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Examining the reproducibility of stable isotope ratios in the marine bivalve, Astarte borealis, from populations in the White Sea, Russia: implications for biological consequences of climate change

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Shells of the marine bivalve, Astarte, are uniquely suited to investigate links between environmental/climate change and biological consequences because of their change in size and biogeographic distribution through time. For example, are there corresponding changes in lifespan and biogeographic distribution depending on warm vs. cold climate states? Does warm vs. cold climate state result in longer or shorter lifespans? Early studies of Astarte have documented a decrease in shell size through geologic time. Modern specimens are much smaller than those from the mid Pliocene at similar latitudes. Astarte had a wide latitudinal and cosmopolitan distribution in the western North Atlantic during the Oligocene to Pliocene. During the early Pleistocene, most of the warm-water species became extinct, and today, their biogeographic distribution is mostly restricted to the northern Pacific, Atlantic, and Arctic Oceans. To answer questions linking biological consequences and climate change, we must first decipher ontogenetic changes in shell growth of modern specimens. Preliminary data using isotope sclerochronology identified slowed shell growth from late summer to winter in modern specimens from the White Sea, Russia, possibly triggered by increasing freshwater input and decreasing temperatures. Here, we present new data examining the reproducibility of isotopic time series and season of slowed growth among modern individuals collected at the same time from the same population.