Geophysical Research Abstracts
Vol. 15, EGU2013-5763, 2013
EGU General Assembly 2013

Investigating carbon sources to the North Sea using short-lived radium isotope distributions

William Burt (1), Helmuth Thomas (1), and Johannes Pätsch (2)

(1) Department of Oceanography, Dalhousie University, Halifax, Canada (willburt@dal.ca), (2) Institute of Oceanography, University of Hamburg, Hamburg, Germany

Carbon cycling in the North Sea is affected by inputs of atmospheric CO_2, as well as inputs of carbonate species (dissolved inorganic carbon (DIC) and alkalinity (AT)) from various sources including adjacent seas, the sediments lining the ocean floor and from land. While the atmospheric contribution is well understood, this study intends to identify the sedimentary and lateral additions of DIC and AT, and their contributions to the North Sea carbon budget. We propose to quantify these carbon fluxes by utilizing a radium (Ra) isotope tracer technique to first quantify diffusive inputs and Ra dispersion in the North Sea. During a Royal Netherlands Institute for Sea Research (NIOZ) cruise in summer, 2011, the Ra data set was collected 3-dimensionally in the water column, as well as within sediment cores, representing uniquely comprehensive spatial coverage for a single basin. This allows us to fully balance the North Sea's Ra budget under consideration of vertical and lateral sources.
Combined with data from high-quality core incubations, preliminary results indicate that the Ra dataset can provide estimates of benthic fluxes of Ra, DIC and AT from the extensive shallow mudflat regions of the North Sea. Furthermore, the surface Ra distributions throughout the region can be used to assess dispersion patterns and eventually determine the contribution of DIC and AT from lateral basins. Simulations of the Ra distributions with a passive tracer hydrographic model are used to evaluate analytical results regarding fluxes of both Ra and carbonate species.