

# Mass extinction blamed on fiery fountains of coal

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FOSSIL fuels have a new crime to live down. A frenzy of hydrocarbon burning at the end of the Permian period may have led to the most devastating mass extinction Earth has ever seen, as explosive encounters between magma and coal released more carbon dioxide in the course of a few years than in all of human history.

Around 250 million years ago, the so-called "Great Dying" saw 70 per cent of species wiped out on land and 95 per cent in the oceans. A clue to what may have triggered this disaster lies in solidified magma from this time, which is widespread in an area of Siberia where coal is also abundant.

One suggestion is that the heat of the magma could have baked many billions of tonnes of CO<sub>2</sub> out of the coal over a geologically brief period of a few thousand years ([New Scientist, 8 December 2007, p 42](#)). The ensuing climate change and ocean acidification would account for the extinctions. Now Norman Sleep and Darcy Ogden, both of Stanford University in California, think the trigger for the Great Dying may have been even swifter and more terrifying.

Rather than causing gentle heating, magma encountering oil- and tar-soaked coal underground would melt it, producing a highly combustible material, they say. Crucially, this molten mixture would be light enough to rise quickly to the surface. There it would burn explosively on contact with oxygen in the air, blasting dust and ash into the stratosphere and releasing huge quantities of CO<sub>2</sub>.

A molten mixture of magma and coal would burn explosively on contact with air

"You're basically going to have something like a fire fountain every few kilometres or so over this vast moonscape that's erupting, with flares going high into the air and columns of smoke and fly ash," says Sleep. The ground would be "covered with coal tar and coal fragments and pieces of basalt", he adds.

Dust injected into the stratosphere would cause drastic cooling. That would quickly switch to warming as the dust settled out of the atmosphere, leaving nothing to counteract the greenhouse effect of the increased CO<sub>2</sub>. The climate might have swung between heating and cooling as new eruptions injected yet more dust into the stratosphere. "The climate is just going to go completely unstable," says Sleep, who presented the idea last month at a [meeting of the Geological Society of America in Portland, Oregon](#).

Lee Kump of Pennsylvania State University in University Park agrees that a coal bed could be ignited by an intruding finger of magma in the way Sleep and Ogden envision. But he says their scenario would require many magma fingers to ignite many coal beds in the span of just a few years - whereas the solidified magma in Siberia more likely took thousands of years to intrude into rock. "[It's] possible, but seems improbable to me," he says.

If Sleep and Ogden are right, proof of their scenario may be hiding in Siberia's abundant volcanic deposits. In a burning mixture of coal and magma, the carbon in the coal would strip oxygen from iron oxide in the magma, leaving behind particles of iron.

"These things would get treated as a curiosity unless somebody was particularly looking for them," says Sleep. Part of the reason for presenting the theory at the meeting was "to get people to look at those rocks", he adds.