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Regional fluxes of CO_2 on the northern European shelf

Meike Becker[1,2], Are Olsen[1,2], Peter Landschützer[3], Abdirhaman Omar[2,4], Gregor, Rheder[5], Christian Rödenbeck[6], and Ingunn Skjelvan[2,4]
[1]Geophysical Institute, University of Bergen, Bergen, Norway.
[2]Bjerknes Center for Climate Research, Bergen, Norway.
[3]NORCE Norwegian Research Centre AS, Bergen, Norway.
[4]Max Planck Institute for Meteorology, Hamburg, Germany.
[5]Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Rostock, Germany
[6]Max Planck Institute for Biogeochemistry, Jena, Germany.

Since coastal oceans cover large parts of the world their contribution to the ocean carbon sink needs to be considered in global estimates. However, their high spatial and temporal variability as well as a more complex set of drivers make it more complicated to describe their fluxes. The special characteristics of each region need to be considered when interpolating existing observations into maps of surface ocean fCO_2. We developed a simple method to refine the existing open ocean maps towards different coastal seas. Using a multi linear regression based on the open ocean CO_2 map, bathymetry, satellite and reanalysis data such as chlorophyll a, mixed layer depth, ice concentration, sea surface temperature and salinity we produced monthly maps of surface ocean fCO_2 in the northern European shelf seas (North Sea, Baltic Sea, Norwegian Coast and the Barents Sea) covering a time period from 1997 to 2016.
Based on these monthly fCO_2 maps we estimate trends in surface ocean fCO_2 and pH (through a salinity-alkalinity correlation) and quantify the air-sea CO_2 fluxes on the northern European shelf.