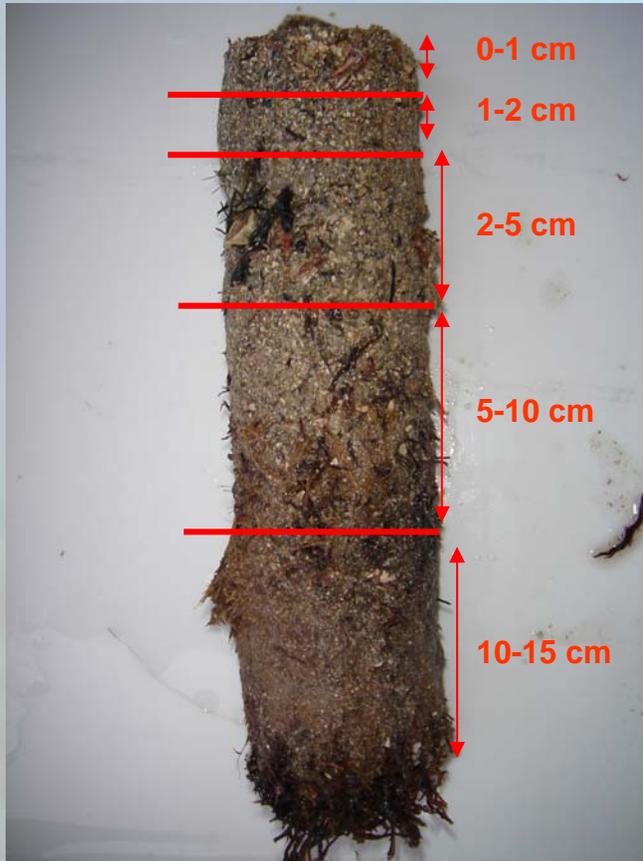
Baie de Revellata

# Sampling strategy



- 3 grids
- March, June, November 08
- 12 nodes/grid (uniform random)
- 3 cores/node
- 1 pore water sample/node (nutrients)

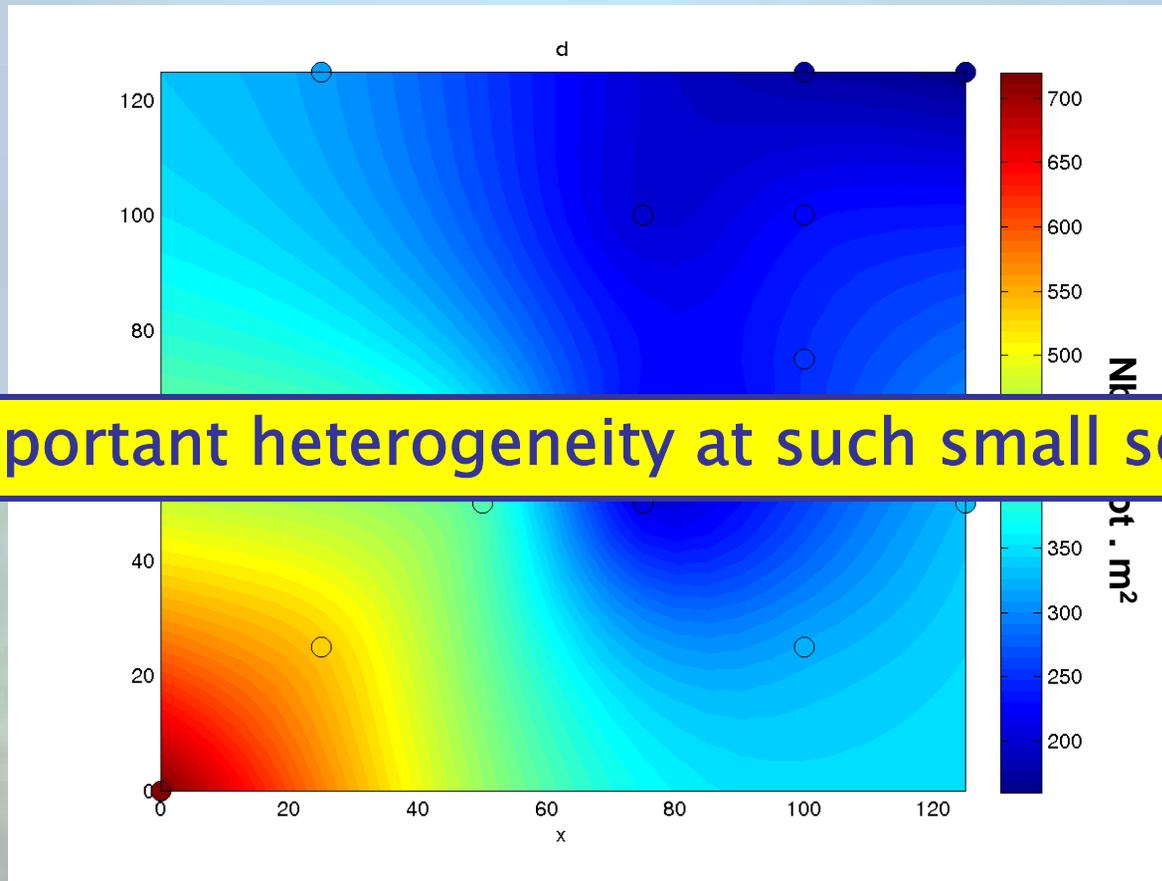
# Measured parameters



- Slices: 0-1, 1-2, 2-5, 5-10, 10-15 cm
- Bacterial biomass, **abundance** (Vienna, Austria, B. Velimirov): epifluorescence
- Organic matter biomass (AFDW)
- Microphytobenthos biomass : spectrophotometer
- **Meiofauna**
- **Granulometry**

# Results : DIVA analysis

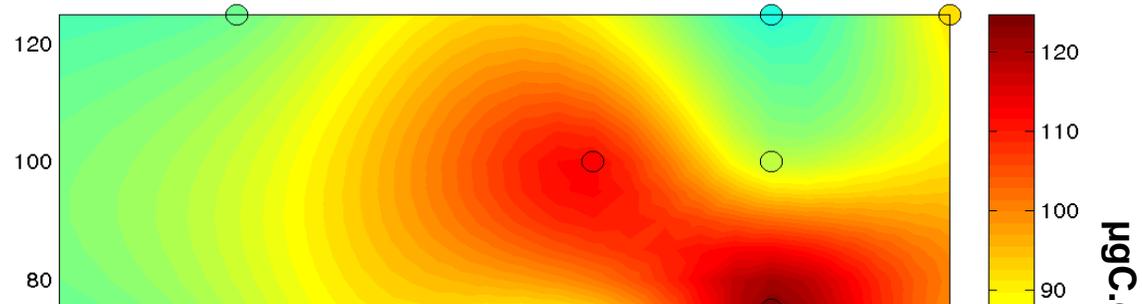
## Density of the meadow



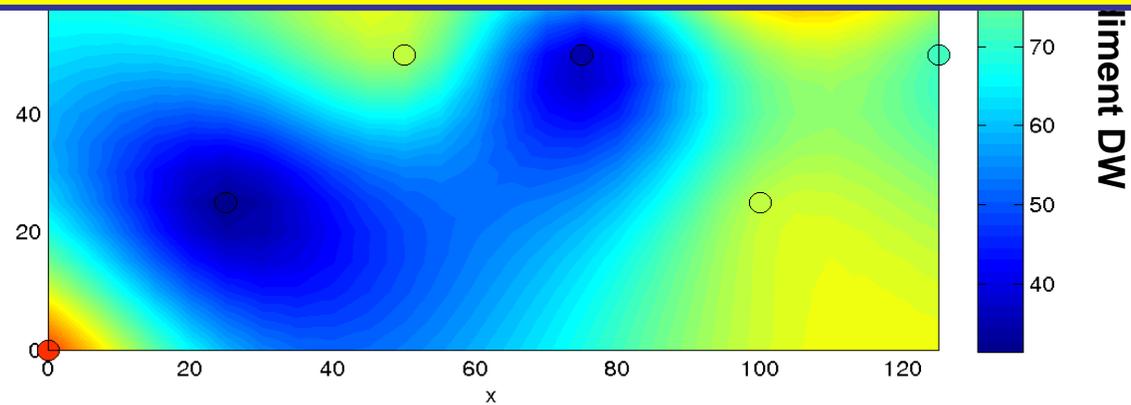
Important heterogeneity at such small scale!

# Results : DIVA analysis

## Biomass of bacteria (0-1 cm)

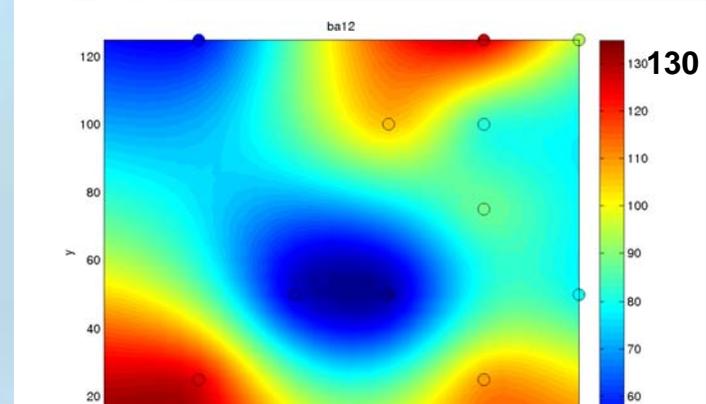
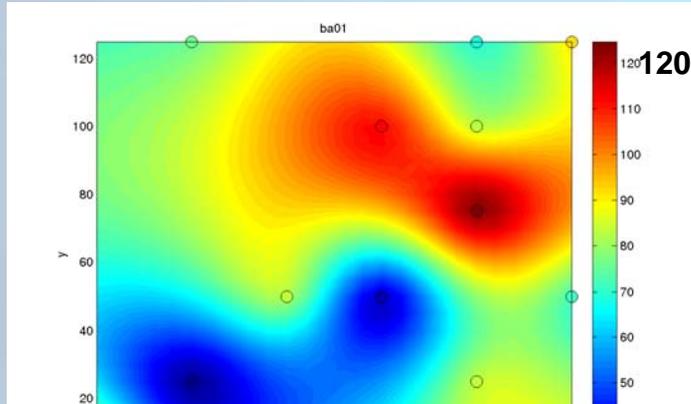


**Important heterogeneity too!**



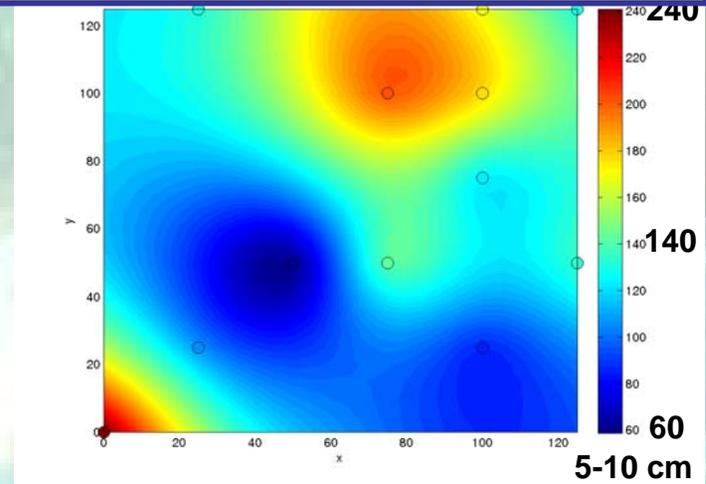
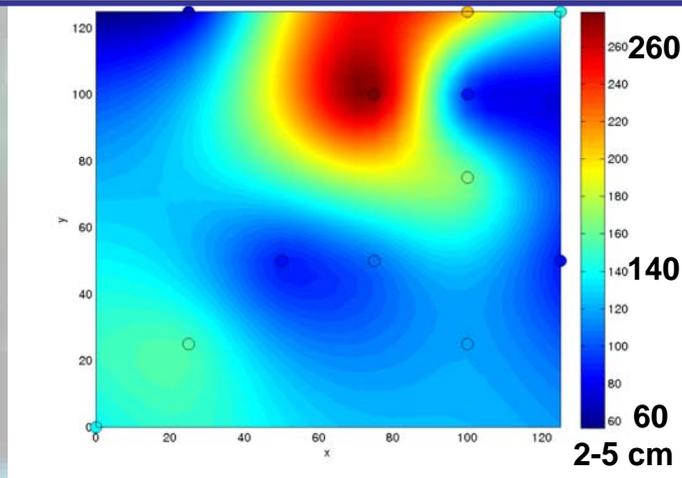
# Results : DIVA analysis

Biomass of bacteria ( $\mu\text{gC.g}^{-1}$  sediment DW)



More bacteria at low sediment depth (organic matter, less predators)

But hot spots who generate gradients of biomass



\*

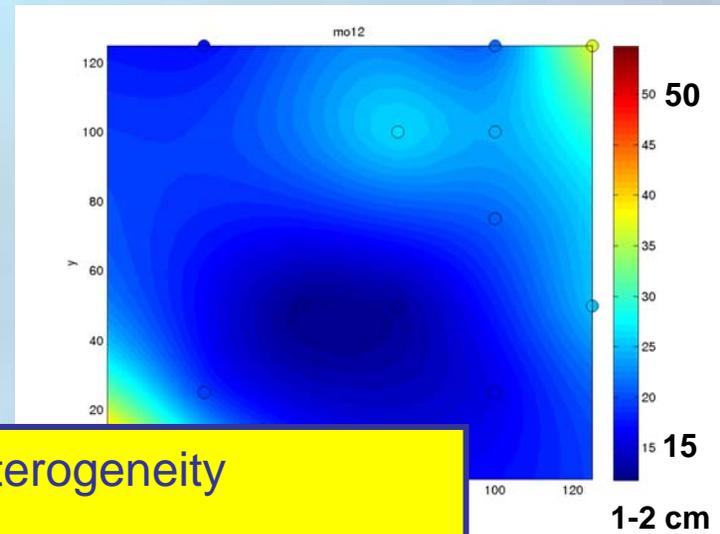
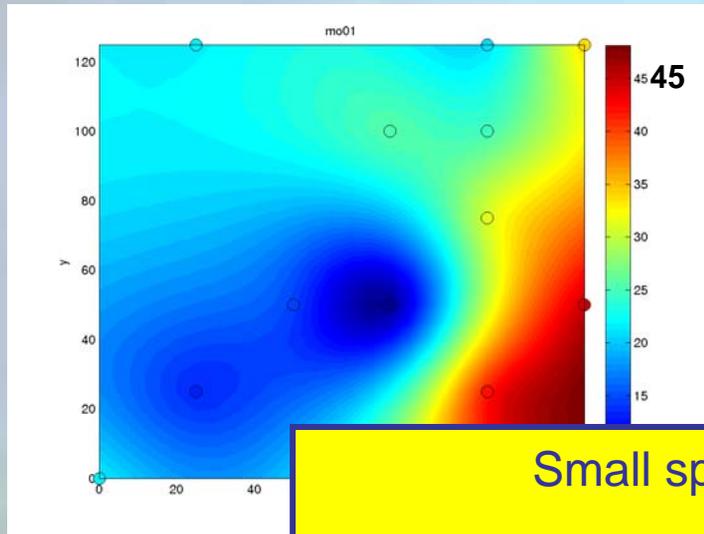
\*

\*

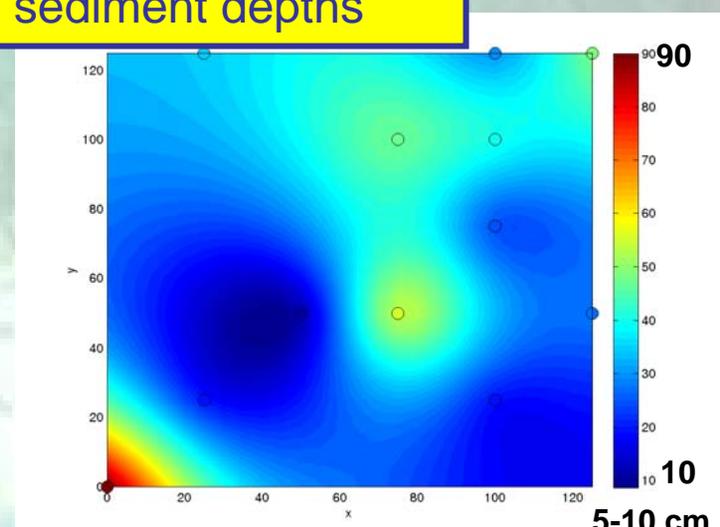
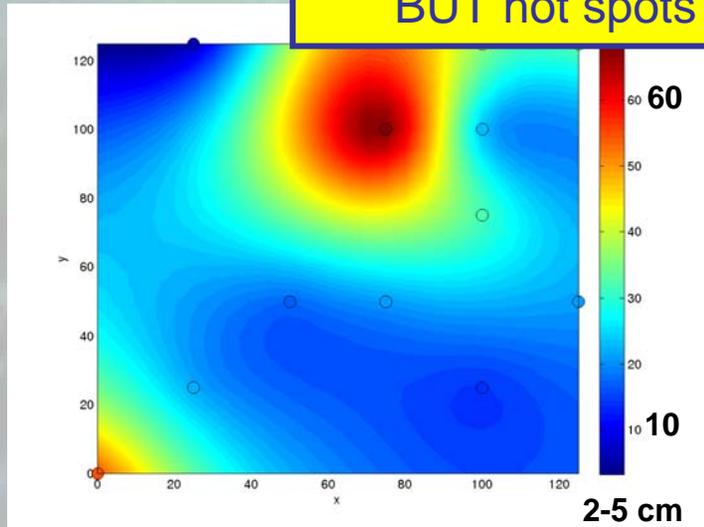
\*

# Results : DIVA analysis

## Biomass of OM ( $\mu\text{gC.g}^{-1}$ sediment DW)



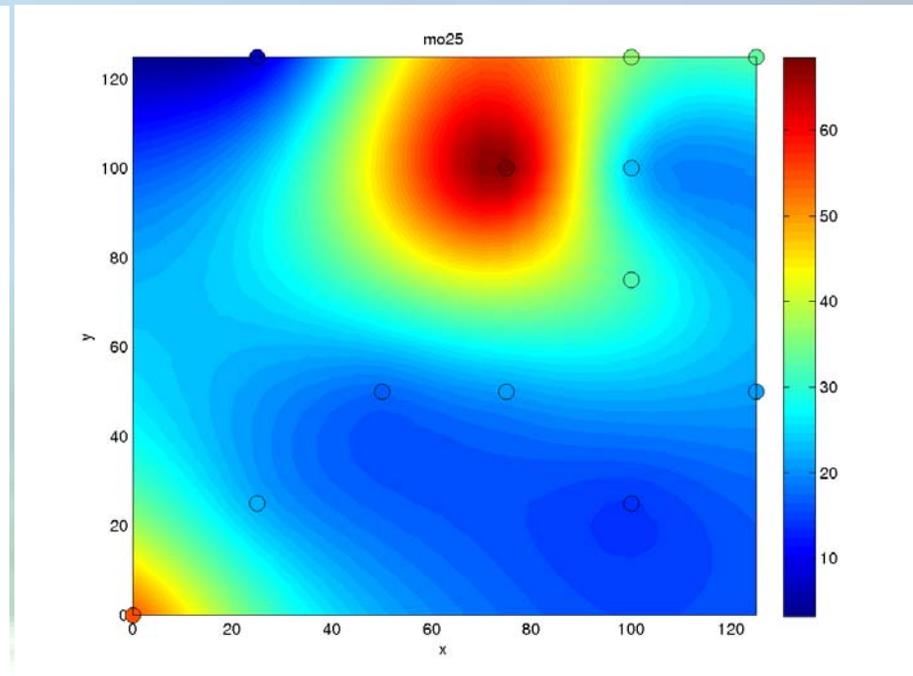
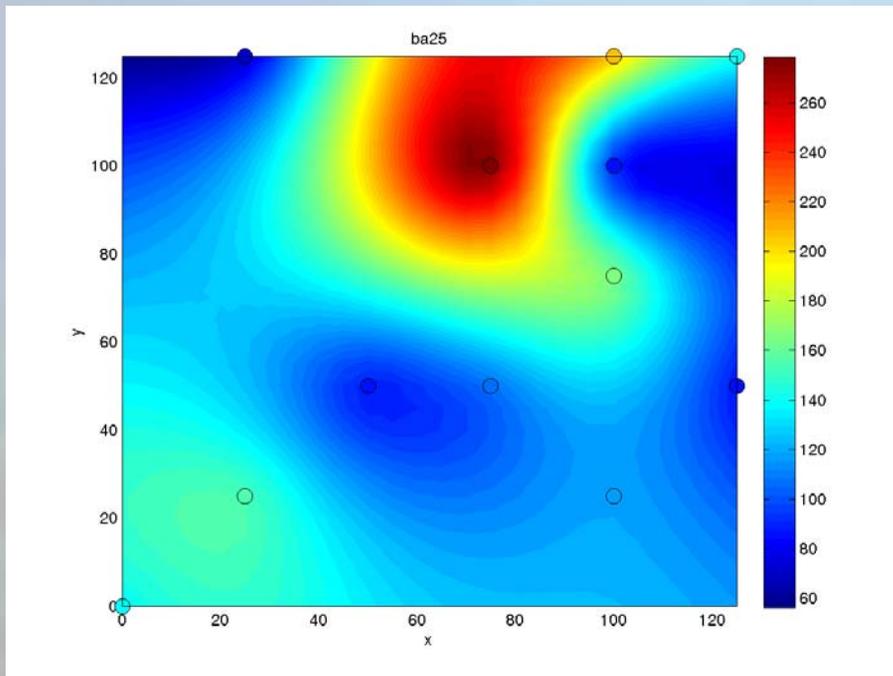
Small spatial heterogeneity  
BUT hot spots at some sediment depths



# Results : Correlation between OM and biomass of bacteria

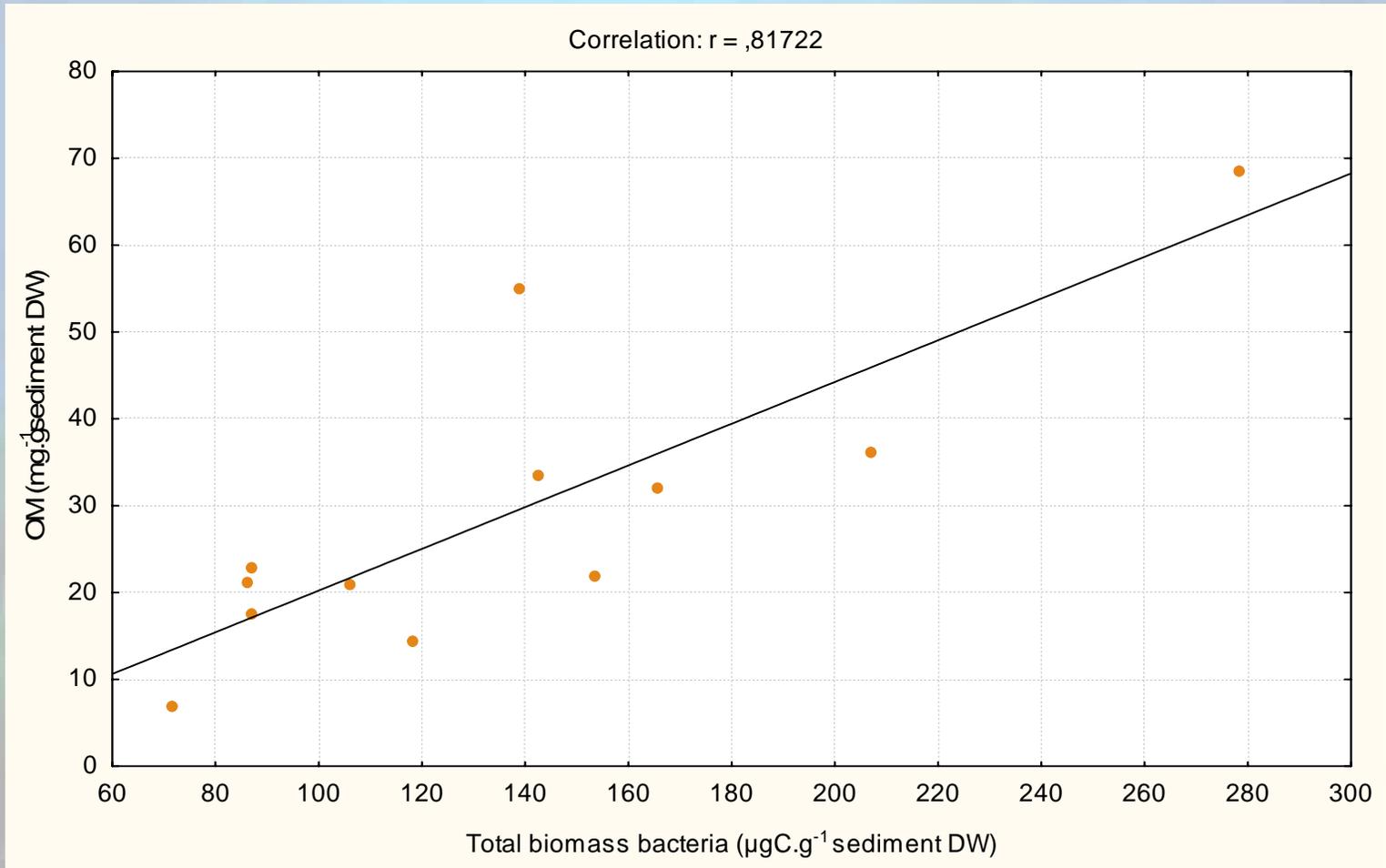
Biomass of bacteria

Biomass of OM



2-5 cm

# Results : Correlation between OM and biomass of bacteria

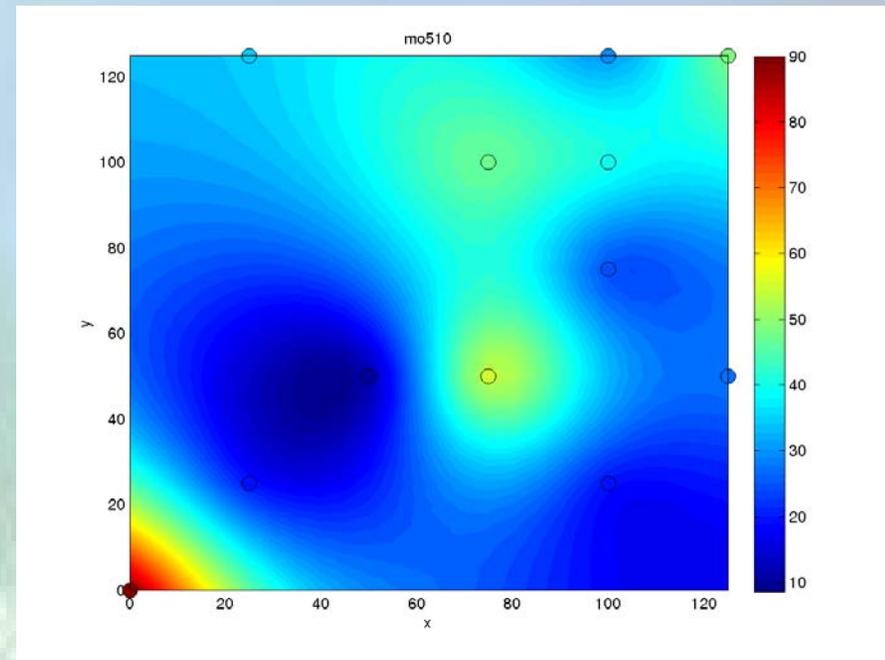
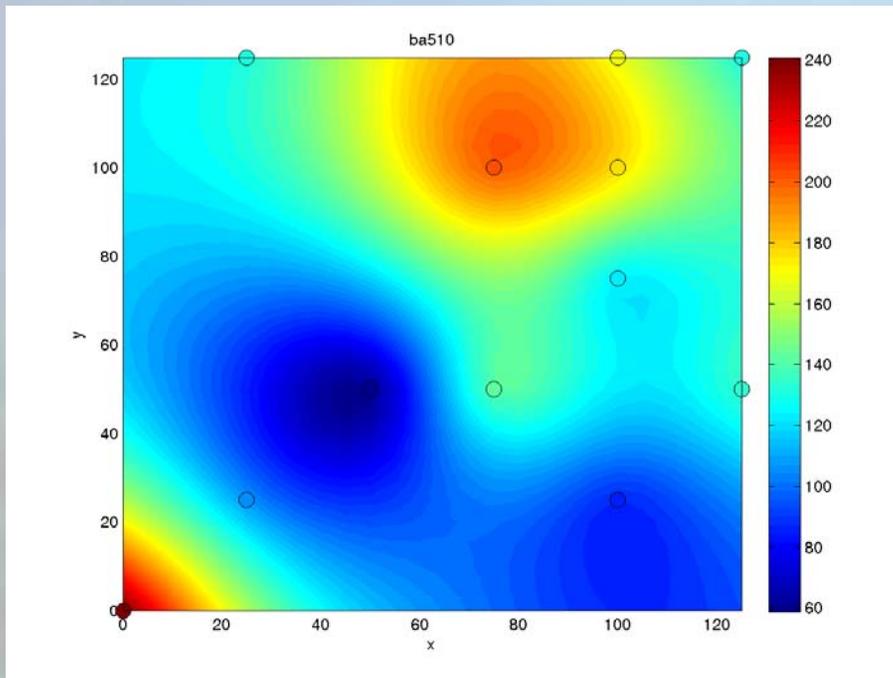


2-5 cm

# Results : Correlation between OM and biomass of bacteria

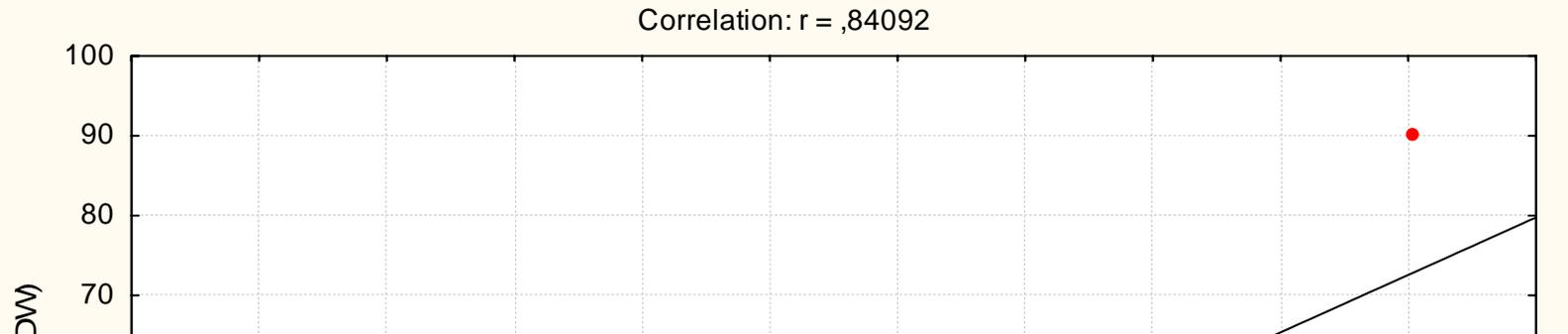
Biomass of bacteria

Biomass of OM



5-10 cm

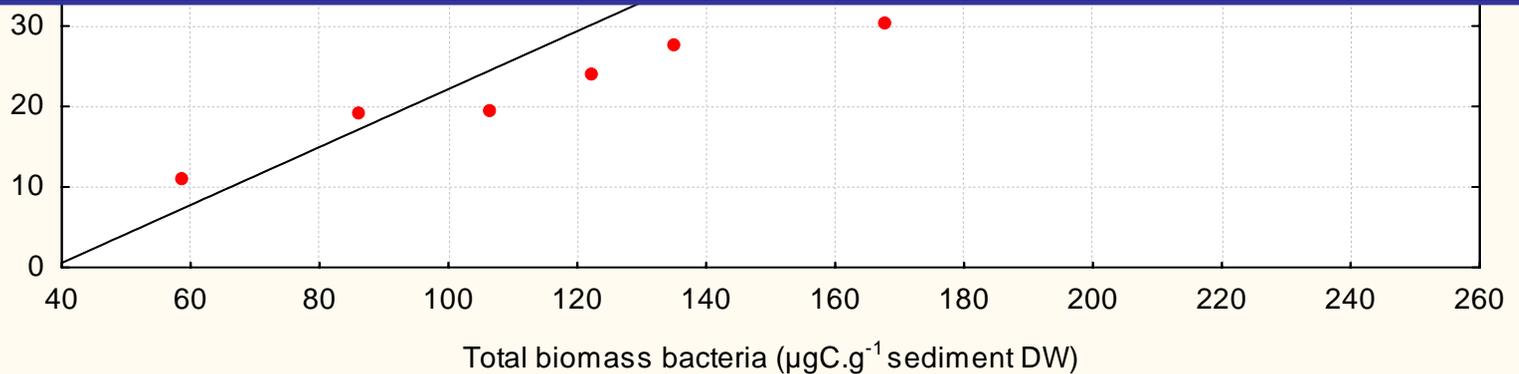
# Results : Correlation between OM and biomass of bacteria



↗ bacteria at lower sediment depth because of OM concentration

→ More food = more bacteria

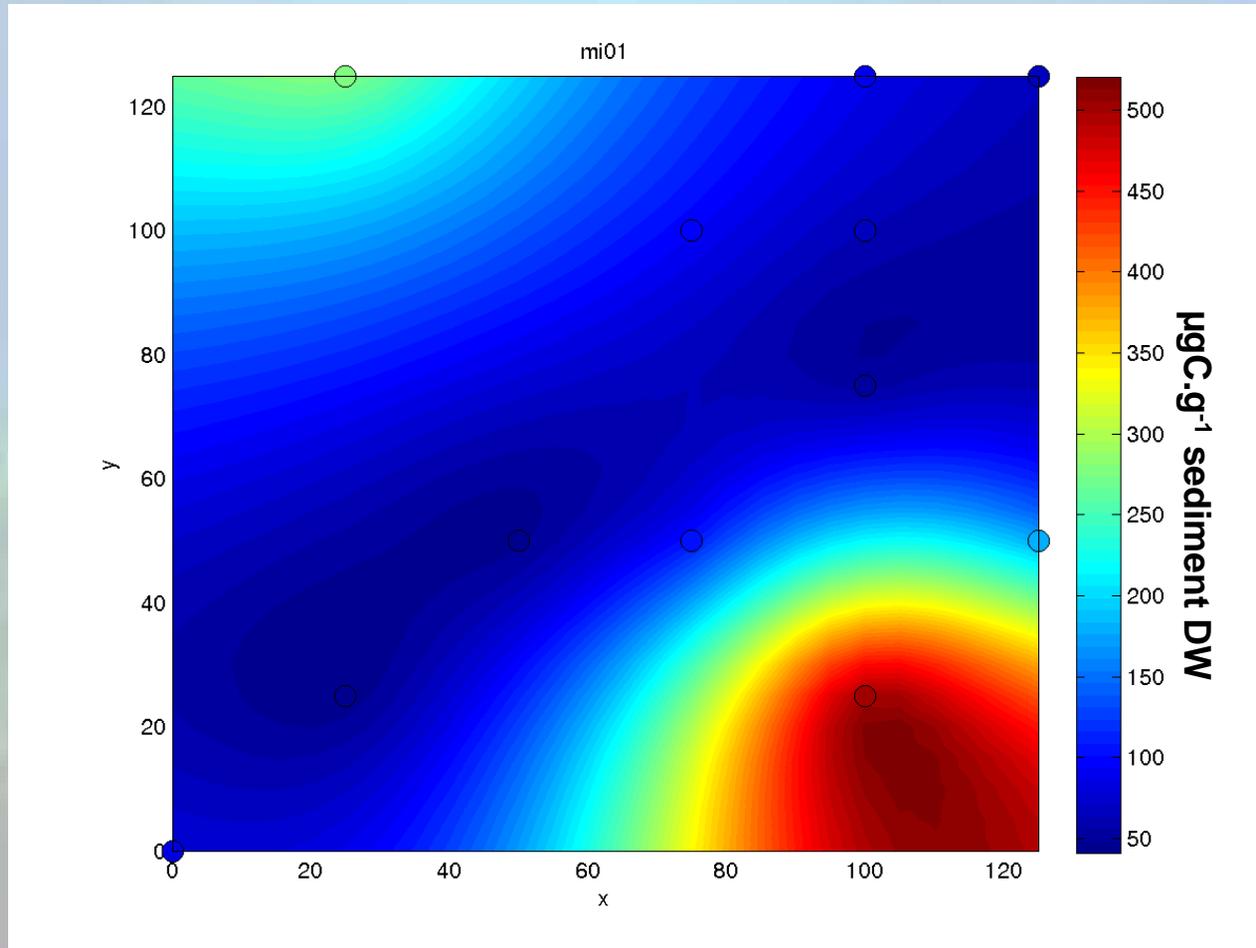
→ Less predators = more bacteria



5-10 cm

# Results : DIVA analysis

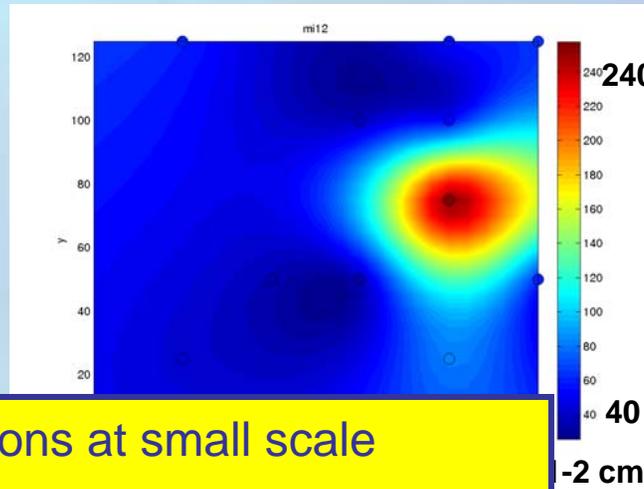
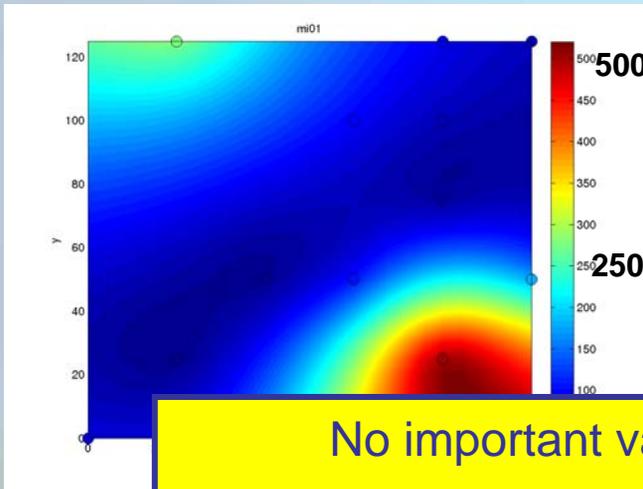
## Biomass of the microphytobenthos



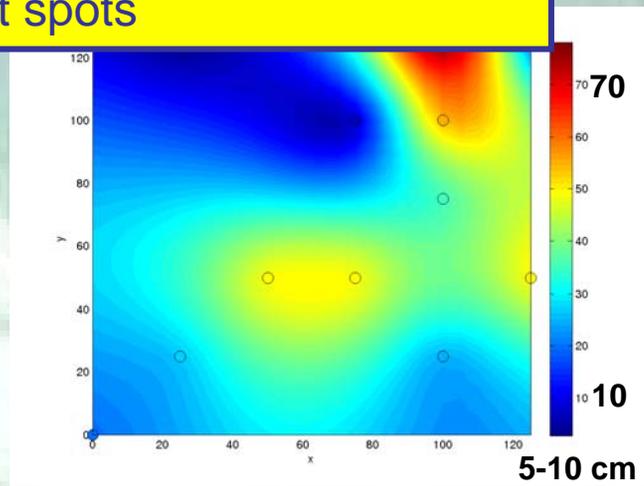
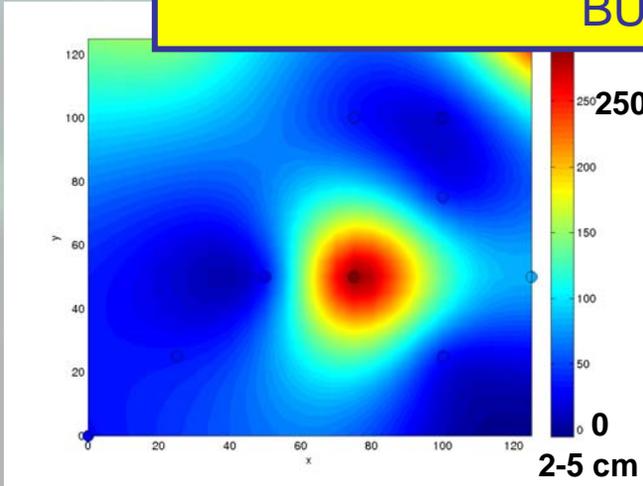
# Results : DIVA analysis

Biomass of the microphytobenthos ( $\mu\text{gC.g}^{-1}$  sediment DW)

\*



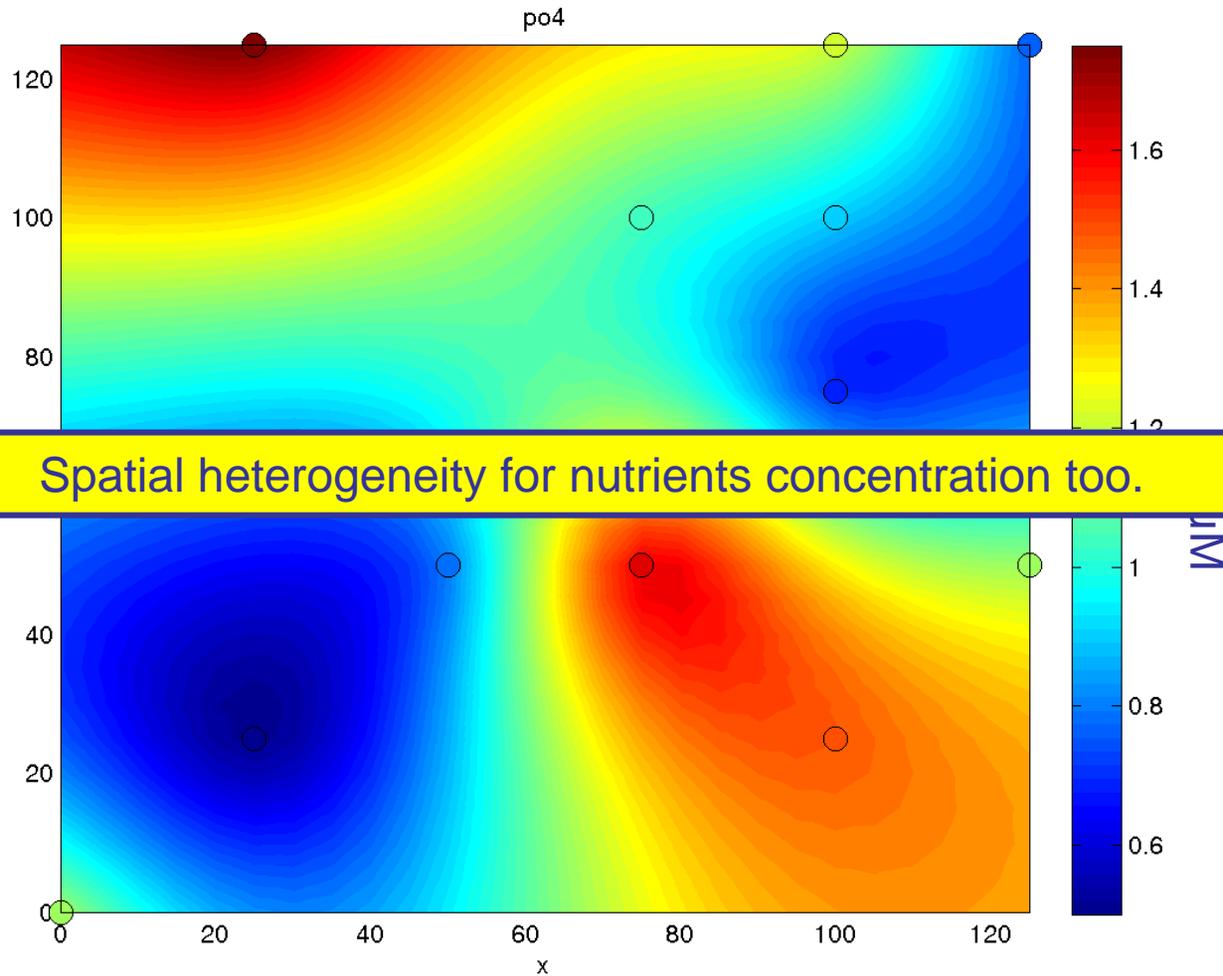
No important variations at small scale  
BUT hot spots



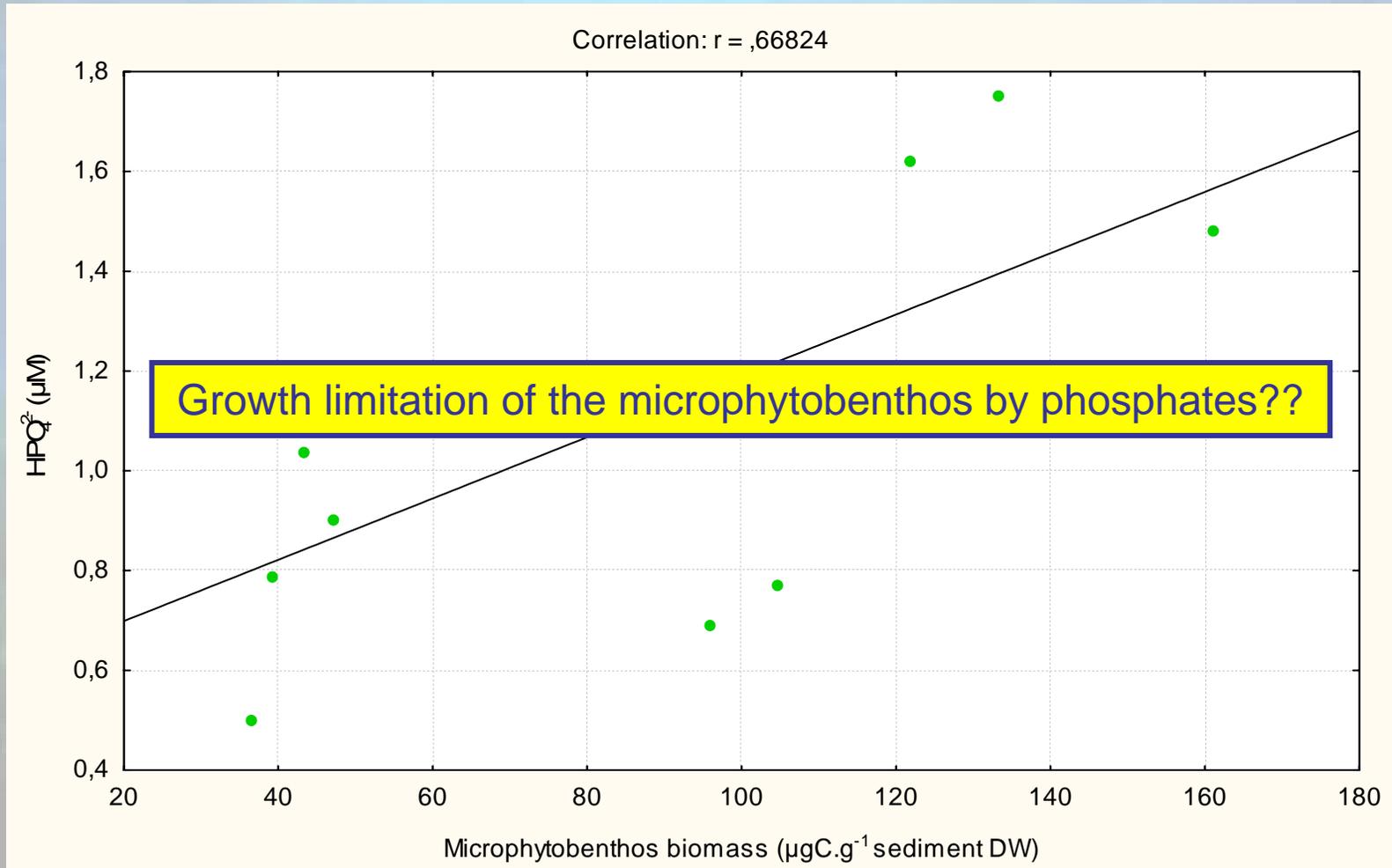
\*

# Results : DIVA analysis

## Phosphates ( $\text{HPO}_4^{2-}$ ) in pore water



# Results : Correlation between phosphates and biomass of the microphytobenthos (mean)



# Conclusions

- Spatial heterogeneity is very important at small scale in the sediment of *P. oceanica* meadows
- Presence of biomass hot spots for all the measured parameters

→ May introduce bias in statistical analysis

→ Must be taken into account in sampling strategies and discussion of results

A scenic photograph of a sunset over a large body of water. The sun is low on the horizon, creating a bright, shimmering reflection on the water's surface. The sky is filled with scattered clouds, some of which are illuminated by the setting sun. In the distance, the silhouettes of mountains or hills are visible against the horizon. The overall mood is peaceful and serene.

**Thank you very much!!!**