



Spatiotemporal dynamics of physicochemical, photosynthetic parameters and phytoplankton in the central English Channel

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CONTEXT

Phytoplankton species are the principal source of food for life in the sea, proliferations of phytoplankton are common in coastal environment. In open water, the needs for observation and prediction include long records that can characterize the physico-chemical environment and the ecological system.

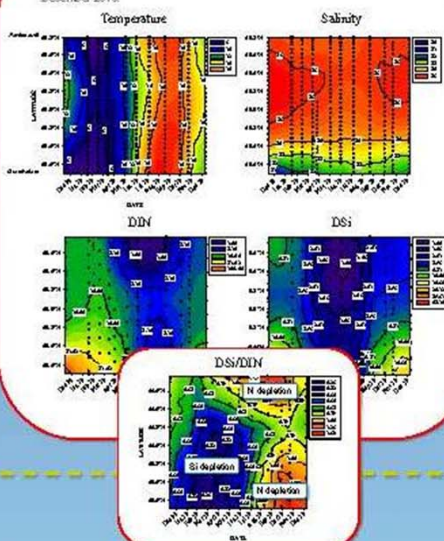


APPROACH

Hydrological and photosynthetic parameters were investigated during one year, along a transect in the central part of the English Channel using a Ferry. Measurements were conducted every month from November 2009 to December 2010 in the English Channel. Data were collected onboard the *Normandie-Brittany ferries* during the ferry's daily cruises on a 175 kilometers transect between Ouistreham (France, 49°17'27 107 N, 000°14'45 W) and Portsmouth (Great Britain, 50°48'49 N, 001°05'29 W).

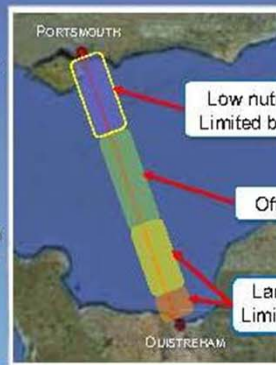
PHYSICO-CHEMICAL PARAMETERS

Latitude-time distributions of the environmental factors : water temperature in °C, salinity, DIN concentrations in $\mu\text{mol L}^{-1}$ and DSI concentrations in $\mu\text{mol L}^{-1}$ along the transect Ouistreham-Portsmouth between November 2009 and December 2010.



A powerful statistical analyze (PTA) allowed to distinguish 4 hydrographic areas

+ an ACP on each area allowed to understand the relationships between physicochemical and biological parameters



Low nutrients concentrations
Limited by nutrients availability

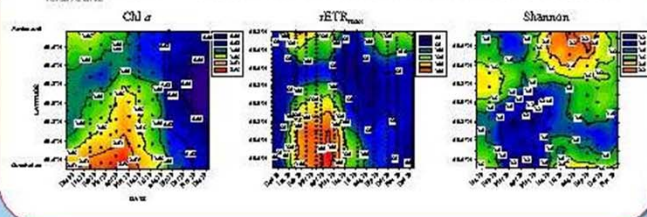
Offshore influence

Large freshwater inputs
Limited by light availability

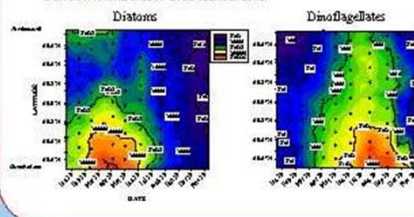
A phytoplankton dynamic characteristic of a temperate ecosystem was observed: a diatom bloom was recorded from January to June, associated to high nutrient concentrations and a dinoflagellate bloom was observed from July to September associated to high temperature and irradiance.

BIOLOGICAL PARAMETERS

Latitude-time distribution of the biological factors : the Chl *a* biomass in $\mu\text{g Chl a L}^{-1}$, the maximal photosynthetic capacity (relative maximal Electron Transport Rate - $rETR_{max}$) in relative unit and the biodiversity (Shannon index) in relative unit.



Latitude-time distributions of the phytoplankton abundance : diatoms in cells L^{-1} and dinoflagellates in cells L^{-1} along the transect Ouistreham-Portsmouth between November 2009 and December 2010.



Our results suggest that there is a temporal uncoupling between the maximal photosynthetic capacity ($rETR_{max}$) and biodiversity. High $rETR_{max}$ values recorded during the winter/spring diatom bloom were associated to low biodiversity, whereas the high level of $rETR_{max}$ observed during the summer dinoflagellate bloom was associated to high biodiversity.

NEXT STEPS

- The species composition and the cells abundance were specific of each hydrographic areas, which allowed us to characterize the factors controlling dynamics species level.
- This work should allow improving the photosynthetic parameters regulation applied in model and used in primary production estimation using updated marine dynamic models.



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