Geophysical Research Abstracts
Vol. 15, EGU2013-13396-1, 2013
EGU General Assembly 2013

Net community production based on Seaglider oxygen measurements in an upwelling region

Christopher Walker Brown, Jan Kaiser, and Karen Heywood

University of East Anglia, School of Environmental Sciences, Norwich, United Kingdom (j.kaiser@uea.ac.uk, +44-(0)1603-591327)

Seasonal upwelling events along the Galician coast (northwest Spain) bring nutrients into surface waters and cause summer phytoplankton blooms. This helps sustain one of Europe's most productive fisheries in the North Atlantic.

Because of the episodic nature of the upwelling events in this region, it is difficult to study them using conventional shipboard observations. Here we show how biogeochemical observations using a Seaglider can help improve our understanding of physical drivers and biological processes involved in these events.

We present data from two months out of a total of four months of continuous observations of temperature ents, salinity, 650 nm optical backscatter, chlorophyll a fluorescence and oxygen during 1 June and 22 September 2010. During this period, UEA Seaglider SG502 "Orca" completed 17 zonal transects across the shelf, continental slope and open ocean at 42.1° N.

We combine the transect-to-transect changes of dissolved oxygen budgets with estimates of air-sea exchange to estimate net community production, $N(O_2)$. Two phytoplankton bloom events occurred during this period, with maximum $N(O_2)$ values between 157 and 198 mmol m^{-2} d^{-1}. Between these two events, the region remained net autotrophic, with an average $N(O_2)$ value of 62 mmol m^{-2} d^{-1} over the 17 transects. Onl during a period of particularly calm weather did we observe net heterotrophic conditions, with $N(O_2)$ averaging -43 mmol m^{-2} d^{-1}. Following a change in wind direction and an increase in average wind speed from 4.7 m s^{-1} to 11.2 m s^{-1}, conditions changed back to net autotrophy.

Our observations highlight the impact of short-term physical processes on $N(O_2)$ for net carbon sequestration in this region. The study also demonstrates how novel autonomous platforms can be used for sustained biogeochemical and physical observations in a challenging operational environment with strong currents and intense shipping traffic.