

## Seasonal Variability of Picoeukaryotes Community Structure Under Coastal Environmental Disturbances

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**Abstract :** A central question in ecology refers to the relative importance that local-scale variables have over community composition, when compared with regional-scale variables. In coastal environments, strong seasonal abiotic influence dominates these systems, weakening the impact of other parameters like micronutrients. After the industrial revolution, micronutrients like trace metals have increased in ocean as pollutants, with strong effects upon biotic entities and biological processes in coastal regions. Coastal picoplankton communities had been characterized as a cyanobacterial dominated fraction, but in recent years the eukaryotic component of this size fraction has gained relevance due to their high influence in carbon cycle, although, diversity patterns and responses to disturbances are poorly understood. South Pacific upwelling coastal environments represent an excellent model to study seasonal changes due to a strong influence in the availability of macro- and micronutrients between seasons. In addition, some well constrained coastal bays of this region have been subjected to strong disturbances due to trace metal inputs. In this study, we aim to compare the influence of seasonality and trace metals concentrations, on the community structure of planktonic picoeukaryotes. To describe seasonal patterns in the study area, satellite data in a 6 years time series and in-situ measurements with a traditional oceanographic approach such as CTDO equipment were performed. In addition, trace metal concentrations were analyzed through ICP-MS analysis, for the same region. For biological data collection, field campaigns were performed in 2011-2012 and the picoplankton community was described by flow cytometry and taxonomical characterization with next-generation sequencing of ribosomal genes. The relation between the abiotic and biotic components was finally determined by multivariate statistical analysis. Our data show strong seasonal fluctuations in abiotic parameters such as photosynthetic active radiation and superficial sea temperature, with a clear differentiation of seasons. However, trace metal analysis allows identifying strong differentiation within the study area, dividing it into two zones based on trace metals concentration. Biological data indicate that there are no major changes in diversity but a significant fluctuation in evenness and community structure. These changes are related mainly with regional parameters, like temperature, but by analyzing the metal influence in picoplankton community structure, we identify a differential response of some plankton taxa to metal pollution. We propose that some picoeukaryotic plankton groups respond differentially to metal inputs, by changing their nutritional status and/or requirements under disturbances as a derived outcome of toxic effects and tolerance.

**Keywords :** Picoeukaryotes, plankton communities, trace metals, seasonal patterns

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