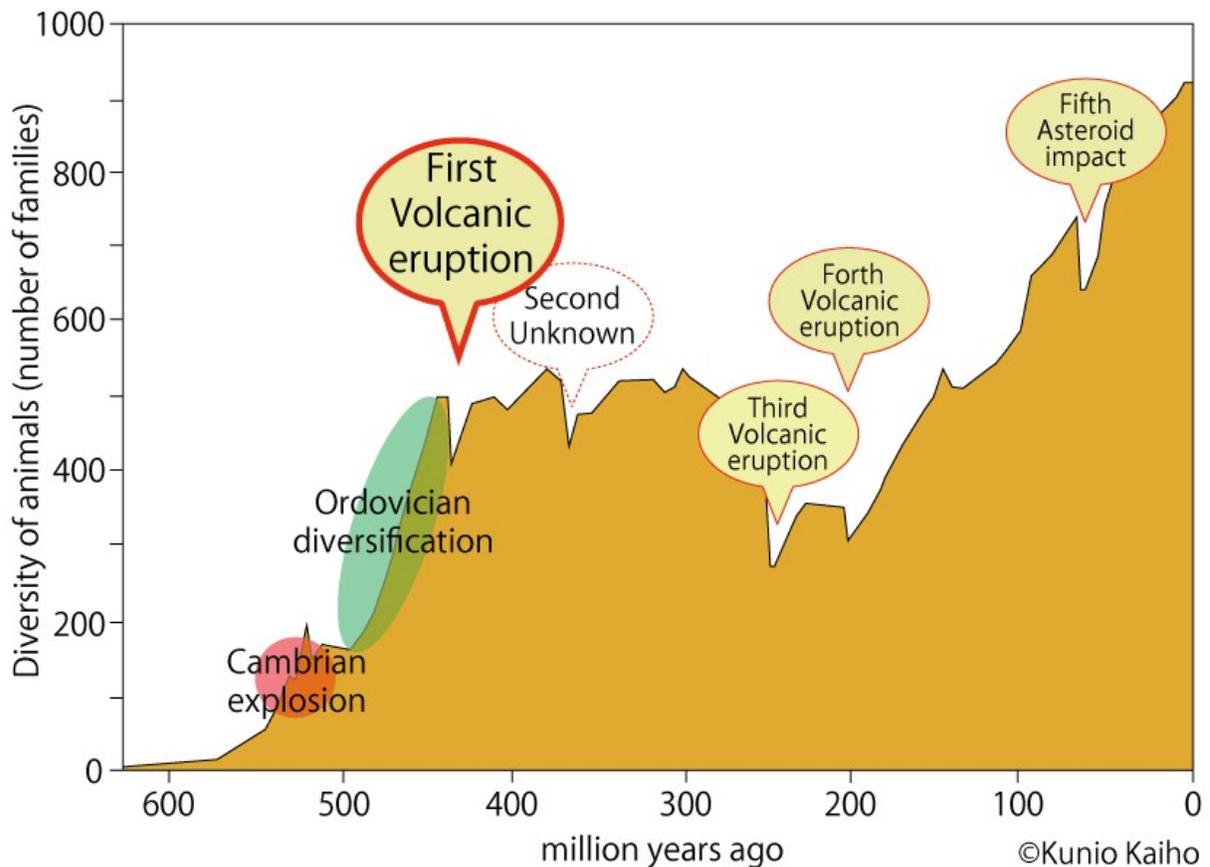


Large volcanic eruption may have caused the first mass extinction

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The researchers found Hg enrichments in sedimentary rocks deposited in North America and southern China 445-443 million years ago. Hg enrichments are products of multiple phases of a large igneous province volcanism. This, they say, could have led to the environmental changes that caused the disappearance of many marine animal species. Credit: Kunio Kaiho

Researchers in the U.S. and Japan say they may have found the cause of the first mass extinction of life on Earth.

There have been five mass extinctions since the [divergent evolution](#) of early animals 600 to 450 million years ago (Figure 1). Volcanic activity was the cause of both the third and fourth, while an asteroid impact led to the fifth. But triggers of the first and second mass extinctions had, until now, been unknown. The new study strongly suggests [volcanic activity](#) caused the first mass extinction.

It occurred at the end of the Ordovician. This age is between the divergence of the Ordovician and land invasion of vascular land plants and animals. Animals in the Ordovician-Silurian comprised marine animals like corals, trilobites, sea scorpions, orthoceras, brachiopods, graptolite, crinoid and jawless fish. Approximately 80 percent of species disappeared at the end of the Ordovician.



Ordovician-Silurian marine fossils from the museum of Tohoku University.
Credit: Kunio Kaiho

A team led by Dr. David S. Jones of Amherst College and Professor Kunio Kaiho of Tohoku University looked into possible triggers of the first mass extinction. They took sedimentary rock samples from two places—North America and southern China—and analyzed their mercury (Hg) content. They found Hg enrichments coinciding with the mass extinction in both areas. This, they believe, is the product of [large volcanic eruptions](#), because the Hg anomaly was also observed in other large igneous province volcanisms.

Huge volcanic eruptions can produce sulfate aerosols in the stratosphere. Sulfate aerosols are strong, light-reflecting aerosols, and cause global cooling. This [rapid climate change](#) is believed to be behind the loss of marine creatures.

Kaiho's team is now studying the second [mass extinction](#) in the hopes of further understanding the cause and processes behind it.



Outcrop of the Upper Ordovician studied at Monitor Range in Nevada. Credit: David S. Jones

More information: Authors: David S. Jones, Anna M. Martini, David A. Fike, Kunio Kaiho, A volcanic trigger for the Late Ordovician mass extinction?: Hg data from South China and Laurentia, *Geology*, [DOI: 10.1130/G38940.1](https://doi.org/10.1130/G38940.1)

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