

“Death and destruction”

Mass extinction and massive volcanism

- a 201-million-year-old environmental crisis –

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Researchers monitoring biodiversity around the world are increasingly more convinced that we are in the midst of a sixth mass extinction, brought upon us by our own actions. During the last 540 million years of life on Earth, at least five major mass extinctions – collectively known as the Big Five - have occurred. Charles Lyell (1797–1875) stated “the present is the key to the past”, but in order to understand the long-term future consequences of the ongoing human-induced extinction we may instead need to look to the past. Four of “the Big Five” are known to have coincided in time with massive flood basalt volcanism and the formation of so called large volcanic provinces. This includes both the most severe mass extinction of all, the end-Permian crisis (252 million years ago), when 95 % of life on Earth was wiped out, and the most infamous mass extinction at the end-Cretaceous (66 million years ago), when an extraterrestrial bolide impact caused the demise of the dinosaurs. Both these mass extinctions coincided in time with repeated flood basalt volcanism.

Such massive volcanism emits huge amounts of greenhouse gases and other potentially harmful substances, in many ways similar to ongoing industrial pollution. Around 201 million years ago, the breakup of the supercontinent Pangaea was initiated with the formation of the perhaps aerially largest flood basalts - the Central Atlantic Magmatic Province (CAMP) – the remnants of which are today scattered on four continents. The CAMP volcanism coincided with the third most severe mass extinction, the end-Triassic crisis, and is generally believed to have been the major cause of the environmental and climatic changes that took place at that time, including such familiar sounding effects as global warming, ocean acidification, and deforestation. However, in order to interpret such a crisis in the geological record, timing is everything. Only when we have the correct sequence of events can we begin to understand the causes and consequences of such past events, and the possible impact modern day pollution may have on our environment in the long-run. Here, recent advances concerning the end-Triassic mass extinction, by our Geocenter Denmark research group and other international groups, are presented allowing the construction of a timeline for this volcanic induced crisis.

