

# There was no such thing as hell on Earth

November 18 2005

---

New Australian National University research is set to radically overturn the conventional wisdom that early Earth was a hellish planet barren of continents.

An international research team led by Professor Mark Harrison of the Research School of Earth Sciences analysed unique 4 to 4.35 billion-year-old minerals from outback Australia and found evidence that a fringe theory detailing the development of continents during the first 500 million years of Earth history – the Hadean (‘hellish’) Eon – is likely to be correct.

The research, published in the latest edition of *Science*, follows on from results by Professor Harrison and his colleagues published earlier this year that confirmed that our planet was also likely to have had oceans during most of the Hadean.

“A new picture of early Earth is emerging,” Professor Harrison said. “We have evidence that the Earth’s early surface supported water – the key ingredient in making our planet habitable. We have evidence that this water interacted with continent-forming magmas throughout the Hadean.

“And now we have evidence that massive amounts of continental crust were produced almost immediately upon Earth formation. The Hadean Earth may have looked much like it does today rather than our imagined view of a desiccated world devoid of continents.”

Professor Harrison and his team gathered their evidence from zircons,

the oldest known minerals on Earth, called zircons. These ancient grains, typically about the width of a human hair, are found only in the Murchison region of Western Australia. The team analysed the isotopic properties of the element hafnium in about 100 tiny zircons that are as old as 4.35 billion years.

Conventionally, it has been believed that the Earth's continents developed slowly over a long period of time beginning about 4 billion years ago – or 500 million years after the planet formed.

However, hafnium isotope variations produced by the radioactive decay of an isotope of lutetium indicate many of these ancient zircons formed in a continental setting within about 100 million years of Earth formation.

“The evidence points to almost immediate development of continent followed by its rapid recycling back into the mantle via a process akin to modern plate tectonics,” according to Professor Harrison.

The isotopic imprint left on the mantle by early melting shows up again in younger zircons — providing evidence that they have tapped the same source. This suggests that the amount of mantle processed to make continent must have been enormous.

“The results are consistent with the Earth hosting a similar mass of continental crust as the present day at 4.5-4.4 billion years.

“This is a radical departure from conventional wisdom regarding the Hadean Earth,” said Professor Harrison.

“But these ancient zircons represent the only geological record we have for that period of Earth history and thus the stories they tell take precedence over myths that arose in the absence of observational

evidence.”

“The simplest explanation of all the evidence is that essentially from its formation, the planet fell into a dynamic regime that has persisted to the present day.”

Source: Australian National University

Citation: There was no such thing as hell on Earth (2005, November 18) retrieved 24 April 2024 from <https://phys.org/news/2005-11-hell-earth.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.