
Phytoplankton's taxonomic and functional diversity patterns over a coastal tidal front

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Abstract

Oceanic communities of photosynthetic organisms (*ie* phytoplankton) with various ecological strategies are responsible for about 50% of the earth's primary production and shape global biogeochemical cycles. Understanding the dynamics in the taxonomic and functional composition of this bulk of organisms is thus a great challenge. The factors brought forward to explain phytoplankton's distribution involve, 1/ Advection and dispersion (*eg* water currents, mixing), 2) resource availability (here light and nutrients) and 3) biotic interactions; whether trophic (*eg* predation), symbiotic (*eg* parasitism) or competitive (here competitive exclusion for light and nutrient).

The Ushant tidal front (Iroise Sea, French Brittany), is a zone of high primary production where all those confounding effects takes place. A recent application of trait-based modelling in the Iroise Sea highlighted a hotspot of diversity in the location of the front. Two hypotheses were highlighted to explain a higher phytoplankton diversity in the front: 1/ the advection of ecological strategies adapted to the distinct biotopes surrounding the front (*ie* ecotone) and 2/ the local decrease in competitive exclusion due to better resource availability.

These mechanisms shaping phytoplankton's taxonomic and functional diversity in the front were studied by coupling metabarcoding and a biological trait analysis. The Ushant tidal front was sampled three times during 2015 and protists (*ie* unicellular eukaryotes) were targeted and identified by sequencing methods. Based on their taxonomy, Operational Taxonomic Units (OTUs) were annotated with 13 traits to select and infer phytoplankton ecological strategies. We will first highlight the physicochemical factors influencing the formation of distinct biotopes and protistan communities in the Iroise Sea. Then, in a focus on phototrophic protists (here considered to represent phytoplankton), will discuss the maxima in diversity at the front and compare the two hypotheses previously highlighted, with respect to taxonomic and functional diversity.

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