



Flood basalt volcanism, end-Triassic deforestation, and intense weathering of soils and bedrock

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The end-Triassic mass-extinction on land was characterized by the widespread dieback of gymnospermous forests across the northern hemisphere and their transient replacement by ferns and fern allies. These floral changes are thought to have been triggered by the eruption of 2 million cubic kilometers of basalt belonging to the Central Atlantic Magmatic Province, releasing noxious and greenhouse gases into the atmosphere. Here, we provide evidence for the dramatic consequences of deforestation during the latest Triassic in the form of intense erosion of soils and the weathering of bedrock across northwest Europe. Together with abundant fern spores, representing a pioneer vegetation, we find enhanced levels of kaolinite in the boundary beds, indicating chemical weathering. In palynological samples from cores that span the Triassic-Jurassic boundary in Sweden, Denmark and Germany we notice abundant reworked Carboniferous spores, reworked Silurian and Devonian acritarchs, and mycorrhizal fungal remains. The latter suggest soils were being eroded across the Germanic Basin. In Northern Germany, Denmark, and Sweden, Paleozoic palynomorphs were reworked from the Fennoscandian Shield, while in Southern Germany such palynomorphs may have originated from the Bohemian Massive. The contemporaneous, intense weathering of bed rocks and soil erosion on landmasses during the latest Triassic was likely a direct result of deforestation, but was probably exacerbated by acid rain and greenhouse warming due to the emission of sulfur and carbon dioxide from volcanic activity.