Research sheds new light on origins of Earthâ€™s water

Dossier de
 la rÃ©daction de H2o
November 2015

It covers
more than two-thirds of the Earth's surface, but the exact origins of our planet's water are still something of a mystery. Scientists have long been uncertain whether water was present at the formation of the planet or if it arrived later, perhaps carried by comets and meteorites. In a new paper published on the 13 November in the journal Science, researchers present compelling new evidence that the former theory is correct - water has been a fundamental part of Earth since it was formed from the accretion of dust and rocks more than 4.5 billion years ago.

Researchers
from the Universities of Glasgow and Hawaii describe in their paper how they used advanced ion microprobe technology to examine a set of rocks from Baffin Island, in the Canadian territory of Nunavut. The ion microprobe, housed at the University of Hawaii at Manoa, allowed researchers to focus on minute pockets of glass inside these scientifically important rocks, and to detect the tiny amounts of water within. The ratio of hydrogen to deuterium in the water would provide them with valuable new clues as to its origins. Hydrogen has an atomic mass of one, while deuterium, an isotope of hydrogen also known as 'heavy hydrogen', has an atomic mass of two. Scientists have discovered that water from different types of planetary bodies in our solar system have distinct hydrogen / deuterium ratios.

Dr Lydia Hallis led the
research, first at the University of Hawaii at Manoa and then as a Marie Curie Research Fellow at the University of Glasgow. She said: "The Baffin Island rocks were collected back in 1985, and scientists have had a lot of time to analyse them in the intervening years. As a result of their efforts, we know that they contain a component from Earth's deep mantle. On their way to the surface, these rocks were never affected by sedimentary input from crustal rocks, and previous research shows their source region has remained untouched since the Earth's formation. Essentially, they are some of the most primitive rocks we've ever found on the surface of the Earth, and so the water they contain gives us an invaluable insight into the Earth's early history and where its water came from. We found that the water had very little deuterium, which strongly suggests that it was not carried to the Earth after it had formed and cooled. Instead, water moleculesÂ were likely carried on the dust that existed in a disk around our Sun before the planets formed. Over time this water-rich dust was slowly drawn together to form our planet. Even though a good deal of water would have been lost at the surface through evaporation in the heat of the formation process, enough survived to form the world's water. It's an exciting discovery, and one which we simply didn't have the technology to make just a few years ago. We're looking forward to further research in this area in the future."

The paper, titled 'Evidence for primordial water in Earth's deep mantle', is published in Science. The research was funded by The University of Hawaii NASA Astrobiology institute under a Cooperative Agreement.

University of Glasgow