

Implementation of high frequency innovative approaches to characterize the water quality and the phytoplankton community in the North Sea.

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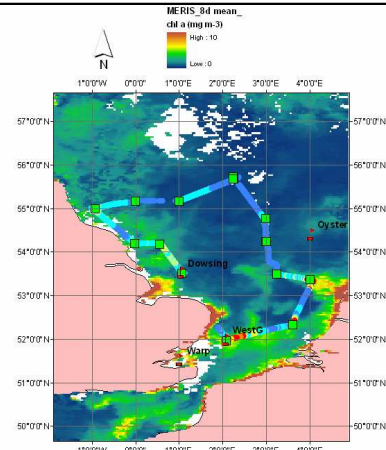
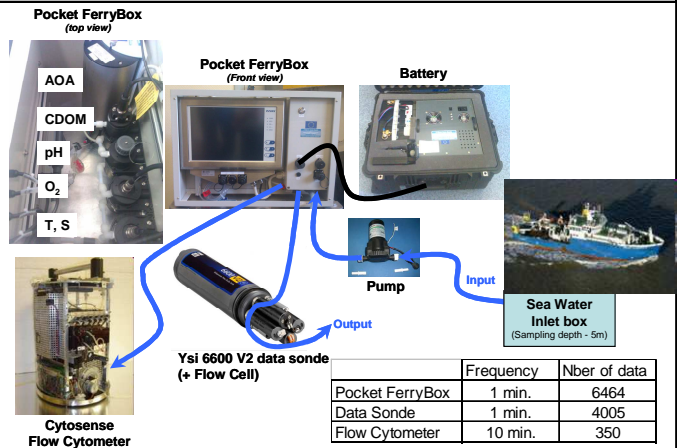


Objectives

DYMAPHY is an INTERREG IVA "2 Mers Seas Zeeën" Programme (2010-2013) that aims to improve the assessment of the quality of marine waters in the Euro-region (English Channel and North Sea) at high spatial and temporal resolution by using a combination of traditional (microscopy, pigments) and innovative approaches (flow cytometry, spectral fluorometry, high frequency automated monitoring systems, satellite imagery).

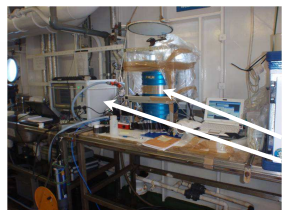
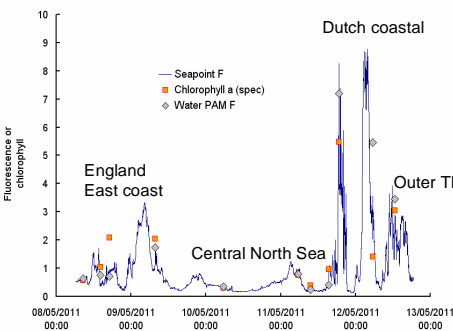
Materials & Methods

A **Pocket FerryBox** (4H-JENA©) coupled with a multiple-fixed wavelength **spectral fluorometer** (AOA, bbe©), an **Ysi data Sonde** and a **Cytosense flow cytometer** (Cytobuoy ©) was implemented during the scientific cruise **PROTOOL** (+PAM, Fastracka, PSI fluorometers, radiocarbon) in May 2011 on the RV Cefas Endeavour.



Results

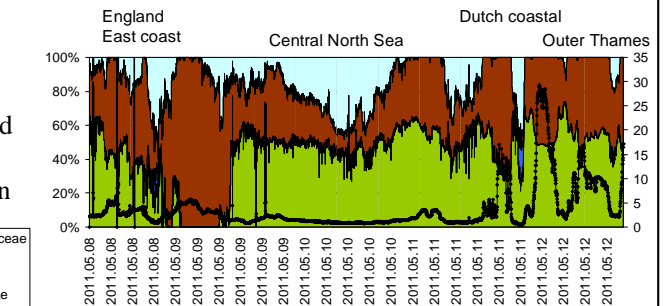
We show high spatial temporal changes in the phytoplankton community which could hardly be detected by employing discrete sampling strategies. High frequency measurements (HFM) allows to identify precisely, in time and space, the contrasted environment sampled. Moreover within a given environment, HFM highlight changes in the composition of the phytoplankton community.



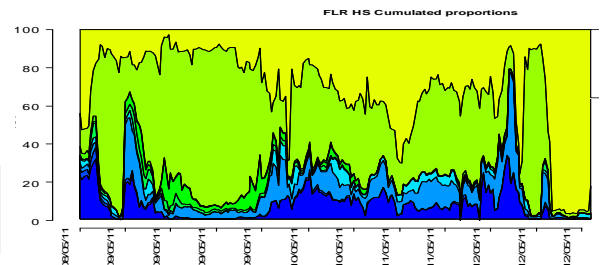
Legend for flow cytometry results:

- Cryptophyceae
- Diatoms
- Blue Algae
- GreenAlgae
- Total Chl_A

A total of 9 groups were distinguished by flow cytometry based on their optical properties.



AOA results shows changes in the main functional groups contribution (discrimination using spectral signature) along the transect.



Targeted *in situ* "chlorophyll" estimates show similar trends and agree with ocean colour.

Conclusions

This study demonstrates that only an high frequency automated operational monitoring system can measure the high variability of the phytoplankton communities, as it is required under anthropogenic pressure areas. This HFM strategy should be complemented by *in situ* samples for calibration purposes. The offshore extension of the monitoring effort needed, for example, within the Marine Strategy Framework Directive (2008/56/CE) makes inevitable this kind of approach and moreover, it becomes necessary to gain further knowledge of the dynamics of special environmental events (...) for an integrative ecosystem assessment of the ecological status of the environment.