The Submarine Groundwater Process, the biological pump and the CO_2 fluxes on the brazilian southeastern shelf

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Introduction

Studies of the South Western Atlantic Ocean Margin are important, mainly in the Southern Brazil, where the influence of submarine groundwater (SGD) on the ocean is evident. SGD acts as source of trace elements, which may influence primary productivity and changes in CO_2 diffusion to the ocean. These aspects may feedback the local atmospheric circulation and possible climate changes. In this context, an oceanographic cruise was planned by the INCT-Mar-COI Project (CNPQ 565062/2010-7) on January 2015 at the southern coastal shelf.

Objectives

- To verify the influence of discharge and advection processes of submarine groundwater on the coastal area
- To assess the amount of atmospheric carbon dioxide biologically transferred from the surface to the bottom of the ocean.

Methods

Sampling Design

- 3 transects (*Albardão*, *Torres* and *Santa Marta*)
- 6-7 stations on the horizontal profile
- 2-5 stations on the vertical one
- Depths: 20 to 1500 m.

Investigated Variables

Water: physico-chemical, nutrients, chlorophyll *a*, dissolved and particulate trace metals, ^{222}Rn, ^{223}Ra, ^{224}Ra, ^{226}Ra and ^{228}Ra, particulate fractions of organic carbon, $\delta^{13}C_{COT}$, ^{234}Th, ^{238}U and Po and indirect pCO2 in water will be estimated by CO2calc program.

Sediments: trace metals, total organic carbon, $\delta^{13}C_{COT}$ and the granulometry.

Preliminary results of the Albardão transect

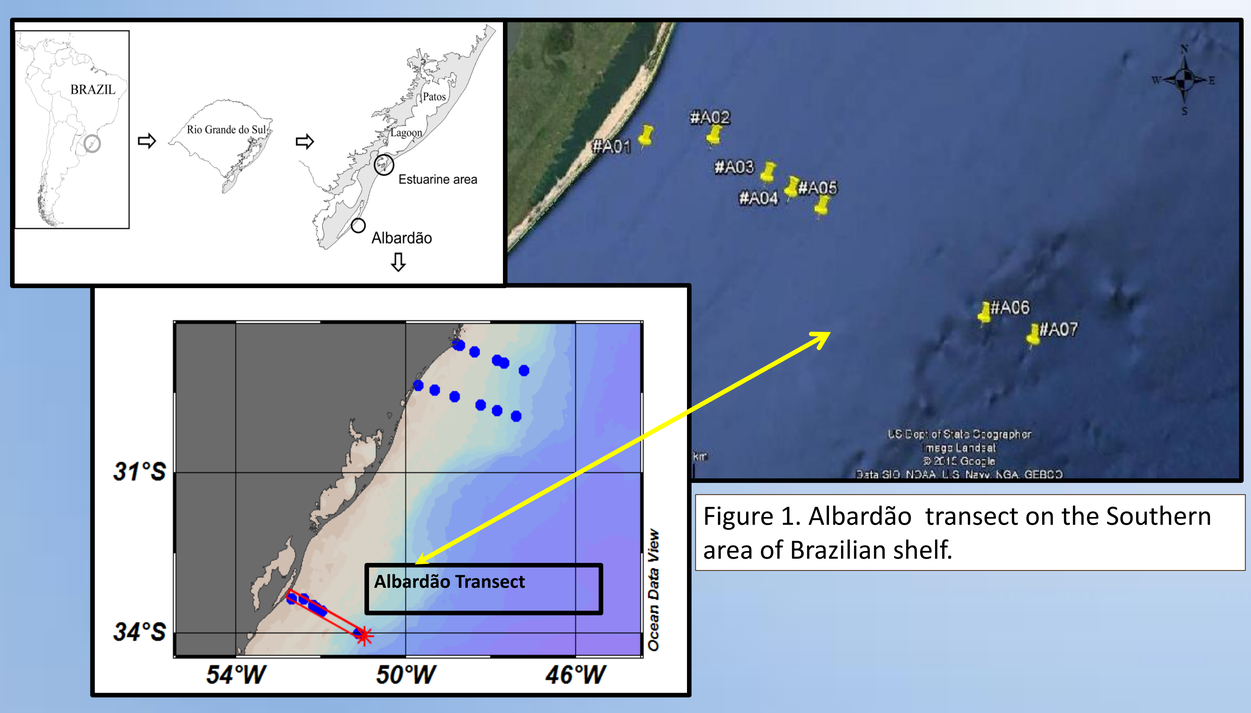

Figure 1. Albardão transect on the Southern area of Brazilian shelf.

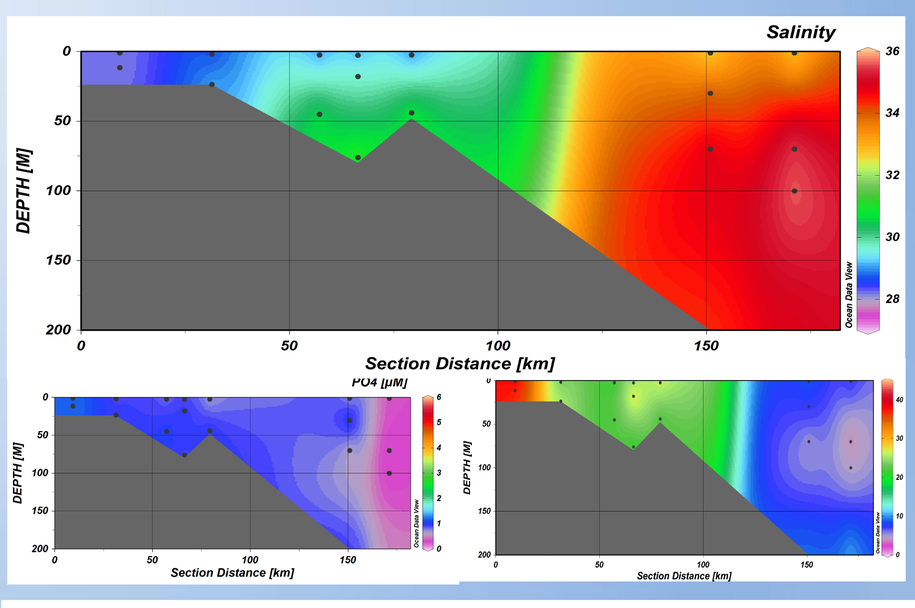

Figura 3. Salinity, Phosphate and Silicate distributions at shallow water (200m).

The new sampling system (Figure 2) allow us to perform a clean sampling, essential for the accurate determination of trace elements and their isotopes in seawater.

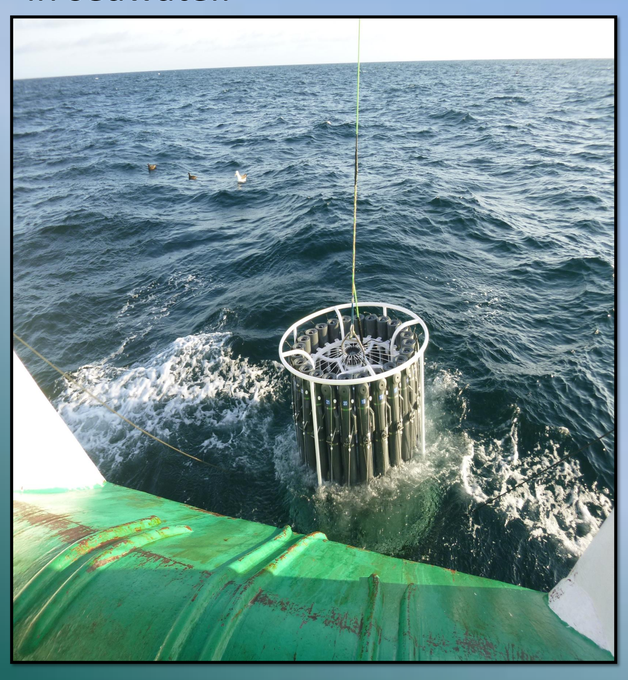

Figure 2. Clean system of Go-Flo bottles (24-bottle sampler of 12-liter) with Kevlar cable, operated by an Interocean winch.

- Continental contribution of phosphate and silicate, corroborated by the inverse relationship with the salinity (Figure 3).
- Different vertical patters at shallow (200 m) and deep water (1500 m) stations (Fig. 3 and 4).
- Evident enrichment for both nutrients at 1000 m deep. This suggests the presence of a distinct deep water mass (Fig. 4).

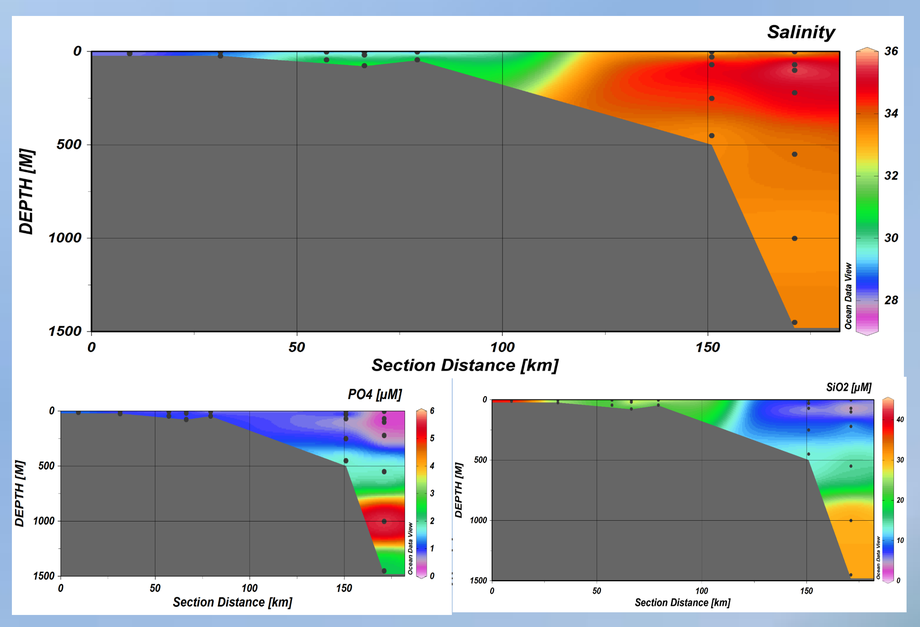

Figura 4. Salinity, Phosphate and Silicate distributions at deep water (1500m).

Advances to be achieved:

- Sampling procedure: clean container;
- Intercalibration procedures;
- Training of scientists, students and crew.

➡ Collaborations with Brazilian and foreign universities are very welcome.

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