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**A 114-year record of spring-summer surface water temperature based on oxygen isotope ratios across bivalve mollusk shells, *Arctica islandica* (North Sea)**

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Although the North Sea is one of the most intensively studied marine ecosystems, there is a lack of continuous, long-term and high resolution record on surface water temperature (SST); SST models still require verification. We approach this deficiency by analyzing seasonal and inter-annual stable isotope variation of the long-lived (>210 years) bivalve mollusk *Arctica islandica*.  $\delta_{18}\text{O}$  ratios were measured in specimens of *A. islandica* specimens collected alive from the North Sea at 25 m depth. Temperature values calculated from the  $\delta_{18}\text{O}$  values range from 6.54°C to 16.69°C. There is a significant correlation and a high running similarity between surface water temperatures measured by satellite, buoys and shipboard measurements and those reconstructed from  $\delta_{18}\text{O}$  of the shells. Currently, our SST reconstructions from *A. islandica* shells cover the period from 1889 to 2002 with a resolution ranging from about two weeks to about six months. This temporal resolution was achieved through micro-milling technique. Our study demonstrates that the bivalve species *Arctica islandica* provides an excellent archive for testing the accuracy of SST models prior to direct measurements. Such data can be used for calibrating and testing Global Circulation Models.