EVOLUTION OF EQUATORIAL PANGEAN CLIMATE AND ATMOSPHERIC PCO2 AS DERIVED FROM PERMO-PENNSYLVANIAN PEDOGENIC PROXIES

1MONTANEZ, I. P., 1TABOR, N. J., 2EKART, D. D., and 2COLLISTER, J. 1Dept. of Geology, One Shields Ave., UC, Davis, CA 95616, and 2Energy & Geoscience Institute, University of Utah, Salt Lake City, UT 84108.

Berner's (1994) modeled evolution of paleoatmospheric pCO2 suggests a pCO2 minimum at end-Pennsylvanian to Early Permian time followed by a linear increase in pCO2 initiated in the latter half of the Permian, culminating in a pCO2 maxima in the mid-Triassic. Although Berner's modeled pCO2 increase during the Permian implies that the greenhouse effect was a major control on post-Early Permian climate, it remains untested in the geologic record. Carbon isotope values of pedogenic carbonates, paleosol organic matter and associated vertebrate teeth from the U.S. southwest and midcontinent, and northern Italian Alps provide the first test of Berner's hypothesized evolution of Permo-Pennsylvanian pCO2 levels, and suggest a more dynamic evolution of Permian atmospheric pCO2. Our best estimate of latest Carboniferous through Permian atmospheric pCO2 levels confirm and refine earlier estimates of minimum pCO2 contents in latest Pennsylvanian through earliest Early Permian time. Modeled pCO2 estimates indicate an abrupt rise and subsequent fall in atmospheric pCO2 levels in 'late Wolfcampian time' that is coincident with a change in paleosol morphology. This rapid rise in pCO2 levels may signify the end of Late Paleozoic glaciation. Estimated pCO2 levels rise during the Middle Permian culminating in a previously unrecognized rapid fall in pCO2 at the end-Permian. Our pCO2 curve exhibits similarity to the newly resolved secular marine C isotope curve for the Permo-Pennsylvanian (Veizer et al., 1999), suggesting that the modeled rapid changes in Permian pCO2 partially reflect variations in the d13C composition of atmospheric CO2.