

Voilier Autonome Instrumenté pour Mesures Océanographiques de Surface (Autonomous sailing boat with embedded instrumentation for ocean surface measurements)

People involved in the project:

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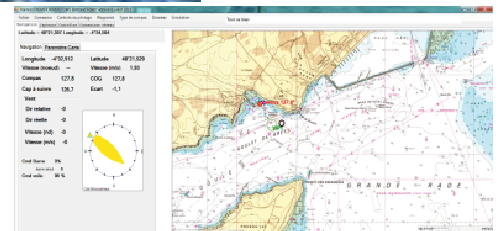
Origin of the project:

Recent publications revealed that the mixed layer may present surface singularities for biogeochemical parameters. Those studies question the common view of a homogeneous mixed layer. However, the degree of ubiquity of these surface singularities and their horizontal structures remain largely unknown because of the lack of adequate instruments to sample the first centimeters of the ocean. Therefore, the development of a new type of instrument, an autonomous sailboat designed to be easily deployed and to sample quasi-simultaneously the top centimeters and the underlying water column has been started.

In order to be able to document the gradients of several parameters between the top centimeters and the sub-surface of the ocean, we have started in November 2010 the development of an autonomous sailboat able to sample the ocean surface at two depths (the first 10 cm and ~ 1 m).

The instruments use some of the developments made during the Mobile Water Quality Sensor System European project (MOBESENS, see <http://www.mobesens.eu>).

Description of the system:



- Hull is derived from a standard mini-J which is a 1/10th scale model of the famous America's cup Class J.
- Rig is adapted from a balestron (spirit)



- Electronics is build around an embedded Ethernet network
- Access for 2 computers: on Board Linux + on shore PC; each able to drive any sensors on the network
- On sight remote control through a Wifi link and a high level HMI: both keyboard and joystick controls are available
- Offshore communications via Iridium system

Measurements:

- NKE multiparameter probe:

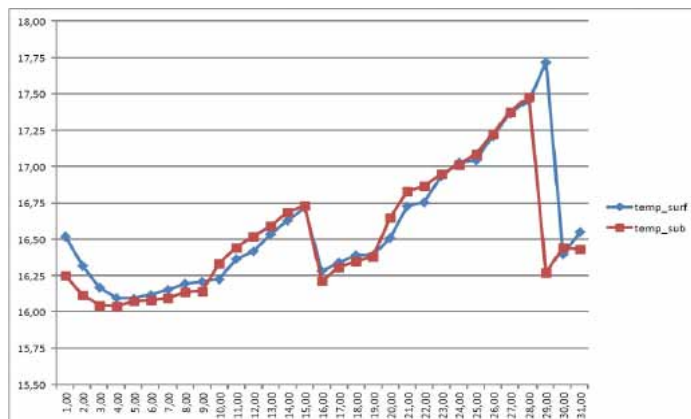
- Turbidity,
- Fluorescence,
- Dissolved Oxygen,
- Conductivity,
- Temperature,

- 1 probe for 2 levels: alternate measurements with 2 water intakes



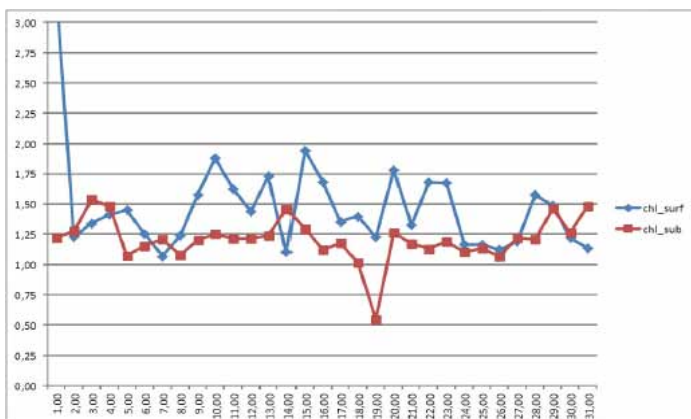
Data acquired and future prospects:

Temperature and Chlorophyll a data acquired during the first trial



The top curves show a quite similar temperature at the 2 levels while the bottom one displays chlorophyll data which differ significantly at the 2 levels.

Of course, these results need to be confirmed by longer time series. Correction of depth with the boat attitude sensors will also be taken into account.



This plot shows the potential of this tool to monitor biogeochemical parameters.

Chlorophyll a (fluorescence), dissolved oxygen, nutrients and partial pressure of CO₂.

We also plan to add to the boat capacity to take samples and stock them inside the hull (with or without poison injection). Post cruise laboratory analyses would then be possible.

Partners of the project:

