A paleotemperature proxy record across the end-Permian extinction horizon and through the Triassic recovery interval from oxygen isotopes in conodont apatite

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The feedbacks and responses of Earth climate and seawater chemistry to perturbations in the global carbon cycle is an ongoing field of research that is not fully understood. In particular responses to abrupt increases in atmospheric greenhouse gases are needed in order to better understand the potential impact of future alterations of the carbon cycle. The end-Permian represents a period with significant changes in the carbon cycle related to the trigger mechanism of the mass extinction. Environmental reconstructions for this time interval are sparse due to the compromised integrity of archives that contain such information. To increase our understanding of causes and consequences of carbon cycle perturbations during this important geological time interval we are using biogenic apatite of Late Permian, Early and Middle Triassic conodonts from South China to reconstruct sea water temperature (oxygen isotopes), weathering rates (strontium isotopes) and carbonate chemistry (calcium isotopes). A coupled C-Sr-Ca model will be developed to help to constrain PTB carbon cycle models, and extinction and recovery scenarios. The results of this study will help to constrain PTB carbon cycle models, and extinction and recovery scenarios.

Preliminary results suggest temperature fluctuations in the range of eight degrees Celsius (ranging from 18 to 26 degrees), a rapid calcium isotope excursion consistent with an ocean acidification scenario and a change in the seawater Sr isotope signature indicative of enhanced weathering. The timing of the carbon isotope and calcium isotope perturbations seem to be coupled.