Boron proxy evidence for surface ocean acidification & higher pCO_2 during the PETM

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The Paleocene-Eocene Thermal Maximum (~55 Ma) has been widely attributed to a rapid input of a large mass (~4500 – 6000 GtC) of ^{12}C-enriched carbon into the ocean-atmosphere system. Patterns of calcium carbonate dissolution at the seafloor as well as modeling studies suggest that this was accompanied by a rapid decrease in ocean pH, followed by a gradual recovery. A further result of such modeling studies is the suggestion of an "overshoot" or supersaturated ocean phase after the recovery interval, when the CCD deepened to below its Paleocene depth and surface water carbonate saturation states rose to above pre-excursion levels. In an effort to document changes in the saturation state of surface waters, and infer potential effects on calcifying organisms and Mg/Ca and $\delta^{18}O$-based temperature estimates, we have measured B/Ca and Mg/Ca in mixed-layer planktic foraminifers from site 1209 in the Pacific and Sites 1262 and 1263 in the Atlantic. Previous work at these sites has documented large increases (50%) in Mg/Ca ratios in the mixed-layer planktic foraminifer species *M. velascoensis* and *A. soldadoensis* consistent with 5 to 6°C of surface warming. Our B/Ca results suggest a large drop in surface water pH coincident with the rise in temperature at the onset of the carbon isotope excursion followed by a gradual recovery to pre-excursion levels. The latter feature, coupled with a rise in total alkalinity resulting from dissolution of $CaCO_3$ is taken as evidence of a carbonate saturation overshoot phase starting ~100 ka after the onset of the carbon isotope excursion. We are currently measuring boron isotopes in the same taxa in order to quantify the pH changes suggested by the B/Ca data. Estimating the magnitude of the pH drop at the onset of the event will facilitate computations of the mass and rate of carbon input that triggered the PETM, as well as the magnitude of change in pCO_2.