

Asteroid and comet impacts led to primitive life

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Australian National University scientists have observed a link between asteroid and comet bombardment of the Earth and the emergence of primitive bacterial life forms in the ancient oceans billions of years ago.

Studying ancient iron-rich sediments in Western Australia and South Africa, Dr Andrew Glikson and colleague Mr John Vickers, from the Department of Earth and Marine Sciences at ANU discovered that the formation of banded iron formations, jasper and iron-rich shale coincided closely with asteroid and comet impacts.

The impacts of the asteroids and comets caused volcanic and hydrothermal activity including eruption of iron-rich basalt, according to Dr Glickson. This created an environment which suited primitive bacteria that lived on the floor of the early oceans, and which derived their energy by oxidising water-soluble (ferrous) iron into insoluble (ferric) iron.

This bacterial activity is thought to have precipitated iron and silica-rich sediments, known as banded iron formations, in areas such as the Pilbara in Western Australia. These banded iron formations host the huge Hamersley and Yarrie iron ore deposits of the Pilbara region.

Dr Glikson made the link when studying whether extraterrestrial impacts could be one of the underlying factors in the appearance of these banded iron formations, spanning ages of 3.5 to 2.4 billion years, which extend over distances of hundreds of kilometres in Western Australia, South

Africa, Brazil and Canada.

He found that deposition of iron-rich sediments closely followed massive collisions between asteroids and the Earth at several points in Earth history, including at 3.47, 3.26, 3.24 and 2.63 billion years ago.

“In the majority of cases, the ejected materials left behind from the impact of the asteroids and comets are directly overlain by iron-rich sediments, suggesting a possible cause and effect link between the large impacts, iron-rich volcanic activity and microbial oxidation of iron,” Dr Glikson said.

“It is likely that the asteroid impacts could have triggered faulting, uplift and erosion of iron-rich submarine volcanics.

“The oldest known banded iron formations occur in south-western Greenland, where they are dated as 3.85 billion years old. The age of these banded iron formations coincides with a period of heavy asteroid bombardment on the moon and on Earth, thus marking the earliest known impacts, volcanism and the emergence of microbial colonies at the sea floor,” Dr Glikson said.

To test the significance of these relationships, the scientists are searching for further evidence of asteroid impact units beneath banded iron formations in the Pilbara region of Western Australia.

Source: Australian National University

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