

A global perspective of soil-forming conditions during the late Pennsylvanian: potential stochastic forcing by geosphere–biosphere carbon pools

ERIK L GULBRANSON¹ AND NEIL J TABOR²

¹Gustavus Adolphus College

²Southern Methodist University

Presenting Author: erikgulbranson@gustavus.edu

The Kasimovian was a time of ecologic upheaval and large-magnitude changes in paleoclimate. Referred to as the “collapse” of the paleotropical rainforests, the Kasimovian is marked by rapid changes in megafloreal communities and associated ecosystem effects on vertebrates and invertebrates. *PCO₂* variation coincided with these ecologic catastrophes, varying between pre-industrial levels (PAL) to 2xPAL on 10⁵ yr timescales. Our understanding of the carbon cycle perturbations that affected *pCO₂* and the connection of these climate-forcings to the terrestrial upheaval of paleotropical rainforests remains a grand challenge. Here, the effects of paleosol accumulation and/or degradation on the terrestrial carbon cycle during the Kasimovian is assessed. Paleosols are surveyed from ice-free depositional basins on Pangaea and assessed for paleolandscape equilibrium. An orbital framework is developed in order to understand the relationships of paleosols, the carbon cycle, and insolation. Based on these analyses a key time interval emerges in the early Kasimovian. This time interval records a shift in paleolandscape equilibria, terrestrial carbon cycling, and orbital forcing. The carbon cycling and landscape equilibria are eccentricity-paced, however, predominance of short eccentricity and obliquity throughout this interval indicates that the changes to paleosols and the locus of carbon burial may have acted as a stochastic process.

