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Boron, growth rates, and more accurate pH reconstructions from coral skeletons

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Elements and isotopes in coral skeletons are archives of paleoseawater and the coral extracellular calcifying fluid (ECF) in which the skeleton is formed. However, interpreting these archives is complicated by the fact that, like most Earth surface carbonates, coral skeletons precipitate out of isotopic equilibrium with the ECF or the host solution due to poorly understood kinetic effects and biological influences. Here, we investigate the effects on skeletal boron concentration (B/Ca ratio) and isotopes ($\delta^{11}B$). We find that both B/Ca and $\delta^{11}B$ correlate with pH and both anticorrelate with LGR. Using the dependence of both on LGR, we eliminate the contribution of LGR from the equations, thus providing a correction to present, past (Fig. 1), and future boron data from coral skeletons, and obtain more accurate reconstructions of ECF pH during coral skeleton formation.

Fig. 1. B/Ca variations vs. pH in the extracellular calcifying fluid (ECF)

