Short Term Scientific Mission (STSM)

Scientific Report

Contemporary Acidification Trends in the coastal NorTh EaStern Atlantic (ATlaNTES)

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Purpose of the STSM

Oceanic uptake of anthropogenic CO2 from the atmosphere increases seawater's concentration of CO2, and lowers its pH and calcium carbonate (CaCO3) saturation state – a process known as 'ocean acidification' (OA). The effects of atmospheric CO2 on pH and CaCO3 saturation in ocean margins are complicated by many processes such as inputs of low pH river water, eutrophication-induced deoxygenation, upwelling and remineralization, all of which also influence local and regional acidification trends. The North Eastern Atlantic plays an important role in the carbon cycle of the Atlantic Ocean due to water exchanges with the Mediterranean Sea through the Strait of Gibraltar. The formation of the Atlantic inflow into the Mediterranean Sea, and its exchange of Atlantic and Mediterranean water masses in the Strait of Gibraltar make the Atlantic Iberian Margin a region of unique interest to study OA trends. The STSM ATlaNTES has been directed to examine OA patterns in the North Eastern Atlantic by compiling the available ocean station data with pH and aragonite saturation state (Ω-Ar) and climatological parameters from data products, fixed observatories, and unpublished cruise data from regional and national projects. Data analysis and spatial interpolation showed that surface Ω-Ar was always supersaturated (Ω-Ar > 1) in the continental shelf (< 200 m depth) along the Atlantic Iberian Margin, ranging between 1.8 and 3.5. Between 200 m and 2000 m depth, Ω-Ar ranged between 1.1 and 2.9 with a median Ω-Ar value of 1.8, in accordance with the average Ω-Ar of 2 typical of the North Atlantic Ocean between 20°-40°N latitude. The aragonite saturation horizon, which is defined as the depth where Ω-Ar is equal to 1 (below the saturation horizon Ω-Ar < 1 and calcium carbonate is thermodynamically unstable with a tendency to dissolve) occur at 2000 m depth. Below this depth, higher hydrostatic pressure, lower water temperature, more CO2 buildup from biological activity along with the pathway of thermohaline circulation play important roles in controlling the lower Ω-Ar in the deep waters of the North Eastern Atlantic.

Description of the work carried out during the STSM

Description of the main results obtained

Future Collaborations (if applicable)

Foreseen publications/articles resulting from the STSM (if applicable)

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