Geophysical Research Abstracts
Vol. 14, EGU2012-3310-1, 2012
EGU General Assembly 2012

Diatom biomineralization reflected in diatom B/Si

H. Stoll (1), L.M. Mejia-Ramirez (1), K. Isensee (1), A. Mendez-Vicente (1), and J. Pisonero (2)
(1) University of Oviedo, Geology, Oviedo, Spain (hstoll@geol.uniovi.es), (2) Dept. of Physics, University of Oviedo, Spain

Because boron speciation in seawater is controlled by pH there has been wide interest in using the concentration and isotopic composition of B in marine biominerals to reconstruct past changes in ocean pH. Biomineralization may modulate B incorporation either through cellular pH regulation or uptake processes. We investigate the effect of biomineralization on B incorporation in opal from diatoms. Two species of diatoms, Thalassiosira weissflogii and T. pseudonana, were cultured at pH between 7.4 and 8.6, equivalent to pCO_2 from 2000 to 200 ppmv. Growth rate, type of carbon acquisition, and silicon and carbon quotas were determined. Harvested opal was thoroughly cleaned of organic matter using permanganate and perchloric acid oxidative treatments. The boron content of opal was determined by mounting cleaned frustules in epoxy resin for measurement of 11B and 28Si on LA-ICPMS (Resonetics, Agilent 7700). LA-ICPMS measurements are reproducible from one session to the next and indicate B concentrations in T. pseudonana ranging from 7 to 40 ppm and in T. weissflogii from 4 to 9 ppm. B content in T. pseudonana is correlated with bicarbonate uptake rate and with normalized Si quotas, while for T. weissflogii, which is a bicarbonate-restricted user at the pH studied, B content seems to be regulated primarily by the borate/bicarbonate seawater ratio. We present a simple cellular model of B and Si uptake by diatoms to quantitatively explore the mechanisms for variable B content and its potential as a proxy .