CARBON DIOXIDE. SPATIAL AND SEASONAL VARIABILITY IN THE SOUTHWESTERN SPANISH MEDITERRANEAN

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RADMED monitoring program, implemented by the Spanish Institute of Oceanography, carries out four cruises per year (one per season) from the Straits of Gibraltar to Barcelona, including Balearic islands. Temperature, salinity, dissolved oxygen, chlorophyll-a, inorganic nutrients, phyto and zooplankton abundance and taxonomic composition along the water column are sampled in all the oceanographic stations.

Carbon dioxide (CO_2) is the most important anthropogenic green house gas and the carbonate system in seawater plays an important role in the biogeochemical cycles, being intimately linked to the processes of photosynthesis and respiration. Therefore, pH, Total Alkalinity (TA) and partial pressure of carbon dioxide in air (pCO_2) have been included in the RADMED sampling since 2010. The pH and total alkalinity measurements are determined using a potentiometric method using a titrator and a potentiometer, and partial pressure of carbon dioxide in the air (pCO_2) is measured with a SUNDANS analyzer (Surface UNderway carbon Dioxide partial pressure AnalySer). This instrument determines the partial pressure of carbon dioxide in air that is in equilibrium with a flowing stream of seawater.

The above mentioned variables were monitored in the northern continental shelf and slope of the Mediterranean Sea from Cape Pino (western Alboran Sea) to Cape Palos in the South East Spanish Mediterranean coast. The measurements were obtained from the sea surface to the bottom during six oceanographic surveys extending from summer 2010 to winter 2014. The main goal of this work is to describe both geographical (Southwest-Northeast) and vertical gradients and seasonal variability in the total Alkalinity of sea water. The geographical area studied is affected by the progressive transition from waters highly influenced by the incoming Atlantic jet to waters modified by their circulation within the Mediterranean Sea. At the same time, the thermohaline circulation of the Mediterranean establishes the presence of clearly distinctive water masses at the sea surface, at intermediate waters (200-600m) and at the deep waters. The six oceanographic surveys analyzed extended along a whole seasonal cycle. In the present work it is analyzed the influence of Atlantic versus Mediterranean waters, the depth dependence and the seasonal variability on the total Alkalinity.