Refining CO_2-Temperature Sensitivity During the Paleocene/Eocene Thermal Maximum for Application to Future Climate Change

Jennifer M. Cotton

University of Michigan Department of Earth and Environmental Sciences, Ann Arbor, MI USA

jcot@umich.edu

Anthropogenic climate change is one of the most pressing concerns facing humanity. One way to predict future climate change is to study warming events in the geologic past. The main control of the Earth's temperature over geologic time is the concentration of atmospheric CO_2; however, the precise relationship between CO_2 and temperature is not fully understood. Therefore, it is essential to be able to quantify atmospheric CO_2 in the past at times analogous to current atmospheric changes. The Paleocene/Eocene Thermal Maximum (PETM) is the most rapid release of carbon and subsequent global warming event in recent geologic history, and thus is a good analog for future climate change. Currently, there are few CO_2 estimates for this time period, none in as high a resolution as necessary for the reconstruction of CO_2 changes on the short time scale of the PETM. The goal of this research is to precisely reconstruct CO_2- temperature sensitivity during a time of rapid warming to constrain future climate change predictions. I will produce a high-resolution atmospheric CO_2 reconstruction of the PETM using the pedogenic carbonate paleobarometer and refined soil respired CO_2 estimates using a continuous sequence of carbonate-bearing nodules from the North Horn Formation in central Utah. These atmospheric CO_2 estimates will be coupled with temperature and precipitation estimates from geochemical reconstruction methods, to reconstruct CO_2-temperature sensitivity to improve predictions of future climate and environmental changes.