



Balancing Buoys, Bubbles and Biology II: Celtic-Sea net community production from long term oxygen timeseries.

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Coastal seas represent one of the most valuable and vulnerable habitats on Earth. Understanding biological productivity in these dynamic regions is vital to understanding how they may influence, and be affected by, human activity.

A key metric to understanding the cycling of organic carbon associated with this production is net community production (NCP): the net effect of autotrophy and heterotrophy.

However estimating marine NCP rates is notoriously challenging. This is partly because the net state is finely balanced between large opposing fluxes, measurements of which have large uncertainties.

Here we present estimates of NCP from the Celtic Deep shelf sea biogeochemistry (SSB) site. Using concomitant observations from the SmartBuoy and seabed landers during the 2014 and 2015 SSB program and surface observations since 2009 we also put the SSB years in context of the wider in-annual variability in the Celtic Sea.

Net community production and respiration is estimated using an oxygen mass-balance approach using continuous in-situ oxygen measurements .

We explore how this technique integrates the entire mixed layer and how well it can constrain NCP in regions where production is patchy or occurs at a deep chlorophyll maximum. We also test the global sensitivity and uncertainty of these estimates to different approaches to parametrising mixed layer depth, air-sea gas exchange and bubble mediated supersaturation.