Physical-Biogeochemical Interactions in NW Mediterranean, using the Glider "Sea Explorer" fitted with a Newly Developed Fluorescence Sensor, the " MiniFluo-UV ".

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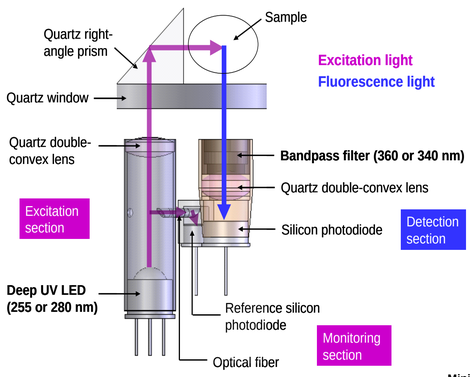
1 INTRODUCTION

- Dynamics of physical structures at meso-and small scales influences the distribution of biogenic and anthropogenic elements with consequences on the biology. Due to their fleeting nature, high frequency measurements are needed to better assess these physical-biogeochemical interactions.
- With this aim, the glider "Sea Explorer" was fitted with conventional sensors (seabird GPCTD/O_2, wetlabs triplet puck Chla/BB_{700}/CDOM), and an original FDOM bi-optical pathways sensor "the MiniFluo-UV" developed by the MIO (Marseille, FR), detecting TRY-like (λEx/λEm : 280/340 nm) and Phenanthrene-like (λEx/λEm : 255/360 nm) fluorophores **(2)** (Tedetti et al. 2013), markers of microbiological activity and oil-related compounds respectively.
- The platform was deployed in Marseille area, South of France influenced by the Rhône river inputs (~1000 m^3 s^{-1}), the industrial and petrochemical activities (FOS area) of this megacity (1M inhabitants) and the Northern current **(3)**.

2 THE MINIFLUO-UV

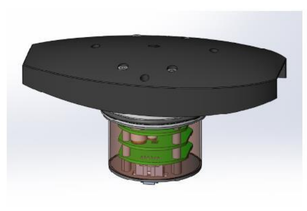
Sensor optical architecture and several version built since 2010



Portable (2010-11) **Submersible** (2012-présent)

Tedetti, Joffre, Goutx (2013) **Tedetti et Goutx (2012, 2014) brevets CNRS**

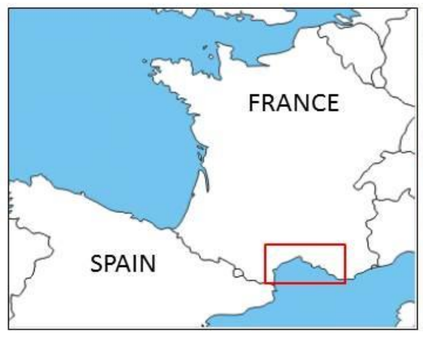
- Measurements of 2 fluorophores (PHE and TRY) + LEDs monitoring
- Small size (80 x 60 mm) and low energy consumption (500 mW @12 V)
- Depth rating: 850 m
- Analog and numerical communication modes



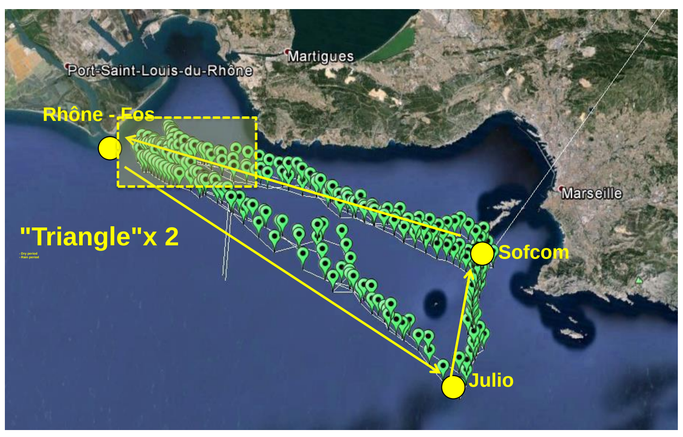
MiniFluo-UV, Alseamar Cie

Glider Sea Eplorer SE003, Alseamar Cie

3 OBSERVATION IN MARSEILLE BAY AREA

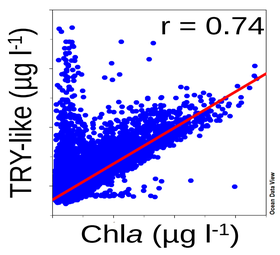


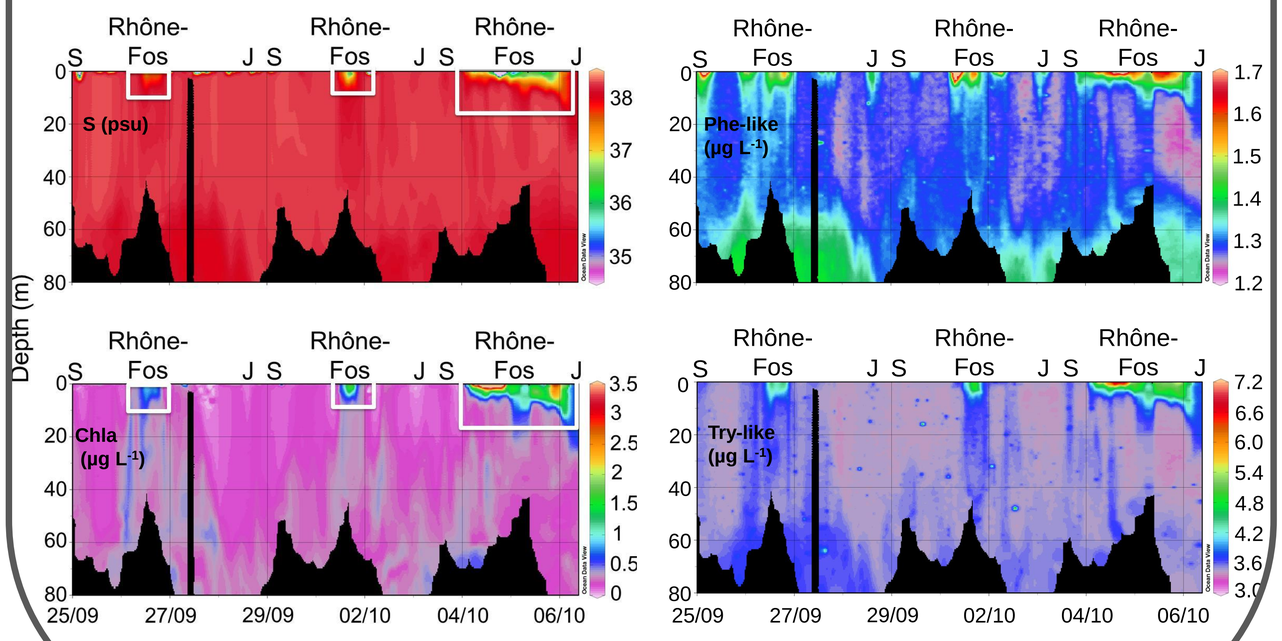
4 NORTHERN BAY



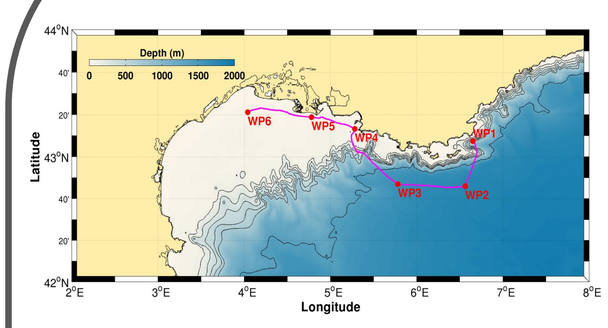
26 sept. - 7 oct. 2014

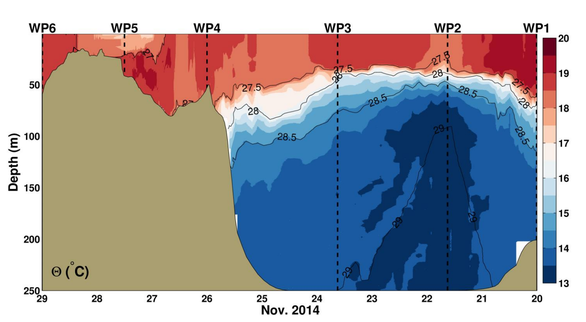
SEA EXPLORER fitted with CTD, EcoPuck e& MiniFluo-UV

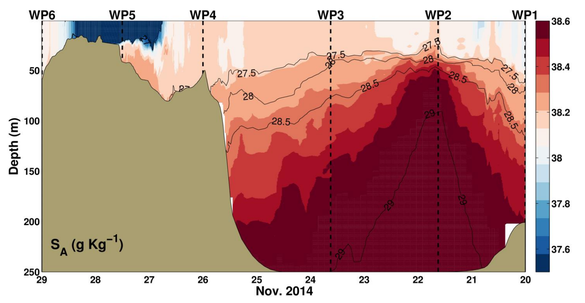


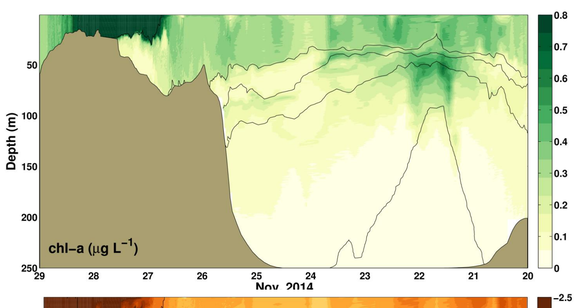


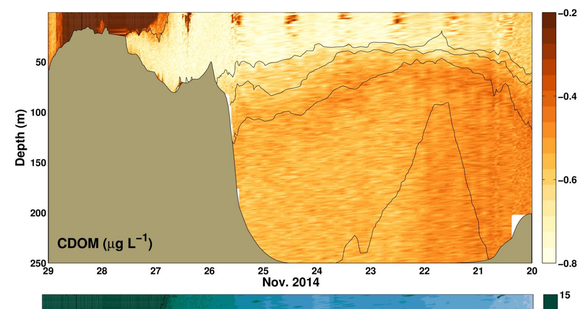
5 SOUTHERN BAY AND ALONG COAST TRANSECT

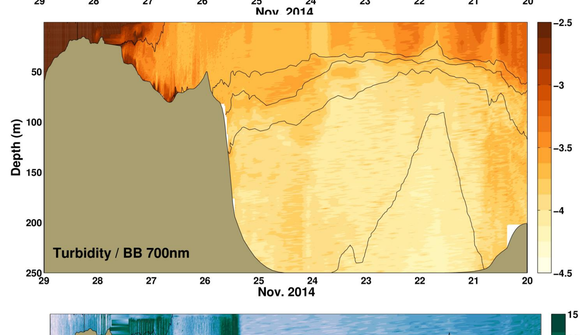


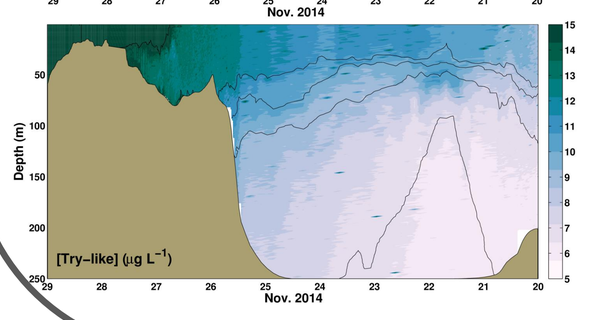


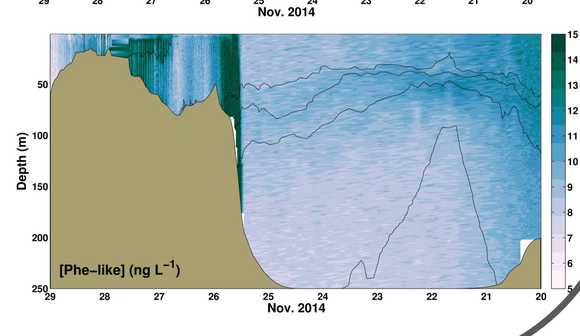












RESULTS AND CONCLUSIONS

The spatio-temporal variability of biogeochemical parameters is related to hydrological features, and human pressure. At the Rhône river mouth (4), physical (S) and biogeochemical descriptors (Chla, Try- and Phe-like) co-varied and extended further southwards after rainy weather. Try-like concentrations showed a significant correlation with salinity and Chl*a* indicating the biological source of DOM related to the Rhône inputs. Try- and Phe-like concentrations displayed independent behavior along the bay of Marseille transects, with patches of higher Phe-like concentrations throughout the transects and inputs from the sediment. The distribution of CDOM (humic-like compounds) appears controlled by the photo-bleaching.

As the edge of the Northern Current is approached (5) (WP2), the frontal dynamics brings cool and saltier waters from the deeper layers near the surface (dome-shape isopycnals). High Chla-concentrations are observed between 50-100m as a result of these upwelled waters. Tryptophan-like concentrations also increase at these depths, thus marking increased biological activity.

This study highlights the interest of coupling the outstanding maneuverability of SeaExplorer for exploring shallow waters and highly dynamic river mouth to the MiniFluo-UV sensor for analyzing the fluorescence properties of sea water.

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