

Evidence of coherent warming in the northwest Atlantic Ocean from *Arctica islandica* oxygen isotope records

Diana THATCHER^{1*}, Nina WHITNEY², Alexandra WALTON¹, Heeyeon SUN¹, Lindsey JAROSINSKI¹, Alan WANAMAKER¹, Michèle LAVIGNE³, Branwen WILLIAMS⁴, Joseph STEWART⁵

¹Department of Geological and Atmospheric Sciences, Iowa State University, 253 Science Hall, 2237 Osborn Drive, Ames, IA, 50011, USA

²Marine and Coastal Science, Western Washington University, 516 High Street, Bellingham, WA, 98225, USA

³Department of Earth and Oceanographic Science, Bowdoin College, 255 Maine Street, Brunswick, ME, 04011, USA

⁴Keck Science Department, Claremont McKenna-Pitzer-Scripps Colleges, 888 Columbia Avenue, Claremont, CA 91711, USA

⁵School of Earth Sciences, University of Bristol, Wills Memorial Building, Queens Road, Bristol, BS8 1RJ, UK

*thatcher@iastate.edu

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Parts of the northwest Atlantic Ocean, including the Gulf of Maine, along the northeastern coast of the United States, are warming at a rate as much as four times faster than the global ocean, according to instrumental and satellite records. In addition to the longer-term temperature increases, the frequency and severity of marine heat waves have been increasing. Combined, the ecological impacts are numerous and concerning, yet our understanding of past climate in this region is incomplete due to sparse and short-duration instrumental records.

Here we present annually resolved oxygen isotope records from the marine bivalve, *Arctica islandica*, from five locations ranging from Jonesport and Seguin Island in the Gulf of Maine to Long Island, New York, Cape May, New Jersey, and Ocean City, Maryland in the Mid-Atlantic Bight, a span of over 870 km along the Atlantic coast. Several of the isotope records span the last 100 years or more and all records show coherent, substantial warming since at least 1980 CE. The level of warming indicated in the shell oxygen isotopes is comparable to the 0.5 °C per decade (1980-2020 CE) warming also shown in the instrumental record of sea surface temperature from Boothbay Harbor along the central coast in the Gulf of Maine. These five spatially distant isotope records span different oceanographic conditions and dynamics, including water mass sources, yet they all indicate a substantial warming in recent decades, likely related to increased anthropogenic warming. Beyond reconstructing seawater temperature prior to instrumental records, a major goal of this work is to disentangle the global warming signal from these records to better understand the underlying ocean dynamics also influencing these records.

