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Carbon Capture and Storage on Circum-Antarctic Seabeds in a Changing Climate

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Life on the seabed, on continental shelves around Antarctica, can be globally important in immobilizing organic and inorganic carbon. Although their turnover of carbon cycling is low compared with oceanographic carbon storage or water column pelagos (e.g. zooplankton), the storage, burial and thus potential for sequestration is high, but little understood or quantified to date. Carbon storage by benthic animals around West Antarctica's continental shelves, estimated at 10^6 tonnes per year, has increased in response to climate change and shows seasonal, annual and between-region variation. Quantifying this variation should reduce error in CO_2 pathway models. SubAntarctic island shelves are likely to be even more important benthic carbon stocks because of more considerable phytoplankton blooms, little or no sea ice and warmer sea temperatures than Antarctica (enabling faster meal processing time, and thus growth rates by benthos). Their potential as a carbon sink is almost unknown but new projects on the Antarctic Circumnavigation Expedition (ACE) and ICEBERGs have been sampling these shelf benthos using bespoke camera landers, video and photo-equipped trawls and cores. These are enabling estimation of changes in intra and inter-shelf variability in benthos carbon storage. Growth models constructed from age structure of sampled species with growth check lines (e.g. bryozoans, bivalves, brachiopods and corals) enable carbon accumulation to be estimated across seasons and years. We are constructing seabed carbon capture and storage budgets in a rapidly changing part of the world that may represent one of the most important global negative feedbacks on climate change.

Biography:

Dr. David Barnes is a marine ecologist at British Antarctic Survey, NERC and teaches at the University of Cambridge (UK). He has worked in polar marine science, focusing on continental shelf benthos, for 27 years and has published 240 scientific papers. Most recently, he is working on quantifying blue carbon in cold waters, it's tempero-spatial variability and power as a negative feedback on climate change – on the Antarctic Circumnavigation Expedition and NERC funded projects, Changing Arctic Ocean Seabed and ICEBERGs – see www.asccc.co.uk. Recent highlight papers include Barnes (2017) Global Change Biology, http://dx.doi.org/10.1111/gcb.13772 and Ashton et al (2017) Current Biology, http://dx.doi.org/10.1016/j.cub.2017.07.048