

Real Extinction versus Artifact: A Look at the Frasnian–Famennian Mass Extinction Event on the Mid-Continent

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Mass extinction has come under recent debate as to whether such rapid declines in global diversity result primarily from biotic and abiotic factors, which cause actual extinction, or are drastically exaggerated by sampling artifact. Eustatic sealevel change can bias observed diversity by decreasing the marine rock volume available for sampling and by removing environmental conditions necessary for preservation of certain taxa. This study examines the degree to which such sampling biases artificially amplify the apparent decrease in global diversity at the Frasnian-Famennian (Upper Devonian) mass extinction event on the mid-continent.

Iowa was chosen for study because of its location within the Forest City Basin and the variation in marine depositional environments. Preliminary examination focused on the influence of surface area, maximum thickness, rock volume, and percent carbonate of six lithostratigraphic units through the Frasnian-Famennian boundary on species diversity estimates within the same units. The surface area, maximum thickness, and rock volume of the lithostratigraphic units are derived from digitized pixels from a geologic map produced by the Iowa Geological Survey. Percent carbonate and species diversity are estimated from the literature, noting that previous workers maintained a constant sampling method. Strong positive correlations exist between species diversity and estimated surface area ($r=0.81$), maximum thickness ($r=0.74$), rock volume ($r=0.86$), and percent carbonate ($r=0.82$) across the different lithostratigraphic units. While preliminary, these strong correlations across the Frasnian-Famennian boundary likely reflect sampling biases and warrant a deeper look.