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Benthic foraminifera cultured over a large salinity gradient: first results and comparison with field data from the Baltic Sea.

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Some of the most significant challenges in paleoclimate research arise from the need to both understand and reduce the uncertainty associated with proxy methods for climate reconstructions. This is especially important for shelf and coastal environments where increasing numbers of high-resolution paleorecords are being generated. These challenges are further highlighted in connection with ECORD/IODP Expedition 347: Baltic Sea Paleoenvironments. This large-scale drilling operation took place in the Baltic Sea region during the autumn of 2013. At this time, there is a pressing need for proxy calibrations directly targeted at the brackish Baltic environment. Within the CONTEMPORARY project we are investigating different temperature and salinity proxy variables through a combination of field- and culture-based benthic foraminiferal samples, together with genetic characterization (genotyping) of the morphospecies. We have completed two field campaigns where we collected (living) foraminifera and water samples at several sites, ranging from fully marine to low salinity conditions. The core-top foraminifera have been analysed for trace metal/Ca, stable oxygen and carbon isotopes, and faunal composition. Living foraminifera collected from the sediment-water interface were cultured in sea water in two long-term experiments at different temperatures (5°C and 10°C) and at three different salinities (15, 25, and 35). The first experiment yielded a large number of reproduced and experimentally-grown Elphidium specimens. The second experiment resulted in growth but no reproduction. We will provide a summary of the experimentally grown material and discuss the challenges of generating new proxy calibrations for foraminiferal shell geochemistry in the Baltic Sea. Furthermore, specimens of Elphidium and Ammonia, found at two sampling sites (Anholt, Kattegat and Hanöbay) with differing salinities, were genotyped and the results indicate that the same genotype of Elphidium is found in both salinity regimes but that the Ammonia genotypes differ depending on the prevailing salinity regime.

Also in the CONTEMPORARY team: Heather Austin, Clare Bird, Johan Gabrielsson, David J. McCarthy, Angela Roberts, Magali Schweizer.