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Tracing ocean pH/acidification at the Early Jurassic (Pliensbachian-Toarcian) and Permian Triassic extinction events (pH-prox)

Extreme perturbations of the Phanerozoic Earth System are expressed as mass extinctions coincident with profound disruption to the global carbon cycle. Such events are often caused by dramatic shifts in climate or oceanic chemistry i.e. rapid global warming, the expansion of oceanic anoxia onto continental shelves, and acidification of the surface ocean. These processes have catastrophic impacts on ecosystems at all trophic levels, and so represent important feedback mechanisms for the operation of the global carbon cycle. To document the role of ocean acidification in mass extinctions, we aim to produce high resolution boron isotope profiles from well-characterized marine carbonates that preserve an exemplary biogeochemical record for the greatest mass extinction of the Phanerozoic, the Permo-Triassic event, as well as for the second-order mass extinction, but most prominent Mesozoic oceanic anoxic event, the Early Jurassic (Pliensbachian-Toarcian) event. This will allow reconstructing oceanic pH conditions leading up to and during mass extinction events for which ocean acidification has been hypothesized. Our samples will be concurrently evaluated by other participating scientists for additional proxy data and biological consequences to generate key biogeochemical information that will allow testing hypotheses that link mass extinction to dramatic changes in ocean pH and ocean acidification.