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GSA Annual Meeting in Phoenix, Arizona, USA - 2019

Paper No. 89-3

Presentation Time: 8:30 AM

THE ANTARCTIC SCALLOP ADAMUSSIUM COLBECKI AS A PROXY FOR SEA-ICE DURATION IN ANTARCTICA

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Sea ice is critical in structuring Antarctic marine ecosystems, controlling disturbance and primary productivity. Sea ice either melts annually or persists for multiple years, but variability in sea-ice duration is poorly understood prior to satellite images. The Antarctic scallop *Adamussium colbecki*, with its circum-Antarctic distribution and Holocene fossil history, may be a proxy for sea-ice duration. Previous work on *A. colbecki* links some trace element or melt and productivity. Further, increments between growth bands (striae) are thought to vary seasonally. To evaluate *A. colbecki* suitability as a sea-ice proxy, we tested correspondence between growth and trace elements known to represent sea ice or productivity at two sites in western McMurdo Sound: Explorers Cove (EC) with multiannual sea ice and Bay of Sails (BOS) with annual sea ice. Trace element signals should be damper or absent at EC, whereas those from BOS should cycle annually.

One *A. colbecki* shell each from EC and BOS were collected live in 12 m of water. Trace elements previously linked to ice melt (Mn/Ca, Fe/Ca, and Pb/Ca), metabolism (Mg/Ca), and primary productivity (Ba/Ca, Li/Ca) were sar from interstrial increments using an LA-ICP-MS along the central axis from umbo to last striae. Interstrial distances (ISDs) were measured and compared to trace elements using wavelet coherence analysis. Coherence (covariance between ISD and trace elements) exceeding 95% significance are reported here.

Results indicate that ISD and trace elements only cohere during episodic sea-ice melt at EC and cohere throughout adult growth at BOS. All EC trace element concentrations display a common pattern: cyclic growth followed minimal variation in early adult ontogeny, with intermittent variation resuming later in adult growth. In contrast, trace elements from the BOS scallop exhibit strong cyclic behavior throughout ontogeny. ISD coheres with trace elements at EC for short strial sequences (5-30) twice in adult growth, corresponding to partial sea ice melts at EC during 1999 and 2002. Conversely, BOS trace elements cohere with ISD for long (20-140) strial sequences adult growth, indicating annual sea-ice melt. Results indicate that *A. colbecki* archives sea-ice duration, thus its fossil record can be used to investigate past variability.

Session No. 89

T124. Advances in Ocean and Climate Reconstructions from Environmental Proxies *Monday, 23 September 2019: 8:00 AM-12:00 PM*

Room 228AB, North Building (Phoenix Convention Center)

Geological Society of America *Abstracts with Programs.* Vol. 51, No. 5 doi: 10.1130/abs/2019AM-340824

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