

Temporal realised niche analysis of the diatoms community and of *Phaeocystis globosa* on the French Coast of the eastern English Channel

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A recent investigation of the effect of environmental controls on the dynamics of spring phytoplankton blooms occurring in the eastern English Channel was done over the last two decades (1993-2014). Concentration of nutrients (Nitrogen and Phosphorus) decreased, at a different rate making N/P ratio increasing while at the same time, the annual mean temperature and PAR decreased. These changes in resources are correlated with a change in diatom community structure (increase in species richness, and decrease in biomass and mean biovolume). Conversely, the magnitude of the following undesirable prymnesiophytes *Phaeocystis globosa*'s bloom gradually increased. Contrarily to the diatoms, *P. globosa* has no need for silicate, has a higher N/P ratio and consequently mainly depends on the excess of nitrate left after the diatoms' bloom.

Two non-mutually exclusive hypotheses can be formulated. The first one is that the blooms' magnitude increase of *P. globosa* over time is explained by the preceding decrease of nitrate use efficiency of the diatoms community, which structure and succession changed over time. The second one is that change of climate conditions (light and temperature) favours *P. globosa* over diatoms. To confirm/infirm these hypotheses, the characterisation of the ecological niches is needed. This will provide a more general understanding of the effect of environmental controls on the diatoms community composition and structure in relation with the ecosystem functioning. Ecological niche is defined statistically for each species based on their relative abundance for certain environmental conditions by the OMI analysis. The late winter and early spring diatoms communities are species-rich, displaying large variations in size, shape, coloniality, and therefore in their niche characteristics. For example, we know that small diatoms have a greater competitive advantage when nutrient resources are low but lower resource stoichiometry plasticity than the large ones. A new method was developed, based on the OMI analysis, in order to compare the yearly niche position and breadth of each species within a single fix referential plan.

Here, we present the results on a temporal realised niche analysis performed in an attempt to show the effect of the nutrient reduction and climate change over time on the succession of the diatoms community prior the bloom of *P. globosa*. The apparent decrease of the diatoms community size will be discussed in the context of a reduction and/or expansion of their realised niches of the large and small species, respectively.

Keywords: global change; spring bloom; OMI analysis; succession; niche reduction; niche expansion; referential plan