The impact of seawater pH on the $\delta^{11}B$ of coral aragonite

N. ALLISON[1], C. COLE[1], A. A. FINCH[1], C. HINTZ[2] AND J. RAE[1]

[1]Department of Earth and Environmnetal Sciences, University of St. Andrews, KY16 9AL, UK. na9@st-and.ac.uk
[2]Marine Sciences, Savannah State University, GA, USA

To investigate the relationships between the pH of seawater, coral skeletal $\delta^{11}B$ and the pH of the coral extracellular calcification fluid (ECF) we cultured a series of *Porites* spp. corals over a range of seawater pCO_2 ranging from the last glacial maximum (180 ppm) to levels projected by the end of this century (750 ppm). Multiple coral genotypes were cultured in each treatment. The skeleton deposited after a > 5 month acclimation period was identified and analysed for $\delta^{11}B$ and B/Ca. ECF pH was estimated from skeletal $\delta^{11}B$. Our data confirm that the magnitude of pH upregulation in coral is dependent on seawater pH. Coral cultured at high seawater pH increased the pH of the calcification fluid by less than ambient corals while corals at low seawater pH increased calcification fluid pH by more than ambient corals. ECF pH varied significantly between genotypes cultured at the same seawater pCO_2 in all treatments but was significantly higher in corals cultured at 180 ppm. There was no significant difference in ECF pH between the datasets for corals cultured at 400 and 750 ppm but this reflected the performance of two coral genotypes which maintained a high ECF pH even at high seawater pCO_2. The high skeletal $\delta^{11}B$ (ECF pH) variability between corals cultured at the same pH is likely to hamper any estimate of past seawater pH from fossil coral $\delta^{11}B$.