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A shell-based reconstruction of environmental change on the North Icelandic shelf

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In this study, we use annually banded growth histories from the long-lived bivalve, *Arctica islandica* (L.), to reconstruct ocean climate variability on the North Icelandic shelf. We present the first cross-matched marine sclerochronological record from the North Icelandic shelf, an area that is largely influenced by the confluence of the warm and salty Irminger Current and the cold and relatively fresh East Greenland Current. The master chronology (MC) is based on shells that were collected alive in July 2006. Annual band counting revealed that some of these shells are $>$250 years old and one *A. islandica* specimen had more than 400 annual growth bands in its shell, making it the longest-lived mollusc and possibly the oldest non-colonial animal yet discovered. The calculated average expressed population signal (EPS) of the shells was $>$0.84 from 1900-2005 AD, indicating strong synchronous growth behaviour related to ambient ocean conditions. A comparison between this record and environmental data from the local area yielded a positive relationship ($r = 0.49$; $p < 0.0001$) between the MC and 50 m seawater temperature during the summer months from 1948-2005. A successful split period calibration/verification (reduction of error [RE] = 0.20; coefficient of efficiency [CE] = 0.18) performed on this dataset was used to reconstruct a 50 m depth summer seawater temperature back to 1900 AD. Ongoing research is focused on using both live-caught and dead *A. islandica* shells to create a cross-matched and absolutely dated MC from the North Icelandic shelf during the last millennium. Once the MC is adequately developed, geochemical sampling ($^{18}O/^{16}O$, ^{14}C) will be undertaken. This record will provide a framework to better understand natural ocean climate variability, and to assess the potential impacts of anthropogenic activity on the ocean climate system in the North Atlantic.