N89-21339

WIDESPREAD HABITAT CHANGE THROUGH PALUDIFICATION AS AN INTERACTIVE MECHANISM IN MASS EXTINCTION EVENTS; L.F. Klinger, National Center for Atmospheric Research, Boulder, CO 80307

The study of mass extinction events has largely focused on defining an environmental factor or factors that might account for specific patterns of faunal demise. Several hypotheses elaborate on how a given environmental factor might affect fauna directly, but differentially, causing extinction in certain taxa but not others. Yet few studies have considered specific habitat changes that might result from natural vegetation processes or from perturbations of vegetation. This paper focuses on the role of large-scale habitat change induced by natural successional change from forest to bog (paludification), and considers how large perturbations (e.g. volcanism, bolide impacts) might favor increased rates of paludification and consequent mass extinctions.

Bogs are very poor habitats for most animal species due to the low nutritional content of the dominant plants (mosses). Widespread bog formation would negatively affect large terrestrial animals with extensive habitat requirements, and would also negatively affect certain marine-based trophic structures due to decreased runoff and nutrient (especially phosphorus) flow to the oceans. The large quantity of carbon tied up in extensive peat bogs could lower atmospheric carbon dioxide levels enough to cause significant climatic cooling, a phenomena commonly associated with mass extinctions.

Evidence from the K-T boundary of extensive coal measures (peat bogs) and of fossils from plants which are typical of bogs suggest paludification was quite active well before and after the boundary, but that an unusually intense episode of paludification, evidenced by the "fern spike" occurred right at the K-T boundary. It is suggested that this episode is related to high levels of acid rain, produced either by volcanism or by a bolide impact, causing rapid and extensive paludification.

This hypothesis has an advantage over other hypotheses for mass extinctions in that modern day analogs of paludification are common throughout the world, thus allowing for considerable testing.