

TOTAL INORGANIC CARBON AND TOTAL ALKALINITY DISTRIBUTION IN THE AEGEAN SEA

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Abstract

Data of C_T and A_T were obtained in the Eastern Mediterranean in the frame of SESAME project. Preliminary results showed that Aegean Sea deep waters have the highest concentrations in C_T and A_T . Important differences on the concentrations of these two parameters, observed in the deep waters of the North and South Aegean during spring 2008 can be attributed to the dense water formation in the North Aegean Sea.

Keywords: Aegean Sea, Eastern Mediterranean, Carbon, Oxygen

Introduction

Total Inorganic Carbon (C_T) and Total Alkalinity (A_T) were determined in seawater samples collected in the Eastern Mediterranean (Aegean- Ionian-Levantine) during two cruises performed in the framework of the SESAME project during spring and late summer 2008, in order to provide both knowledge and reference for further investigation on the carbonate system.

The carbon dioxide system in the Eastern Mediterranean is very poorly studied. C_T and alkalinity values have been obtained at the 404 Geosecs station [1]. In 1983, [2] presented oxygen, C_T and phosphate correlation in two stations in Central and South Adriatic waters. The distribution of C_T and its relation with oxygen and nutrients in a dense grid of stations in the Northern Adriatic Sea were presented by [3]. Recently [4] published C_T and A_T data collected in Thermaikos Gulf (NW Aegean) in May 1997.

Results & Discussion

Preliminary results of the distributions of these two parameters in the Eastern Mediterranean, showed that the Aegean Sea deep waters have the highest C_T and A_T , reaching 2340 and 2670 $\mu\text{mol kg}^{-1}$ respectively. Nevertheless our results revealed important differences between the North and the South Aegean Sea. In the surface layer the higher C_T , A_T and oxygen values were recorded in northernmost part of the Aegean Sea in the 'less warm' and 'less saline' surface water of Black Sea origin (Figs. 1 & 2).

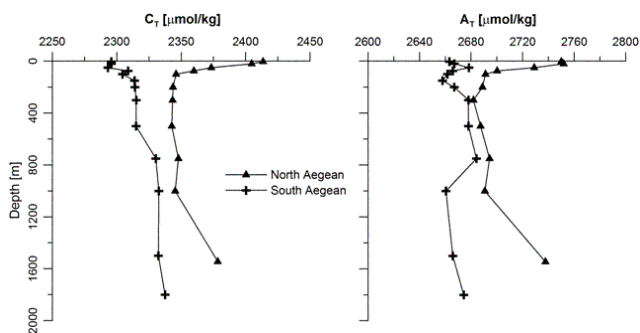


Fig. 1. Vertical distribution of C_T and A_T ($\mu\text{mol/kg}$) in the Northern and the Southern Aegean Sea

Our observations support the hypothesis of the major influence of the Black Sea to the Mediterranean water alkalinity, argued recently by some authors [5]. During spring 2008, the deep waters of the North Aegean Sea are richer in both C_T and A_T regarding those of the South Aegean Sea, indicating the existence of different sources of deep water and the limited communication between the two basins.

Indeed, the bottom topography of the region is characterised by an alternation of plateaux and deep troughs allowing water exchange above 400-m depth. Below 400 m, the deep basins of the North Aegean are filled with very dense water of local origin [6] and the deep basin of the South Aegean with Cretan Deep Water [7].

The C_T and A_T concentrations of the North Aegean Sea intermediate layer, reach the concentrations of the deep waters of the South Aegean Sea and the deep waters of the North Aegean are very well oxygenated (Fig. 2). Further examination of the oxygen distributions and the T-S diagrams showed that a dense water formation event occurred in North Aegean during winter 2008.

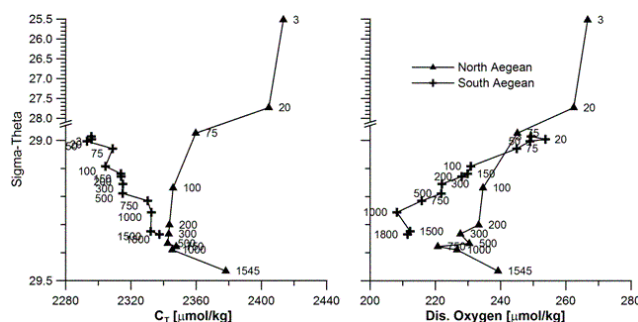


Fig. 2. Distribution of C_T and dissolved oxygen ($\mu\text{mol/kg}$) plotted against sigma-t in the Northern and the Southern Aegean Sea

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