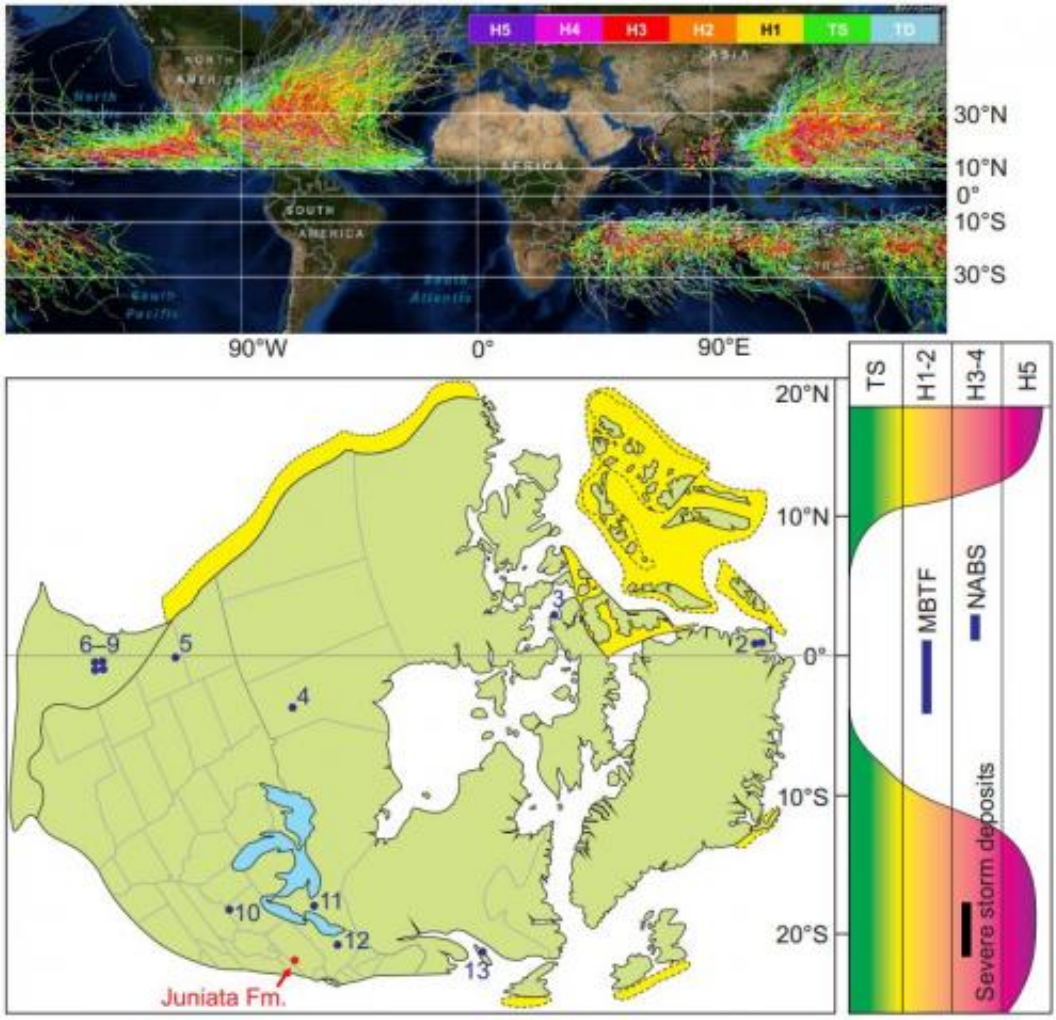
Scientists use fossils to discover the ancient equator

December 17 2012



Credit: University of Western Ontario

(Phys.org)—Researchers at Western University have discovered where the equator was "precisely located" 450 million years ago, which is an important breakthrough for paleontologists and planetary scientists, as well as private and public mineral resource companies. The findings have been published in the journal Geology and were highlighted in today's Editor's Choice section of Science.

Jisuo Jin and Phil McCausland from Western's Department of Earth Sciences led an international research team that successfully traced a 6,000-kilometre stretch of fossils which proved the Ordovician equator ran through Northern Greenland, Manitoba (Canada), Utah and Nevada. The Ordovician geologic period, the second oldest of six of the Paleozoic Era, began 488.3 million years ago, following the Cambrian period, and ended 443.7 million years ago.

"If you consider the polar magnetic regions, you would have found those regions located in quite a different place 450 million years ago. And the equator, consequently, was located in quite a different place too," explains Jin. "North America has rotated approximately 90 degrees since the Ordovician. What is North today would have been East."

"Because there are no hurricanes, there is no severe disturbance in the sea at moderate depth, so the sediment remains consistent for millions of years," says Jin. "By tracing fossils and fossil records, we were able to locate the precise location of the Ordovician equator."

According to Jin, locating past latitudes is vital to understanding anything that's happened historically to the Earth, geologically.

"If you want to predict the occurrences of anything from coal deposits to barrier reefs, you need to know the latitude," offers Jin. "By precisely mapping and orienting the ancient Earth, we will have a good starting point to explore and better understand the evolutionary history of the

planet, as well as the distribution of its various natural resources."

Jin says while this is an important finding for scientists, mineral resources companies will also find this discovery advantageous.

"If you can find the ancient equator, you can map all the latitudes, and then you can predict what kind of minerals, rock, or petroleum resources exist and where they are located," says Jin. "For example, the famous Tyndall stone used for so many public buildings in Canada occurs only along the ancient equator from some 450 million years ago."

Jin says an all-important factor to the discovery was the fact that today there are no hurricanes within 10 degrees latitude of the equator. This equatorial hurricane-free zone can potentially be recognized in the fossil record of undisturbed marine deposits.

McCausland adds another determining dynamic is the fact that ancient Ordovician geography is based on permanent magnetic compass directions recorded in rocks of that period.

"These frozen-in-time paleomagnetic directions give us a good estimate of where the ancient polar regions were, but only if the Earth's magnetic field behaved then like it does now – as a kind of giant bar magnet."

More information: For a downloadable map, please visit communications.uwo.ca/comms/pdf/jin_map.pdf .

Provided by University of Western Ontario