



## **A survey of the carbonate system in the Levantine Mediterranean Sub-basin**

Abed El Rahman Hassoun, Elissar Gemayel, and Marie Abboud-Abi Saab

National Council for Scientific Research, National Center for Marine Sciences, P.O.Box 534, Batroun, Lebanon  
(abedhassoun@cnrs.edu.lb)

The carbonate system is very important since it regulates the pH of the seawater and controls the circulation of CO<sub>2</sub> between the various natural reservoirs. Recently, several oceanographic cruises have been carried out to assess this system in the Mediterranean Sea. However, the measurements undertaken to quantify the carbonate system parameters in the Levantine Sub-basin remain scarce and occasional. In our study, we are compiling the occasional data taken near Lebanon and surveying the carbonate system in the Lebanese seawaters for the first time by fixing two stations off the Lebanese coast to study the monthly and annual variations of this system through the water column.

The dominant processes changing the carbonate chemistry of a seawater can be described by considering changes in the total alkalinity (AT) and the total dissolved inorganic carbon (CT). To measure these parameters, the collected seawater samples are titrated via potentiometric acid titration using a closed cell (DOE, 1994). Further, the temperature and the salinity are measured in situ. Dissolved oxygen concentrations are measured using a Winkler iodometric titration. Nutrients (phosphates, nitrates, nitrites), chlorophyll a and phytoplankton populations are also studied.

The compilation of the carbonate system data taken from the cruises conducted near Cyprus (MedSeA 2013, Meteor 84-3, BOUM, Meteor 51-2) indicate that the AT and CT averages are equal to  $2617 \pm 15$  and  $2298 \pm 9 \mu\text{mol kg}^{-1}$  respectively, showing high AT and CT concentrations compared to those measured in other Mediterranean sub-basins. Our survey will provide a brand new dataset that will be useful to better comprehend the carbonate system in the Mediterranean Sea in general and the actual situation of the water masses formation in the Levantine Sub-basin after the Eastern Mediterranean Transient (EMT) in particular. Moreover, this work will permit us to estimate the air-sea fluxes and to estimate the anthropogenic CO<sub>2</sub> concentrations and the acidification rate in the Lebanese seawaters for the first time.

**Keywords:** Total alkalinity, total dissolved inorganic carbon, carbonate system, Lebanon, Levantine Sub-basin, Mediterranean Sea.