

Biomass of Size-fractionated Phytoplankton during the Spring-Summer Season in Southern Chile

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Abstract

Picoplankton ($< 3 \mu\text{m}$), nanoplankton ($< 25 \mu\text{m}$), and netphytoplankton ($> 25 \mu\text{m}$) chlorophyll *a* were measured during the spring and summer months at sampling stations in the Strait of Magellan and three adjacent areas: Bell Bay, Oracion Bay and Brinkley Island. The results obtained in the present study indicated that the biomass of the netphytoplankton fraction became an important component (68%) of the phytoplankton community during late spring (November, December, January) in all four areas. This is supported by the dominance of large chain-forming diatom species registered in these coastal stations. In contrast, the contribution of pico- and nanoplankton fractions became important ($> 67\%$) during early spring (September, October) at the Strait of Magellan and during summer (February, March) at Bell Bay, Oracion Bay and Brinkley Island.

Introduction

During the last decade the size spectrum of plankton has received much attention because of the potential influence on the food web and fishery dynamics (Malone 1980, Azam *et al.* 1983). In addition, the application of new methods for the quantification of small cell-size phytoplankton ($< 20 \mu\text{m}$) has revealed that most of the biomass ($> 50\%$) and primary production ($> 80\%$) of marine phytoplankton in oceanic and tropical neritic waters can be attributed to fractions below $10 \mu\text{m}$ cell-size (Joint *et al.* 1986, Hopcroft and Roff 1990, Peña *et al.* 1990).

The temperate coastal waters of Chile, in contrast, have been characterized by short pulses of high chlorophyll biomass during the spring-summer seasons which are dominated by the netphytoplankton size-class (large and chain-forming diatoms) (Alvial and Avaria 1982, Gonzalez *et al.* 1987). Furthermore,

pico- and nanoplankton biomass remains constant throughout the year (Gonzalez *et al.* 1989). However, few studies characterizing the taxonomic composition of the netphytoplankton have been carried out on phytoplankton of the Chilean fjords ($42^\circ - 55^\circ\text{S}$ latitude), and even fewer of the phytoplankton of the Strait of Magellan and adjacent areas (Uribe 1988, Uribe 1991).

Primary production rates, biomass, and carbon-particle concentration of phytoplankton are essential community properties for modelling energy fluxes of the pelagic ecosystem. Information concerning such community properties are particularly important in comparative analyses of high latitude coastal waters. The aim of the present study is to describe the spring–summer variability of the phytoplankton size fractionated biomass at a single fixed station in the Straits of Magellan and 3 adjacent areas: Bell Bay, Oracion Bay and Brinkley Island.