

SPECIFICITIES AND INTERANNUAL VARIABILITY OF THE SURFACE PLANKTON ECOSYSTEM OF THE BAY OF CALVI (CORSICA)

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Abstract

In the oligotrophic Bay of Calvi, Corsica (Ligurian Sea, Northwestern Mediterranean), the seasonal dynamics of surface plankton communities is studied for three decades, with the aim of assessing seasonal patterns, plankton assemblages and interannual trends. A major interannual variability is observed and seems to be controlled by hydro-climatic changes, rather than by anthropogenic perturbations. This confirms that the Bay of Calvi offers a unique site where ecosystem responses to climate change can be studied.

Keywords : Plankton, Ligurian Sea, Food Webs, Biodiversity, Global Change.

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As a distinctive feature of the Bay of Calvi, a plurimodal plankton bloom occurs generally between January and April, with large interannual variability. Later in the season, the plankton biomass remains very low from May to December.

A major interannual variability of plankton organisms, assemblages and food webs is observed, and seems to be controlled by hydro-climatic changes rather than by anthropogenic perturbations [1, 2]. A seasonal succession of characteristic plankton assemblages is observed: 1) late winter and early spring assemblages with diatoms, radiolarians, tintinnids and euphausiids; 2) spring assemblages with small diatoms and large copepods; 3) late spring and summer communities dominated by phytoflagellates and cyanobacteria, ciliates, small copepods, salps and appendicularians; 4) late summer communities often characterized by mixotrophic organisms.

As a general rule, the organisms size decreases from late winter to autumn, while the diversity increases over the same period. This succession corresponds to the ecosystem functional response to decreased nutrient availability.

Another specific characteristic of the Bay of Calvi is that the winter - spring bloom does not occur each year, which is largely attributable to the nutrient limitation characteristic for mild winter. When occurring, the bloom is dominated by large Diatoms and macrozooplankton. Smaller phytoplankton and microzooplankton exhibit less interannual variability.

The main factors controlling the composition of the surface plankton of the Bay of Calvi are strong oligotrophy, winter climate variability, wind stress, the interactions with the *Posidonia* seagrass [3] and the vicinity of the Liguro-Proçençal Front.

Because of its oligotrophic status and its sensitivity to climate forcing, the plankton ecosystem of the Bay of Calvi is at the limit between a state characteristic of temperate and tropical ecosystem functioning. Through modifications in patterns of plankton biomass and biological assemblages, small changes in the physical environment propagate throughout the plankton ecosystem and control the entire food web dynamics. As a consequence, the diversity of the upper trophic levels of the pelagic ecosystem is not affected directly by temperature changes, but is indirectly sensitive to the physical and climate changes. These environmental changes affect also the microbial plankton food web as a source of food (e.g. qualitative and quantitative interactions, match / mismatch).

References

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