Geophysical Research Abstracts
Vol. 17, EGU2015-3466-3, 2015
EGU General Assembly 2015

Environmental effects on shell microstructures of *Cerastoderma edule*

Stefania Milano (1), Bernd R. Schöne (1), and Rob Witbaard (2)

(1) Institute of Geosciences, University of Mainz, Joh.-J.-Becherweg 21, 55128 Mainz, Germany (smilano@uni-mainz.de), (2) Netherlands Institute for Sea Research (NIOZ) PO Box 59, 1790 AB Den Burg, Texel, The Netherlands

Bivalve shells serve as sensitive recorders of environmental conditions. However, reconstruction of a specific environmental parameter is still challenging. For example, variable shell growth rates simultaneously provide information on water temperature, food availability and food quality. Likewise, shell oxygen isotope values function as a dual proxy of water temperature and salinity (=oxygen isotope signature of the ambient water). Reconstruction of water temperature from $\delta^{18}O_{shell}$ requires knowledge of $\delta^{18}O_{shell}$ and vice versa. Unfortunately, the incorporation of trace elements in the shell is strongly controlled by biological effects and, hence, the element-to-calcium ratios of the shell are difficult to interpret in terms of environmental variables. Here, we studied if the structural properties (shell architecture, shell microstructures, fabrics) of the shell of the common cockle can function as an alternative proxy of environmental variables. Specimens of *C. edule* were collected alive from the intertidal zone of the North Sea. Temperature and salinity were monitored at the site where the shells lived on hourly basis for almost one year. Each portion of the shell was temporally contextualized with the tidally-deposited growth increments. Shell microstructures (composite prismatic structures) were analyzed under with a scanning electron microscope (SEM). The change of the size and shape of the mesocrystals was strongly correlated to water temperature during the growing season (May - Sep.). With rising temperatures, the size of mesocrystals increased and their morphology changed from rounded to elongated shape. Our findings suggest that shell microstructures of *C. edule* may serve a new, independent proxy for water temperature.