

## **Researchers find oldest rocks on Earth**

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Bedrock along the northeast coast of Hudson Bay, Canada, has the oldest rock on Earth. Credit: Jonathan O'Neil

Canadian bedrock more than four billion years old may be the oldest known section of the Earth's early crust. Scientists at the Carnegie Institution used geochemical methods to obtain an age of 4.28 billion years for samples of the rock, making it 250 million years more ancient than any previously discovered rocks. The findings, which offer scientists clues to the earliest stages of our planet's evolution, are published in the September 26 issue of *Science*.

The Nuvvuagittuq greenstone belt is an expanse of bedrock exposed on the eastern shore of Hudson Bay in northern Quebec and was first recognized in 2001 as a potential site of very old rocks. Samples of the Nuvvuagittuq rocks were collected by geologists from McGill University in Montreal and analyzed by Jonathan O'Neil, a PhD student at McGill,



and Richard Carlson at the Carnegie Institution's Department of Terrestrial Magnetism.

By measuring minute variations in the isotopic composition of the rare earth elements neodymium and samarium in the rocks, O'Neil and Carlson determined that the rock samples range from 3.8 to 4.28 billion years old. The oldest dates came from rocks termed "faux amphibolite," which the researchers interpret to be ancient volcanic deposits.

"There have been older dates from Western Australia for isolated resistant mineral grains called zircons," says Carlson, "but these are the oldest whole rocks found so far."

The oldest zircon dates are 4.36 billion years. Before this study, the oldest dated rocks were from a body of rock known as the Acasta Gneiss in the Northwest Territories, which are 4.03 billion years old. The Earth is 4.6 billion years old, and remnants of its early crust are extremely rare—most of it has been mashed and recycled into Earth's interior several times over by plate tectonics since the Earth formed.

The rocks are significant not only for their great age but also for their chemical composition, which resembles that of volcanic rocks in geologic settings where tectonic plates are crashing together. "This gives us an unprecedented glimpse of the processes that formed the early crust," says Carlson.

Source: Carnegie Institution

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