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Annually resolved seawater temperature variability of the Sub-polar North Atlantic over the last 1000 years

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The lack of annually-resolved marine climate records spanning the last millennium constrains our understanding of the natural variability of the global climate system. We present a continuous annually-resolved reconstruction of sub-polar (N Iceland) sea water temperatures (SWT) derived from the [U+F064]18O analyses of carbonate material drilled from the annually resolved growth increments contained in an absolutely dated master Arctica islandica sclerochronology spanning the period 953-2000. The calibrated SWT reconstruction contains a significant cooling trend over the period 953-1891 (0.1oC per century) and a marked warming trend over the period 1891-2000 (2.3oC per century). The underlying natural variability is controlled by solar irradiance changes modulated by volcanic forcing and internal variability. The modern SWT warming is demonstrated to lie outside the range of natural variability of the last 1000 years consistent with an anthropogenic influence.