



# A TWO YEAR SURVEY OF ULTRAPLANKTON IN THE BAY OF MARSEILLES (NORTHWESTERN MEDITERRANEAN SEA) :

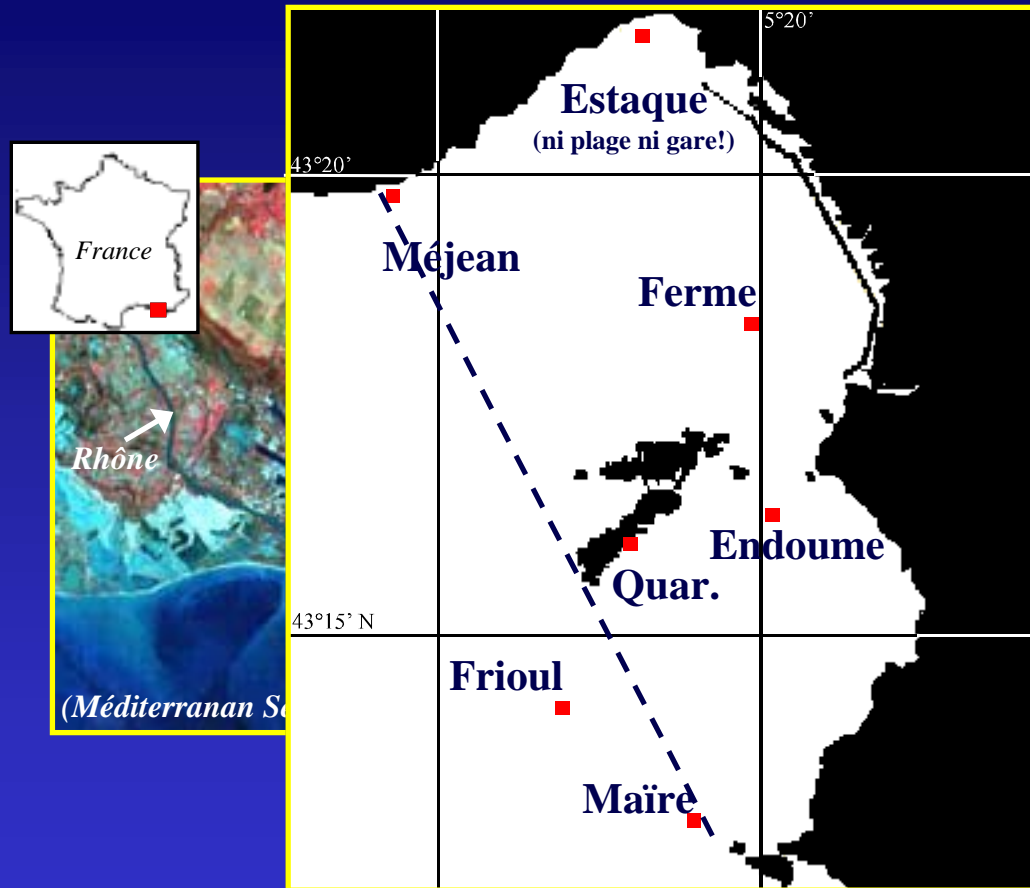
*An experiment to automatically identify clusters  
from Flow Cytometric data using  
Kohonen Self Organizing Map*

Grégori G.<sup>1</sup>, Colosimo A.<sup>2</sup>, Denis M.<sup>1</sup>, Lefèvre D.<sup>1</sup>

<sup>1</sup> Lab. d'Océanographie et de Biogéochimie, CNRS, UMR 6535, Marseille ( France)

<sup>2</sup> Univ. Roma « La Sapienza », Dept. Scienze Biochimiche, Roma (Italy)

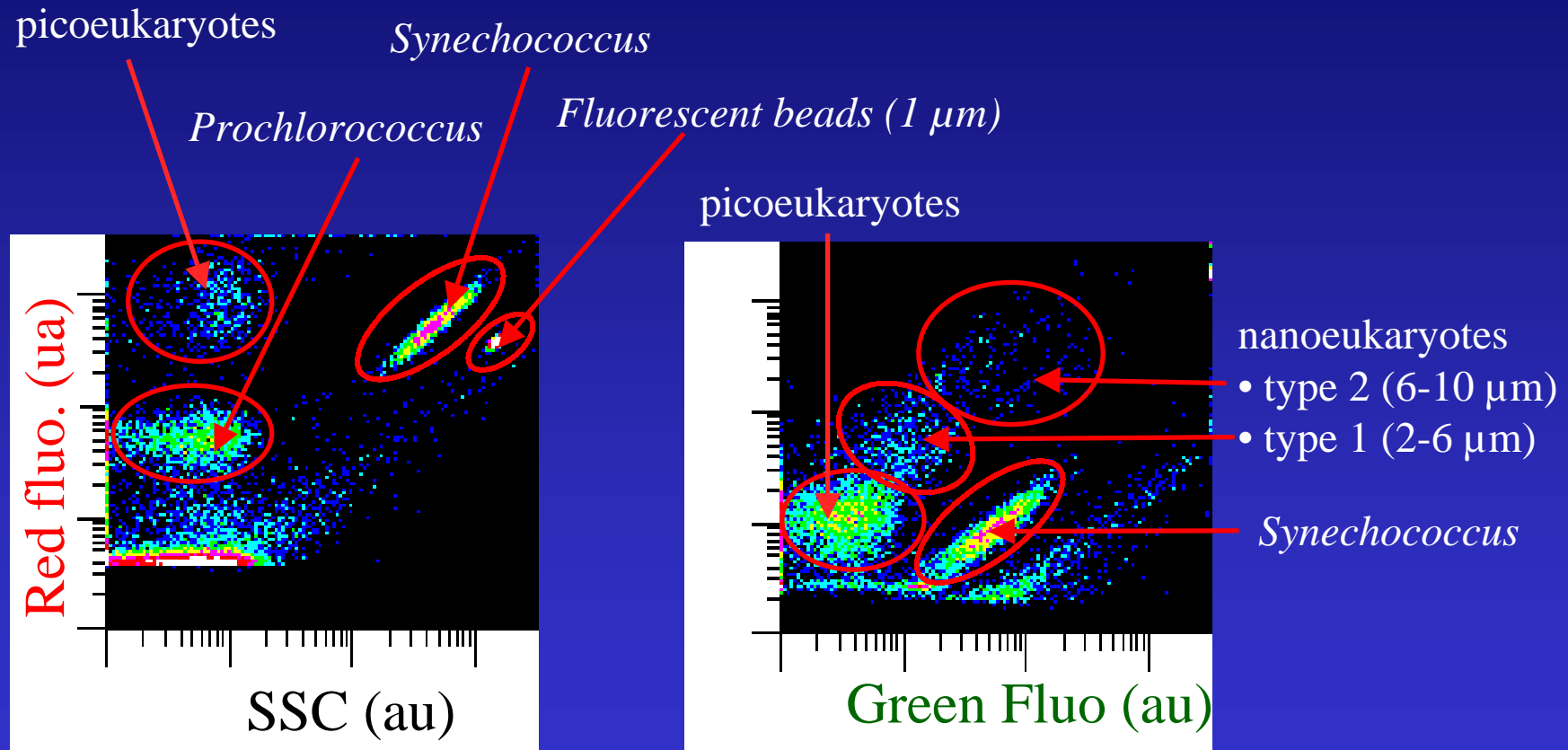
# Sampling site



# Sampling strategy

- **7 Stations**
- **3 depths :**
  - **surface**
  - **water column (max. chl. *a*)**
  - **bottom**
- **frequency: twice a month**

# Resolution of ultraphytoplanktonic clusters by flow cytometry



(size  $\leq 10 \mu\text{m}$ )

# Problem to solve

Large quantity of samples

1° Flow cytometric analysis

2° Cluster identification  
and quantification

**Time consuming**

**Objectivity?**

# A possible solution

To automatically determine  
the different clusters



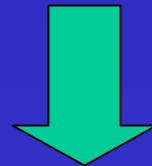
Artificial Neural Network



To be more objective



Unsupervised ANN



**Kohonen Self Organizing Map (SOM)**

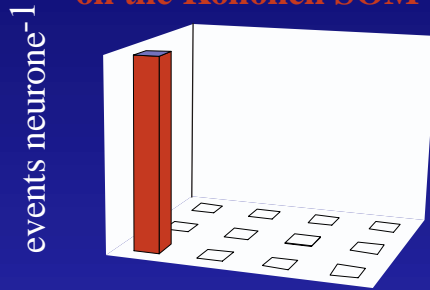
# What are SOMs?

- SOMs are "unsupervised classifier systems"
- SOMs provide a straightforward mapping of points from a n-dimensional space (input) into a 2-dimensional regular array of nodes (neurones)
- Preservation of the same spatial relationships among points in both spaces (topology conservation)
- Input space = flow cytometric variables
- Output nodes = the clusters potentially available for the observed events (particles).

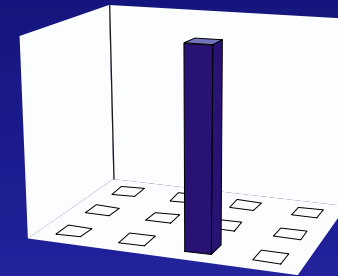
# Results

# Cluster identification on the SOM

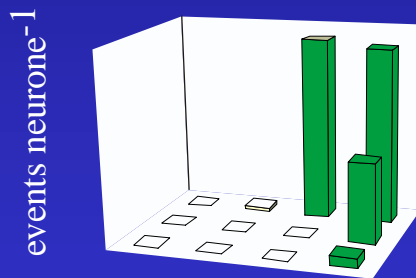
Position of calibration beads  
on the Kohonen SOM



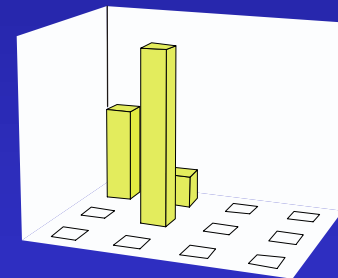
Position of *Prochlorococcus*  
on the Kohonen SOM



Position of *Synechococcus*  
on the Kohonen SOM

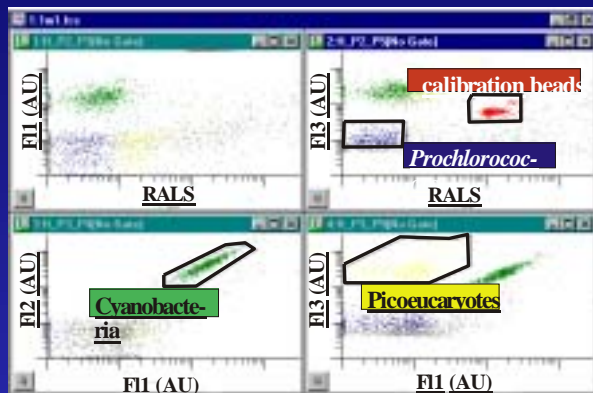


Position of picoeukaryotes  
on the Kohonen SOM

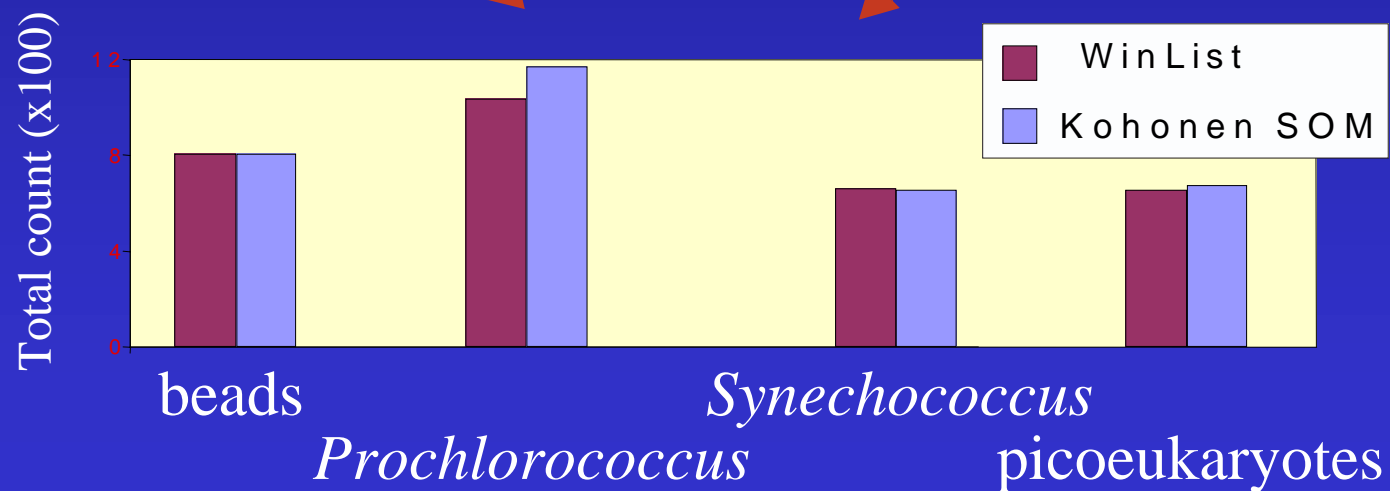
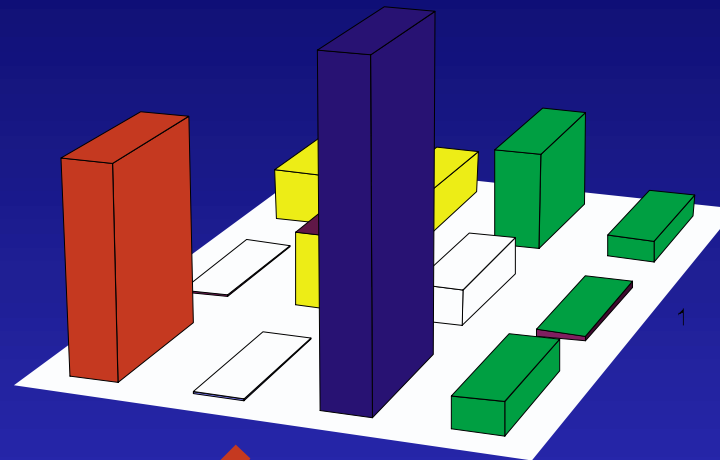


# Natural sample

Classical flow cytometric software



Kohonen SOM



More explanation?

...please come to see  
the poster PP 13.



*Thank you for your attention...*