

New findings on plankton extinctions hold implications for species vulnerability to climate change

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Scientists from Victoria University of Wellington and GNS Science have for the first time determined precisely when more than 2000 species of ancient marine plankton became extinct, and found a potential indicator for which current species may be vulnerable to rapid climate change.

According to the findings, the [extinction](#) rate of the ancient marine plankton was largely influenced by global changes in climate, and the ocean's dramatic changes in temperature and circulation patterns.

Professor James Crampton, from Victoria's School of Geography, Environment and Earth Sciences, along with Dr Roger Cooper, Emeritus Research Scientist at GNS Science, used computer-optimised analysis to examine the exact time of origination and extinction of graptolites—an extinct group of ancient marine animal that lived over 400 million years ago.

"We found that extinction happens in short bursts or episodes, separated by longer settled spells, rather than gradually and continuously," says Professor Crampton.

"When the world had a warm 'greenhouse' climate, there were low rates of extinction among the plankton. Then there was a sharp change to a cooler, fluctuating 'icehouse' climate like today, and several sharp peaks in the extinction rate, including one very severe peak where graptolites

were almost wiped out."

Professor Crampton and Dr Cooper worked alongside researchers in the United States to examine each of the 2041 species of the plankton through their 70 million year history.

"Our analysis also shows that minor changes in the climate affected the newly evolved species of plankton—these [new species](#) were unable to compete and became extinct. It seems that nature was generating lots of new species, many of which could not survive," says Professor Crampton.

"In contrast, the most abrupt, severe episodes of environmental change affected the old species more profoundly—in this situation, the old guard was disadvantaged.

"So it is the severity of the change in the environment that determines if old or new species are prone to extinction. Overall the extinction changes were very rapid and the ecosystem was relatively unstable."

The research group believes that the findings demonstrate the effect the current global [climate](#) may have on ocean habitats.

"Our research suggests that the modern rate of environmental change could alter the balance of [extinction risk](#), so that the old [species](#) will be at greatest risk," says Professor Crampton.

The research was recently published in *Proceedings of the National Academy of Sciences*.

Provided by Victoria University of Wellington

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