

## Using ocean quahog (*Arctica islandica*) shells to reconstruct palaeoenvironment in Öresund, Kattegat and Skagerrak, Sweden

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**Abstract** Shells of *Arctica islandica* collected between 1884 and 2004 from Öresund, Kattegat and Skagerrak (Swedish West Coast) were used to monitor local climate variations and the influence of human activities on the local environment. For this purpose, we analysed the growth, structure and chemical composition of these shells and compared them with shells collected from Kiel Bay, Norway and Iceland. The growth rate of the studied shells registers an NAO periodicity of ca 8 years. However, the observed signal is weak because of other environmental interferences that are either of natural or anthropogenic origin. For example, the oxygen isotope ratios show temperature fluctuation, but also the influx of low salinity water. Higher contents of S, N, Cu, Zn, As, Cd and P in shell portions formed during the last century are related to human activities such as mining and industrial development. Our study indicates that in order to use *Arctica* shells as archives of climate change it is necessary to study the

full range of environmental data that is recorded in the shells by using a multi element and isotope approach in combination with different analytical techniques including investigation of growth rates and shell structure.

**Keywords** *Arctica islandica* · Shell chemistry · Shell growth · Oxygen isotopes · Trace elements · Shell structure

### Introduction

For a better understanding of recent climate changes and for prediction of future changes it is essential to reconstruct environmental history and to properly define on one hand the natural periodicities in climate change and on the other hand the human impact on the environment with its effect on climate (Dunca et al. 2005).

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