

Culture experiments to better understand biomineralization under varying geochemical conditions

--Zombie factory in Japan: the first trial on Scandinavian foraminifera--

Laurie Marie Charrieau¹, *Takashi Toyofuku⁵, Petra L. Schoon², Melissa Chierici³, Jeroen Groeneveld⁴, Katsunori Kimoto⁵, Emma Kritzberg⁶, Karl Ljung², Osamu Sasaki⁷, Helena L. Filipsson²

1.Dept. of Geology and CEC, Lund University, 2.Dept. of Geology, Lund University, 3.Dept. of Chemistry, Göteborg University, 4.Center for Marine Environmental Sciences (MARUM), Bremen University, 5.Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), 6.Dept. of Biology, Lund University, 7.The Tohoku University Museum

Ocean acidification is a consequence of ongoing global climate change, and it may have severe impacts on calcifying organisms. This process may be amplified in coastal regions where erosion, land run-off and eutrophication contribute in lowering the pH.

The aim of our study is to define how bottom-dwelling foraminifera will respond to pH changes in the Skagerrak/Baltic Sea region in addition to other environmental stressors such as temperature and salinity changes.

First results demonstrate variations in shell preservation of the living foraminiferal fauna. The more marine foraminifera have pristine shells, while the low salinity Baltic ones are more or less dissolved and only inner organic linings are still visible. However, these "zombie" foraminifera are still alive, as determined from the CellTracker Green labelling. The dissolution can be linked to the lower pH in the Baltic.

In order to investigate the zombie foraminifera further, we set up culture experiments on healthy foraminifera under controlled geochemical parameters. We discovered that lowering the pH is not sufficient to create zombie foraminifera and that abrasion between foraminifera and sediment is probably involved in the shell loss. Those results highlight the multiple factors affecting the balance of benthic ecosystems subjected to environmental stressors.

Keywords: benthic foraminifera, ocean acidification, laboratory experiment