

Nitrogen isotopes in the shell of the Antarctic scallop *Adamussium colbecki* as a proxy for sea ice cover in Antarctica

POSTER

Presented by David P Gillikin



Monday, 11 July 2022



23:30 - 01:30



Exhibit Hall (1, Hawaii Convention Center) - Poster #457

Sub-session: 14dP3 - Cenozoic and Mesozoic climate change: synthesizing carbon cycle perturbation, surface processes, ecology, atmospheric composition, and seawater chemistry

Symposium Session: 14d - Cenozoic and Mesozoic climate change: synthesizing carbon cycle perturbation, surface processes, ecology, atmospheric composition, and seawater chemistry

Theme: Theme 14: Global Cycles: Linking the Earth, Ocean, Atmosphere, and Climate

Abstract

Adamussium colbecki is a large thin-shelled scallop common in Antarctic waters and well represented throughout the Holocene. Shell nitrogen isotopes in carbonate bound organic matter ($\delta^{15}\text{N}_{\text{CBOM}}$) have the potential to record sea ice state over time. Recent studies illustrated that $\delta^{15}\text{N}_{\text{CBOM}}$ values provide a similar proxy as soft tissue $\delta^{15}\text{N}$ values which in turn are predictably related to food $\delta^{15}\text{N}$ values [1]. Sea-ice organic N should have higher $\delta^{15}\text{N}$ values compared to open water organics due to nitrate draw down in the ice [2]. To test this hypothesis, we analyzed *A. colbecki* shells from Explorers Cove and Bay of Sails, western McMurdo Sound, Antarctica. These sites have different sea ice states: persistent (multiannual) sea ice at Explorers Cove and annual sea ice (that melts out every year) at Bay of Sails. Six adult shells collected live at these sites in 2008 (3 from each site) and two juveniles collected in 2016 from Explorers Cove were serially sampled for $\delta^{15}\text{N}_{\text{CBOM}}$ values from the growing shell margin to the umbo. $\delta^{15}\text{N}_{\text{CBOM}}$ values from Explorers Cove with

persistent sea ice cover were consistently higher ($+10 \pm 0.7 \text{ ‰}$) than those from Bay of Sails where the sea ice melts out every year ($+8 \pm 0.5 \text{ ‰}$; t-test $p < 0.0001$). $\delta^{15}\text{N}_{\text{CBOM}}$ data from Mid- to Late Holocene shells that grew in these locations will also be presented. We posit that nitrogen isotopes in *A. colbecki* shells have a high potential to record sea ice cover.

[1] Gillikin et al. (2017), GCA, 200, 55–66, doi: 10.1016/j.gca.2016.12.008

[2] Fripiat et al. (2014), Global Biogeochem. Cycles, 28, 115–130, doi:10.1002/2013GB004729

Presenting Author



David P Gillikin

Union College

Authors



Emma Puhalski

Union College



Stephen Camarra

Union College



Kelly E Cronin

University of Georgia



Anouk Verheyden

Union College



Sally E Walker

University of Georgia

