Geophysical Research Abstracts
Vol. 12, EGU2010-15226, 2010
EGU General Assembly 2010

The CO2 system in the Scotian Shelf Region of the Northwestern Atlantic: from seasonal to interannual variability

Elizabeth H. Shadwick and the Scotian Shelf Team
Dalhousie University, Halifax, NS, Canada (shadwick@phys.ocean.dal.ca)

The coastal oceans have relatively large fluxes of CO2, but the temporal variability of these systems is high. Compared to open ocean systems, the variability of the CO2 system in coastal regions remains poorly understood. The Scotian Shelf is a highly productive area of the Canadian northwestern Atlantic Ocean. The region is host to active fisheries, is heavily influenced by river water input from the Gulf of St. Lawrence, and receives a downstream flow of Arctic water from the Labrador Sea.

The seasonal variability of inorganic carbon in the surface waters of the Scotian Shelf is assessed using hourly measurements of the partial pressure of CO2, (pCO2), from an autonomous moored instrument, and covering a full annual cycle. These measurements are complemented by frequent shipboard sampling of dissolved inorganic carbon (DIC), total alkalinity (TA), and pCO2 over the larger spatial scale. Biology dominates changes in mixed-layer DIC, while competing effects of temperature and biology influence surface pCO2 in roughly equal magnitude. The mixed-layer in the Scotian Shelf is overall autotrophic; the region acts as a net source of CO2 to the atmosphere on the annual scale.

An algorithm to compute pCO2 from satellite-based estimates of chlorophyll-a concentration, sea-surface temperature, and wind speed is developed. A hind-cast of air-sea CO2 fluxes from 1999 to 2008 reveals significant variability both spatially and from year to year. Regional conditions govern spatial and interannual variability on the Scotian Shelf, while multi-annual trends appear to be correlated with the North Atlantic Oscillation.