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Effects of ocean acidification on trace elements ratio (Mg/Ca, Sr/Ca, Ba/Ca and U/Ca) in two foraminifer species

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It has been concerned that accelerations of anthropogenic CO2 release will result not only warming the surface of earth but also acidify the ocean. Decrease of carbonate ion concentration and pH in the ocean affects marine calcifying organisms. Reef-dwelling benthic foraminifera, which secrete high-magnesium calcite test, could be categorized as first responders to the ocean acidification as high-magnesium calcite is more soluble than aragonite or calcite, however a limited number of studies focus on their adaptation to ocean acidification. One such study is Fujita et al (2011) and they reported the changing in the calcification rates measuring the diameter and the weight of three different species of large, algal symbiont-bearing benthic foraminifers. The result seems to show the positive correlations between the calcification rate and pCO2 in the intermediate level, whereas negative correlations are seen in the high pCO2 (970 micro-atm) condition. However the degree of importance for calcifications seems to have species dependence (i.e. hyaline vs. porcelaneous shell, different type of symbionts, diatom vs. dinoflagellate). The present study use these samples in order to investigate the effects on trace elements in the calcium carbonate shells as is often used for proxies to reconstruct paleoceanography. We analyzed Mg/Ca, Sr/Ca, Ba/Ca and U/Ca by high resolution sector field laser ablation inductively coupled plasma-mass spectrometer (HR-SF-ICPMS) on Baculogypsina sphaerulata (perforate and hyaline shell and diatom endosymbiont) and Amphisorus hemprichii (imperforate and porcelaneous shell and dinoflagellate endosymbiont) cultured at five different pCO2 (260, 360, 580, 770 and 970 micro-atm). We will present the preliminary results of the measurements during the talk.

References:
Fujita, K., M. Hikami, A. Suzuki, A. Kuroyanagi, K. Sakai, H. Kawahata, and Y. Nojiri. 2011. Effects of ocean acidification on calcification of symbiont-bearing reef foraminifers. Biogeosciences, 8, 2089-2098.

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