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Reading #8

Determinants of extinction in the fossil record

Authors: Shanan E. Peters and Michael Foote (2002)

Summary: This paper investigates the relationship between stratigraphic thickness and preservation of fossils and is an important area of study because sampling of biodiversity becomes biased due to the incomplete nature of the rock record. In this study the authors hypothesise that “the observed short-term volatility in extinction rates is an artefact of variability in the rock record.” In other words, the extinctions that are recorded may not be extinctions at all but simply due to sampling procedures. The authors gathered genus data that had been published in Journal of Paleontology and they used the number of exposed marine formations found in the US as a measure of exposed rock. The authors created several models and found that when extinction rate increased, the exposed sedimentary rock also decreased, and that when extinction decreased, the number of units increased. They give two possible explanations for this correlation. Firstly, this relationship may mean that there has been a greater loss of genera than what has been previously predicted, and secondly, that there is some factor that drives extinction and reduces the amount of rock at the same time such as sea-level. There are problems with the second idea, like for example, that some rock may actually be destroyed with higher sea-levels. The authors conclude that further study is needed and that if there is a common cause for extinction and the reduction of exposed rock, this may serve as a better explanation for extinctions rather than other more common explanations such as bolide impacts.

What I liked about this paper: I liked this paper because we talked about null distributions in class and this paper also talks about null distributions. I wish we would go over this one more time because seeing it in a paper like this makes me realise that it’s something useful but I still don’t fully understand it.

What I disliked about this paper: The statistics. Most of it just went right over my head. Maybe a mini-glossary with a few definitions would have been helpful. Some of the terms used were also unclear. I looked up the meaning of “de-trended” (emphasising short-term changes) but what is a stage-to-stage change exactly and how does it help in de-trending?

Diagrams: I think the diagrams were helpful in showing the relationship between extinction and the amount of exposed rock. Figs. 1b, 1c, 2c and 2d are not immediately clear to me and I think that better explanations/more labeling could have helped.