

# VERTICAL DISTRIBUTION OF PHYTOPLANKTON COMMUNITIES AND RELATIONSHIPS WITH PHYSICO-CHEMICAL PARAMETERS RESOLVED BY A FINE SCALE SAMPLER.

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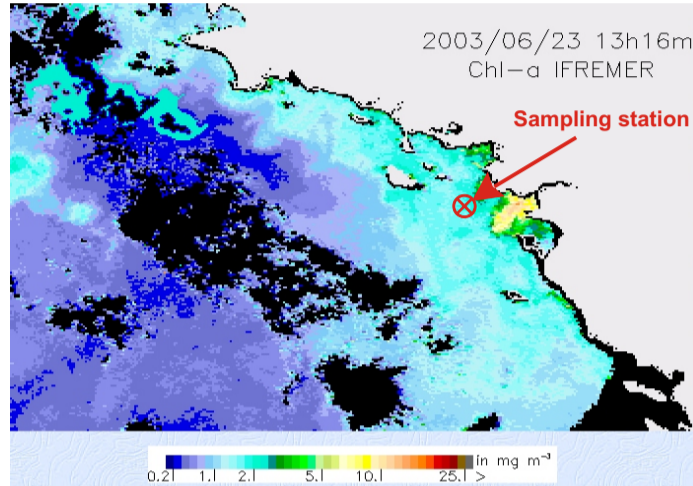
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## Objectives

A new Fine Scale Sampler (FSS) was designed and used in the Bay of Biscay (Loire plume area) in order to study phytoplankton distribution in high stratified water column. The FSS consists in a linear array of 15 sampling bottles, horizontally laid with 20 cm intervals. Data acquired from a CTD and Fluorescence probe allow a precise FSS positioning at the depth of highest density gradient or at chlorophyll a maximum. The FSS allowed to investigate microscale vertical distribution of phytoplankton and relationships with water density, nutrient concentrations or light availability for spring and summer conditions.

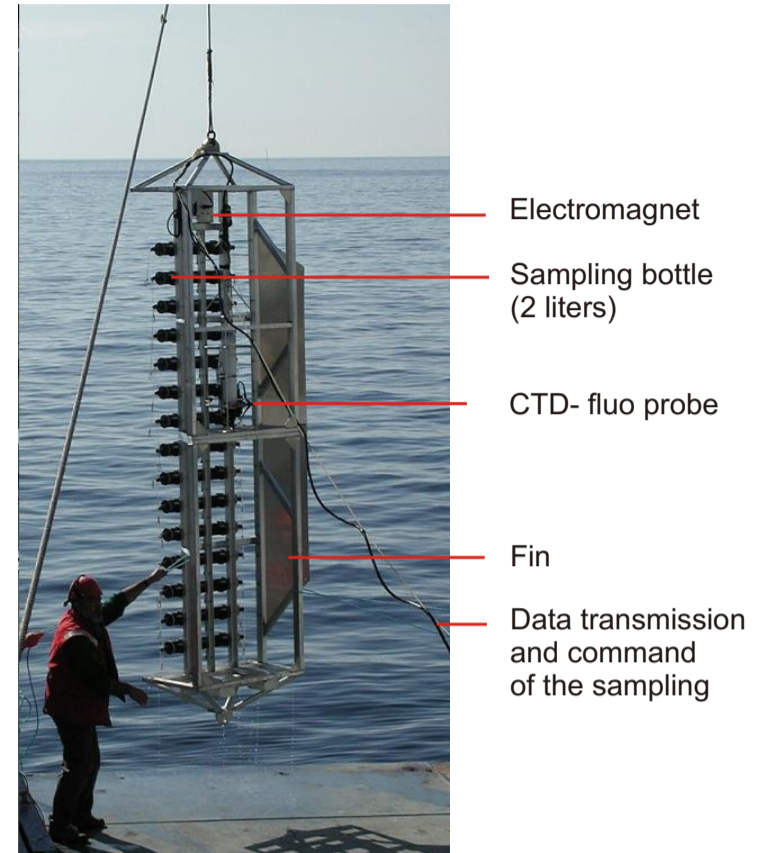
## FineScale Sampling in the Loire plume

The chlorophyll concentrations derived from SeaWiFS (algorithm Ifremer OC5) in the Loire plume, and the sampling station.



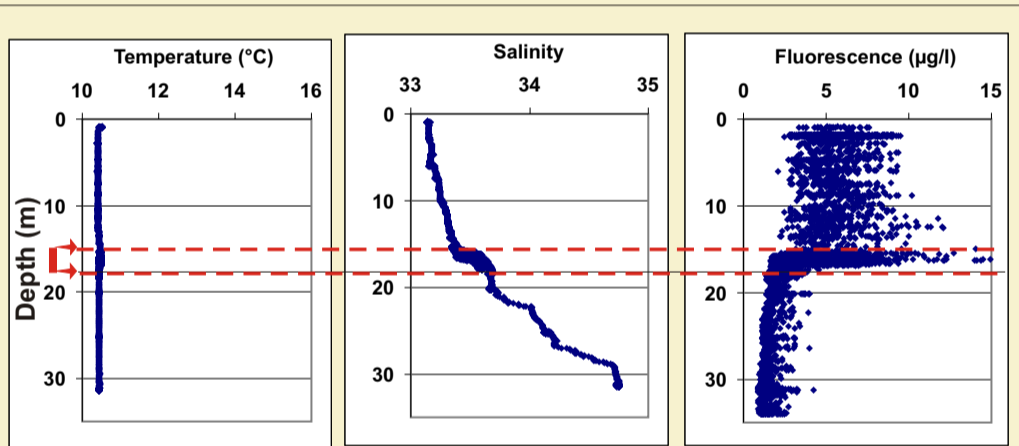
Two experiences of fine scale sampling are presented. First one was realized in spring conditions on 14 April 2002, second one was realized in early summer conditions on 21 June 2003. Located around 25 nautical miles westward of the Loire mouth those two stations are not very distant (3 miles), so the study on the results can be compared.

## The Fine Scale Sampler (FSS)



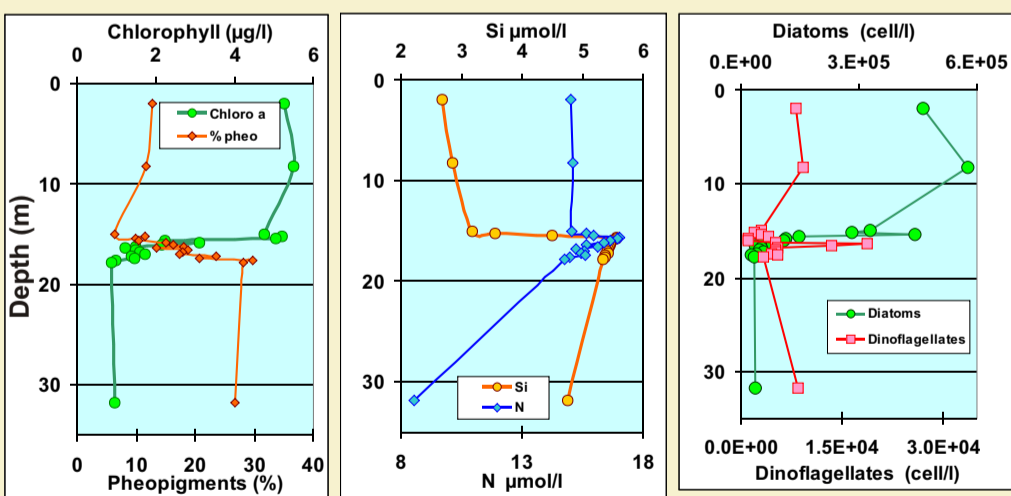
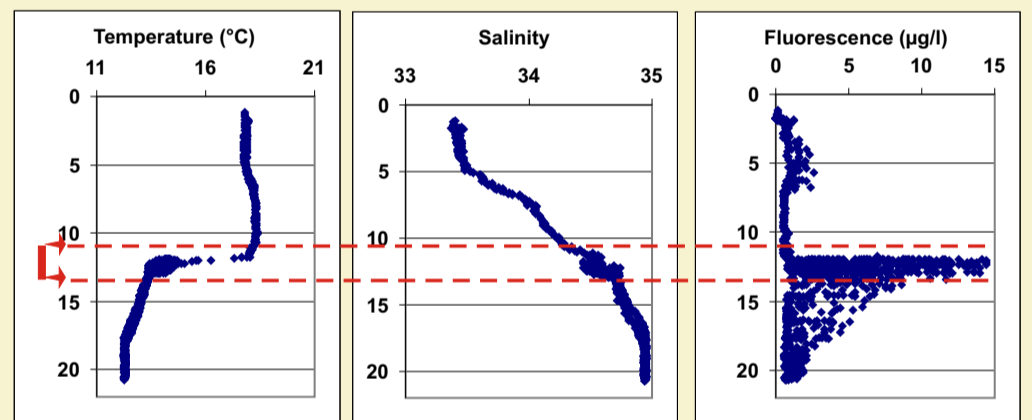
## Results

### Spring conditions : GASPROD - April 2002

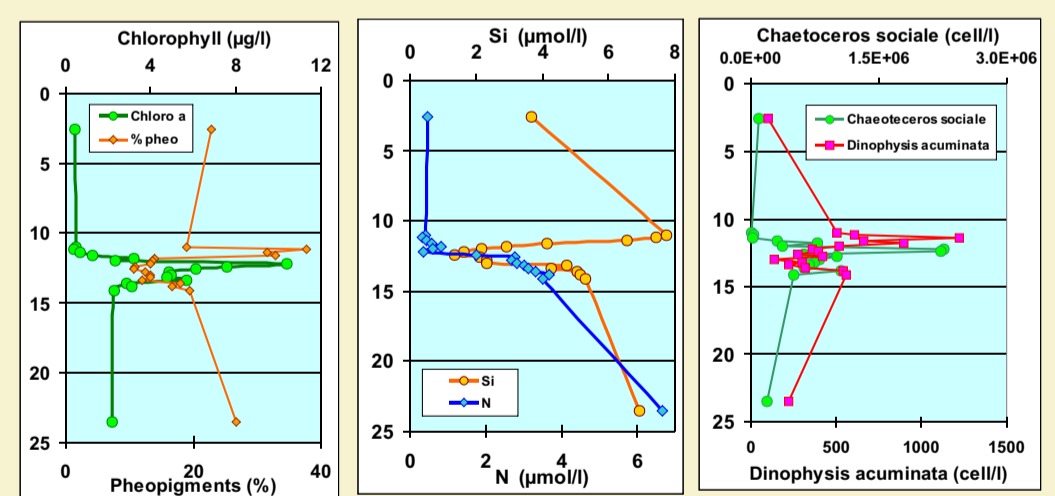


Real time data acquisition from the CTD-Fluo probe integrated on the FSS. The red arrows indicate the position of the FSS at the sampling time.

### Summer conditions : VILOIR- June 2003



During spring conditions in the Loire plume, the 15 upper meters of the water column exhibit high chlorophyll concentrations above the pycnocline; this growing phytoplankton biomass is characterized by a low percentage of pheopigments, contrasting with bottom water enriched with pheopigments. In this upper layer, nutrient uptakes are clearly revealed by Fine Scale Sampling, particularly for the silicate due to large diatom development. Dinoflagellates are spread in a one meter thick layer, just under the diatom maximum.



During summer conditions in the Loire plume, the maximum phytoplankton biomass is located in a thin layer at 12 m depth; the development of diatoms at this level is due to the conjunction of nutrient availability (originating from deeper water) and sufficient light energy from the surface. The FSS highlights a silicate uptake linked with this high diatom biomass between 11 m and 13 meters. A limitation of phytoplankton growth by dissolved nitrogen is also evident above 12 meters. One meter above the chlorophyll peak, there is a high level of pheopigment due to phytoplankton settling from the surface layer to the pycnocline. The diatom *Chaetoceros sociale* is dominant in the phytoplankton peak located below the pycnocline and a thin layer of *Dinophysis acuminata* is detected 1 m above, in nutrient depleted conditions.

## Conclusion

It appears that simultaneous sampling with the FSS allows a non-biased characterization of stratified waters. This method is of importance in coastal areas because high resolution observations improve the knowledge of major processes controlling the primary production and phytoplankton species location in highly productive river plumes.