

End-Triassic Climate Change and Mass Extinction: Atmospheric pCO₂ and Vertebrate Fossils from the Algarve Basin (Portugal)

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Past Climate Center Awards: The graduate student PI has not previously applied for a Climate Center award, but Co-PI J. Whiteside received three awards during her tenure as a graduate student at Lamont (2003, 2004, 2005: titles and abstracts at <http://www.ldeo.columbia.edu/climatecenter/funded-projects>).

Abstract: The Triassic-Jurassic transition was a remarkable interval of mass extinction associated with, and probably driven by, intense volcanic-induced climate change. Investigating the role CO₂ played in this extinction is critical for understanding potential environmental changes our modern world could face as humans release analogous amounts of CO₂ into the atmosphere. We propose to study the record of atmospheric pCO₂ in a thick, well-dated sequence of Upper Triassic-Lower Jurassic sedimentary strata in the Algarve Basin of Portugal. This record, compiled through analysis of stable carbon isotopes in paleosol carbonates, will help test the hypothesis that atmospheric pCO₂ increased in concert with the earliest Central Atlantic Magmatic Province (CAMP) eruptions during Pangean rifting. Furthermore, the presence of abundant and well-preserved terrestrial vertebrate fossils in the Algarve sections allows us to study patterns of climate change in association with patterns of vertebrate evolution and extinction. In particular, our work will test whether the earliest phase of volcanism, and presumably pCO₂ increase, was sufficient enough to drive a local vertebrate extinction event.