The boron isotopic composition of diatom opal

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The boron isotopic composition of marine calcium carbonates is a well-known proxy for ocean pH [1], with applications for marine foraminifera ranging from reconstructing atmospheric CO_2 in the past to tracing the nature and magnitude of ocean:atmosphere exchange of CO_2 [1]. The high latitude oceans are key in this regard, being areas of substantive carbon and heat exchange. However, calcareous microplankton are rare in deep sea sediments south of 50º in the Southern Ocean and north of 40º in the North Pacific. Instead, these sediments contain abundant siliceous microfossils (e.g. diatoms, sponges, radiolaria), necessitating the development of opal-based proxies to reconstruct the past behaviour of these key oceanographic regions.

Here, we apply the boron isotope pH proxy to diatom opal for the first time. We will present $\delta^{11}B$ and B/Si data from two sample sets. The first is for the diatom *Thalassiosira weissflogii* cultured under controlled conditions with variable pH (7.48, 7.83, 8.25, 8.53), and the second sample set consists of sedimentary diatom opal belonging to the genus *Coscinodiscus* from ODP Site 882 in the North Pacific. These samples orginate from 2.52 to 2.85 Ma, and include the period of intensificiation of Northern Hemisphere Glaciation [2]. We will present and discuss the pH-$\delta^{11}B$ and pH-B/Si relationships in the *T. weissflogii* cultures and apply this understanding to interpret the sedimentary record of *Coscinodiscus.* Both sample sets illustrate the differences in boron systematics between carbonates and opal, but also highlight the potential of $\delta^{11}B$ and B/Si in diatom opal as a means to reconstruct the ocean carbonate system in regions devoid of preserved calcareous microplankton.

[1] Foster, G.L., and Rae, J.W.B (2016) Anual Review of Earth and Planetary Sciences, 44, 207-237
[2] Swann G. E. A. (2010) Earth Planet. Sci. Lett. 297, 332-338.