B content and $\delta^{11}B$ from cultured diatoms (*Thalassiosira weissflogii* & *T. pseudonana*): Relationship to $pH_{seawater}$ and diatom C acquisition

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Despite the importance of diatoms in regulating climate, most geochemical records are based on carbonates. Among them, B content and $\delta^{11}B$ has been widely used to reconstruct pH from foraminifera and coral fossils. We present preliminary results of $\delta^{11}B$ on diatom opal and compare them to $\delta^{11}B$ on inorganically precipitated opal. We measured B content in opal with the aim of determining if [B] can be used as a pH proxy or to identify physiological responses to acidifying pH.

Thalassiosira pseudonana and *Thalassiosira weissflogii* were cultured at varying pH and Si and C quotas were determined. Frustule B content was measured by LA-ICPMS and ion probe. Cells of both species grown at higher pH have higher [B] and higher Si requirements per fixed C. If this trend is representative of diatom silicification in a future more acidic ocean, it could contribute to changes in the efficiency of diatom ballasting and C export, as well as changes in the diatom abundance in the phytoplankton community in Si-limited regions. If B enters the cell through the same transporter employed for HCO_3^- uptake, an increased HCO_3^- requirement with decreasing CO_2 concentrations, and higher $B(OH)_4/HCO_3^-$ ratios would explain the observed increase in frustule B content with increasing pH.

With current analytical precision, frustule [B] is unlikely to resolve ocean pH with a precision of paleoceanographic interest. However, if B content was controlled mainly by HCO_3^- uptake, then B content measurements might reveal the varying importance of active HCO_3^- acquisition in the past. Though as occurs with B content, $\delta^{11}B$ may depend either on seawater pH and/or biomineralization processes, preliminary $\delta^{11}B$ results show very low values, which agrees with the very low pH at the site of silicification (~5). At this acidic pH, it is very unlikely that $\delta^{11}B$ provides enough sensitivity to reconstruct $pH_{seawater.}$ Conversely, $\delta^{11}B$ in diatom opal may be used to constrain $\delta^{11}B_{seawater}$, which is very important for foram-based pH reconstructions.

Investigation of the processes of organic matter diagenesis in sediments of Lake Beloye, West Siberia, by the pyrolytic methods

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During diagenesis, biopolymers (proteins, fats, carbohydrates, lignin, etc. synthesized by animals and plants) of organic matter (OM) transform into a geopolymer - the so-called kerogen composing most of the OM of ancient sediments. Starting from the sedimentation and deposition of OM of plant and animal genesis, many biochemical and chemical reactions run in it.

Study of the Holocene sediments of Lake Beloye (West Siberia) in the depth range 0 — 137 cm gave an insight into the transformation of organic matter (OM) at the early stages of diagenesis. Analysis of OM was performed by pyrolytic methods (Rock Eval (RE) and pyrolysis + gas chromatography-mass spectrometry (Pyr-GC-MS)). RE pyrolysis is intended for the identification of oil source rocks, but owing to its simplicity and reliability, this method has been widely used for the study of immature OM in soils and recent lacustrine and marine sediments [1, 2]. The Pyr-GC-MS is the main method for the study of the molecular composition of protokerogen. It consists in conducting the flash-pyrolysis at >600 ºC with a subsequent gas chromatography-mass-spectrometry analysis of the products [3]. Using RE and Pyr-GC-MS methods, 15 and 8 samples have been studied, respectively. The results of the work are presented in detail in [4].

The work has shown that the macromolecular aliphatic structure of the kerogen and the precursors of sterane and hopane geomolecules — sterenes and hopenes — form at the early stages of diagenesis. We suggest that macrophytes and bacteria are the main sources of OM for the studied lacustrine sediments.

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