

Phytoplankton community structures in shelf and oceanic waters off southeast Brazil (20°10'–25°10'S), as determined by pigment signatures

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Introduction

As the major primary producers in many aquatic systems and the basis of nearly all food webs in aquatic ecosystems, phytoplankton are essential for marine ecological and biogeochemical processes. In the Central Region of the Brazilian shelf and oceanic waters (22–19°S) a comprehensive assessment encompassing the full phytoplankton size range is still lacking. Detailed analysis of pigments from natural samples allows the identification of phytoplanktonic taxonomic groups and this approach has been used in many aquatic ecosystems including marine and freshwater habitats (1,2,3,4). However, there have been few studies addressing phytoplankton pigments from the tropical South Atlantic, and, to our knowledge, no previous data are available in the region of the present study.

Results

Structure of the phytoplankton assemblies

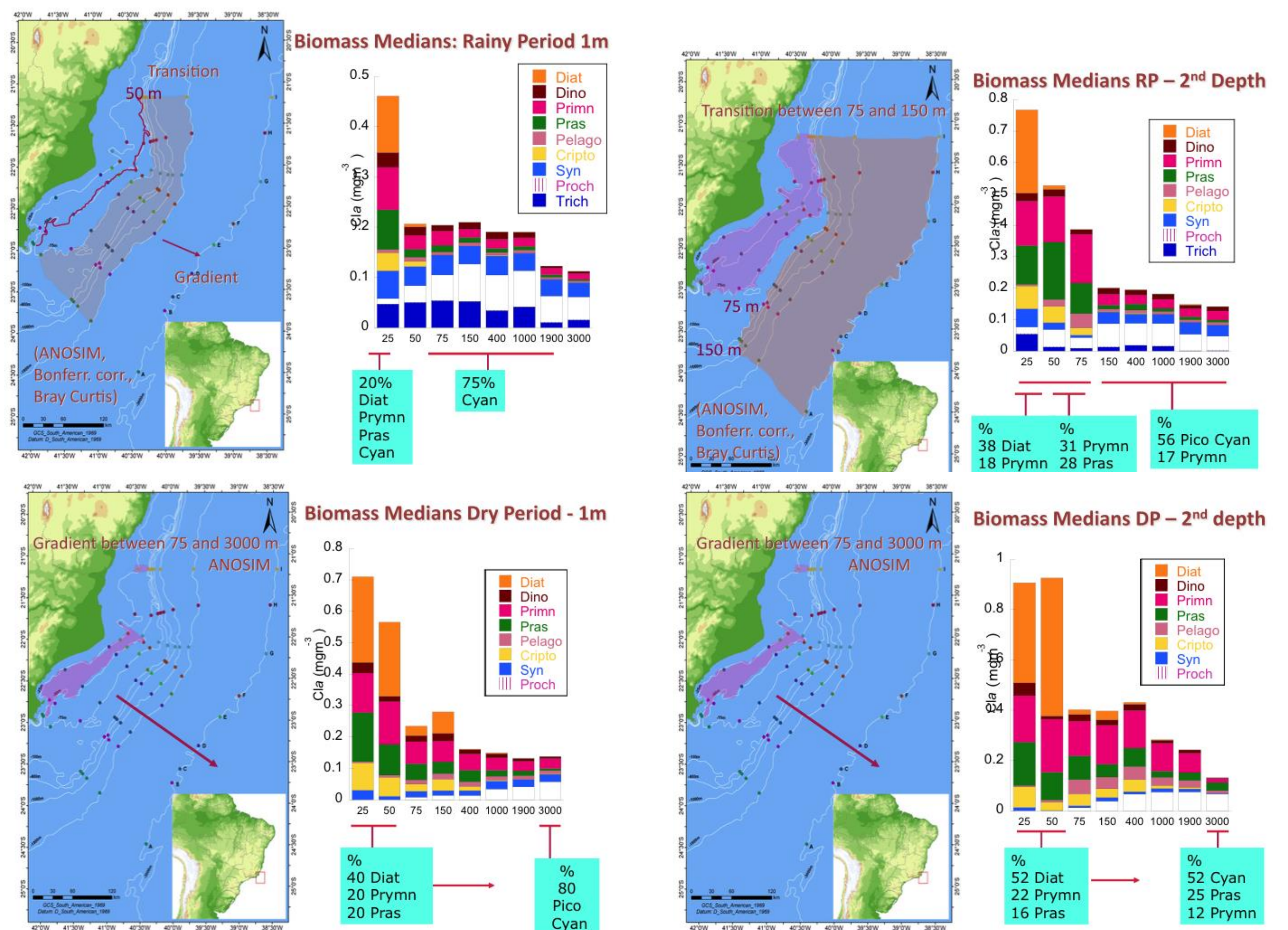


Figure 1: Similarities (coloured in violet and brown) found by ANOSIM and bathymetric profile of the composition of phytoplankton (median among Transects for each isobath)

Study Area and Goals

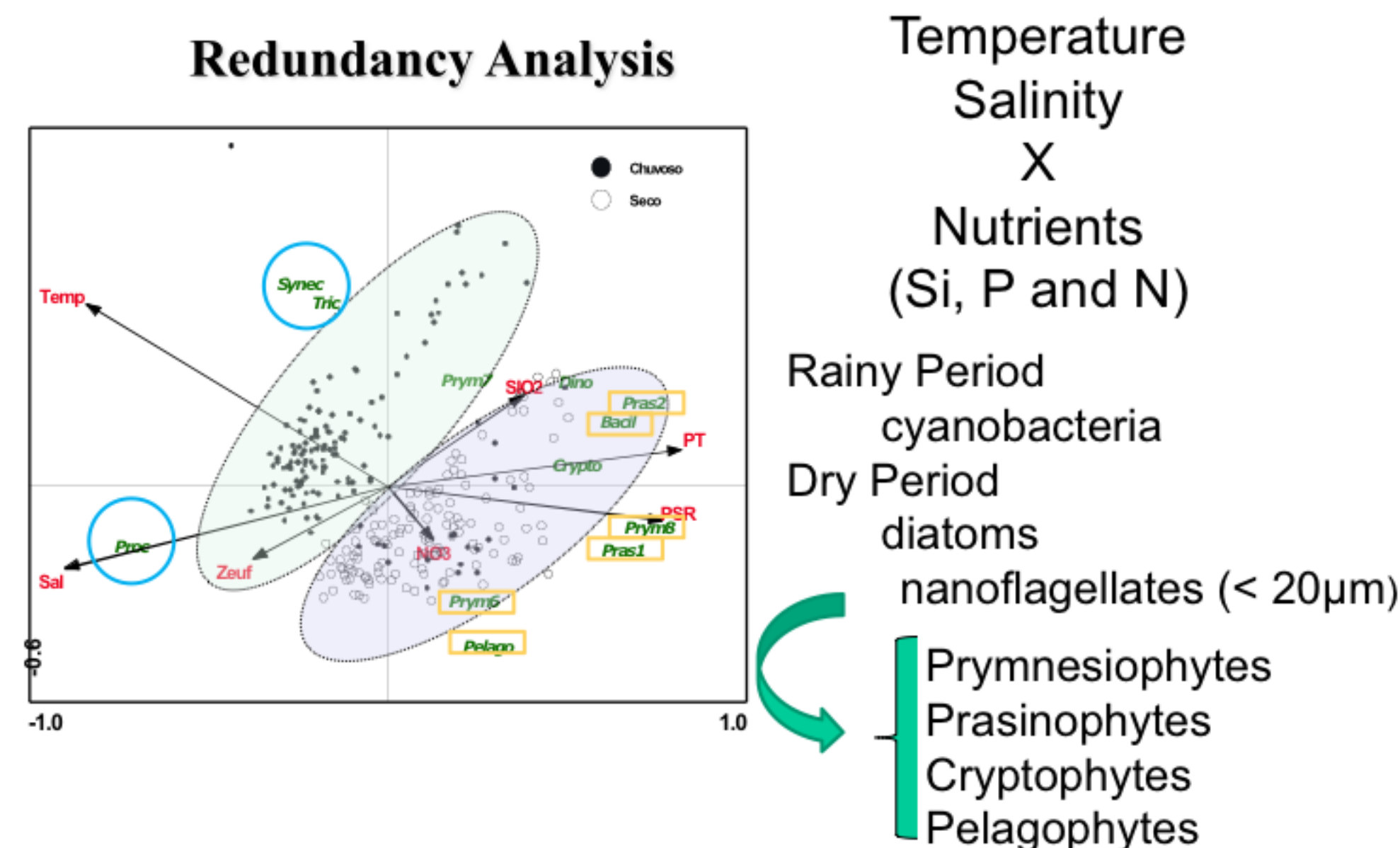
This study was conducted at the Campos Basin, located within the Brazil Shelf Large Marine Ecosystem area, in the Atlantic Ocean (20° to 25°S; 42° to 38°W). This region is located within two biogeographical provinces, one characterized by oligotrophic waters with coastal influence and the other by upwelling phenomena, located in Cabo Frio (5).

The influences of the hydrological features and environmental conditions on the phytoplankton community were studied using HPLC/CHEMTAX pigment analysis.

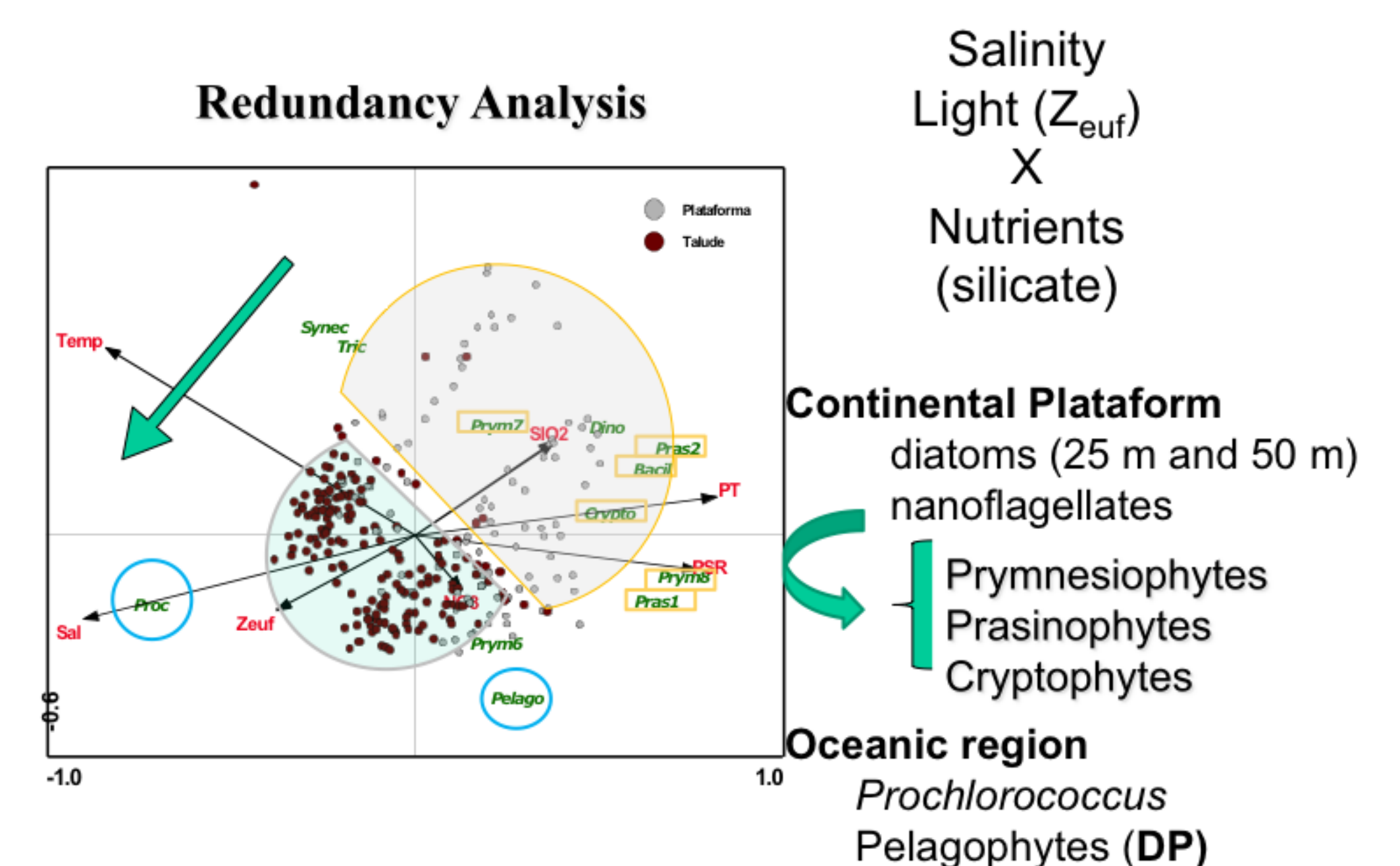
Methodology

Samples were collected at stations distributed along the 25, 50, 75, 150, 400, 1000, 1900 and 3000 m isobaths, along nine transects ranging from south to north (A–I), during two campaigns in 2009, one in the rainy period (03/5th - 04 13th) and the other in the dry period (08/7th - 09/16th). At each station, samples were collected from the sub-surface (1 m) and at a second depth defined for the 25, 50 and 75 m isobaths as the middle of the water column, or as the 20 °C isotherm (typical of the South Atlantic Central Water). Water temperature and salinity were obtained by a CTD and inorganic nutrients were analyzed according to (6). The euphotic zone (Zeuf) was estimated as 3 times the Secchi disk extinction depth. 6 L of seawater were filtered through GF/F 47 mm membranes (Whatman, UK). The pigments were extracted using the method described by Wright and Jeffrey (1997). All samples were analyzed in parallel by two methods (Van Heukelem and Thomas; 2001, and Brotas and Plante-Cuny; 2003), CHEMTAX analysis of the pigments (4 groups of samples) was performed. Statistical treatment of data used ANOSIM, SIMPER and Redundancy Analysis.

Temporal Pattern



Spatial Gradient



Final remarks

Biomasses: oligotrophic system

Composition: 9 phytoplanktonic groups were identified and quantified. Important contributions of picoplanktonic cyanobacteria (*Synechococcus* e *Prochlorococcus*) and nanoflagellates (< 20µm)

Temporal patterns: Higher biomasses, especially nanoflagellates, during the dry period, associated to higher nutrient concentrations