



Earth and Life

Volcanoes: eruptions and mass extinctions

Voice Over

Mass extinctions, of course, are controversial, especially the one at the end of the Cretaceous. Mike Rampino at the University of New York has spent much of his career researching them.

Caption: Michael Rampino, University of New York

We're talking about a thousand mega-tonnes of sulphuric acid aerosols produced in the atmosphere after a large flood basalt event, and that would be enough, if it gets into the stratosphere of forming an optical death in the atmosphere of possibly up to ten.

Interviewer

So again equivalent to a Toba size?

Michael Rampino

Equivalent to a Toba size explosive eruption, yes. For Toba 75,000 years ago we could get up to a 90% drop in the direct solar transmission.

Interviewer

Which is what – like a moonlit night?

Michael Rampino

Like a moonlit night, yes.

Interviewer

Now many people that argued that the eruption of the Kam Basalts 65 million years ago were implicated in the death of the dinosaurs - what's the mechanism that would have caused that extinction?

Michael Rampino

If the flood basalts were involved in the extinction, the cut-down of sunlight from the aerosols in the stratosphere at the time, cutting down on photosynthesis, cooling the climate, the effects of the rainout of the sulphuric acid as acid rain on land, and in the oceans, all of that would combine to possibly lead to pretty bad conditions on the Earth's surface, possibly contributing to the mass extinction.

Haraldur Sigurdsson

There's always the real question here as to whether the volcanic aerosol from these large flood basalt events ever really enters into the stratosphere. Does it enter into the, or is it confined to the troposphere and therefore only of regional effect? I think that we don't really have a viable mechanism whereby a volcanic activity from flood basalt eruptions can bring about global large-scale extinctions.

Michael Rampino

If you look at the dates of the mass extinction events, and the best dates that we have of the flood basalt events, it turns out that there are at least five close coincidences, possibly up to ten coincidences between times of mass extinction, and the times of the flood basalt eruption. That leaves one to think that either they're related in some way, or they're both related to some other phenomenon which is triggering both the mass extinctions and the flood basalt events.

Voice Over

And that's where we end the programme – no hard conclusions but lots of ifs, buts and maybes. Science at the frontier is often like that – plenty of ideas and waiting for some hard evidence.