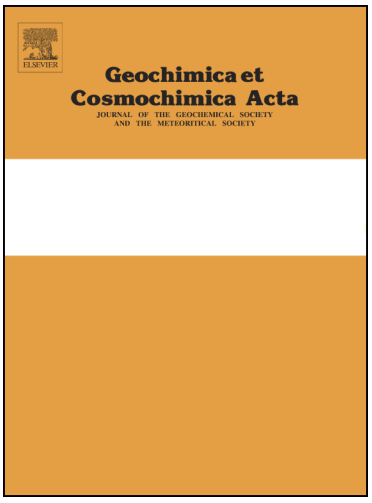

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Boron isotope sensitivity to seawater pH change in a species of *Neogoniolithon* coralline red alga

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The increase in atmospheric carbon dioxide (CO_2) observed since the industrial revolution has reduced surface ocean pH by ~0.1 pH units, with further change in the oceanic system predicted in the coming decades. Calcareous organisms can be negatively affected by extreme changes in seawater pH (pH_{sw}) such as this due to the associated changes in the oceanic carbonate system. The boron isotopic composition ($\delta^{11}B$) of biogenic carbonates has been previously used to monitor pH at the calcification site (pH_{cf}) in scleractinian corals, providing mechanistic insights into coral biomineralisation and the impact of variable pH_{sw} on this process. Motivated by these investigations, this study examines the $\delta^{11}B$ of the high-Mg calcite skeleton of the coralline red alga *Neogoniolithon* sp. to constrain pH_{cf}, and investigates how this taxon's pH_{cf} is impacted by ocean acidification. $\delta^{11}B$ was measured in multiple algal replicates (n = 4 to 5) cultured at four different pCO_2 scenarios – averaging (± 1σ) 409 (± 6), 606 (± 7), 903 (± 12) and 2856 (± 54) µatm, corresponding to average pH_{sw} (± 1σ) of 8.19 (± 0.03), 8.05 (± 0.06), 7.91 (± 0.03) and 7.49 (± 0.02) respectively. Results show that skeletal $\delta^{11}B$ is elevated relative to the $\delta^{11}B$ of seawater borate at all pH_{sw} treatments by up to 18 ‰. Although substantial variability in $\delta^{11}B$ exists between replicate samples cultured at a given pH_{sw} (smallest range = 2.32 ‰ at pH_{sw} 8.19, largest range = 6.08 ‰ at pH_{sw} 7.91), strong correlations are identified between $\delta^{11}B$ and pH_{sw} ($R^2 = 0.72$, $p < 0.0001$, n = 16) and between $\delta^{11}B$ and B/Ca ($R^2 = 0.72$, $p < 0.0001$, n = 16). Assuming that skeletal $\delta^{11}B$ reflects pH_{cf} as previously observed for scleractinian corals, the average pH_{cf} across all experiments was 1.20 pH units (0.79 to 1.56) higher than pH_{sw}, with the