Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09914, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09914
EGU General Assembly 2008
© Author(s) 2008

Towards a process-based understanding of biomineralization in foraminifera

Reichart, G.J. (1,2)

Duenas Bohorquez, A. (1)

Nehrke, G. (2)

Haig, J. (1)

Wit, J. (1)

Bijma, J. (2)

de Nooijer, L. (3)

Wolthers, M. (1)

Ernst, S. (1)

Ní Fhlaithearta (1)

(1) Department of Earth Sciences, Faculty of Geosciences, Utrecht University, The Netherlands, (2) Biogeosciences, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany, (3) Japan Agency for Marine-Earth Science (JAMSTEC), Yokosuka, Japan. (reichart@geo.uu.nl / Fax +31 30-2535302 / Phone +31 30-2535041)

Trace elemental and isotopic composition of fossil foraminiferal shells tests are widely used in reconstructions of past climate. Although most calibrations of foraminiferal test composition to environmental variables are empirically derived, it becomes increasingly clear that the process of biomineralization itself plays a major role in trace element and isotope partitioning. The accuracy of climate reconstructions, therefore, critically relies on our understanding of the processes involved in biomineralization.

Foraminifera incorporate chemical information by taking up seawater for their cal-

cification. However, the chemistry of the ambient seawater is modified by their biology. Both respiration and calcification affect local carbonate chemistry. Controlled growth experiments, in which seawater is altered, are used to explore the impact of such processes. Subsequent active proton pumping, and possibly also modification of Mg-concentrations, sets the stage for the formation of new chambers. Fluorescent probes provide valuable information on how foraminifera, passively and actively, alter the chemistry of the reservoir they calcify from. Organic molecules play an important role when carbonates precipitate from this altered seawater. The organic matter incorporated inside the carbonate matrix and organic linings are isolated and analyzed to identify organic molecules. Inorganic precipitation experiments, both with and without specific organic molecules, are contrasted to determine the impact of these molecules. The role of growth rate and solution stochiometry is also determined in these inorganic precipitation experiments. Together these processes determine how environmental information is ultimately stored in biogenic carbonates.