

Evidence of second fast north-south pole flip found

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This wide angle view of the Earth is centered on the Atlantic Ocean between South America and Africa.

(PhysOrg.com) -- The Earth's magnetic poles flip around every 200,000 years or so, with north becoming south and vice versa. Normally, the process takes 4-5,000 years and it ought to be impossible for the flip to be much faster, if models of the Earth's core are correct, but now for the second time evidence has been found of a flip that appears to have taken only a few years.

The first time evidence was discovered of a rapid geomagnetic field reversal was in 1995 when well-preserved [lava flows](#) were found at Steens Mountain in Oregon in the US. Research on the rocks by a team led by geologist Scott Bogue of the Occidental College in Los Angeles

revealed the lava flow had an unusual magnetic pattern that suggested the [magnetic field](#) had been shifting over 10,000 times faster than normal, at six degrees a day. The magnetic patterns are preserved within the magnetic crystals in the lava, formed as the lava flow cooled.

The first findings remained controversial and many scientists have challenged the fast flip-flop theory, but now Bogue and colleague Jonathan Glen of the US Geological Survey have found evidence in ancient lava rock in Battle Mountain, Nevada of a second fast flip, dated around 15 million years ago.

The record in one particular lava flow in Nevada suggests the magnetic field moved by 53 degrees in a single year. The lava started to cool, but was then heated again within a year as it was buried under fresh lava. The crystals in the rock were re-magnetized by the fresh lava, producing a shift of 53 degrees. This finding could mean the poles swapped over a period of only four years, but Brogue said it could also suggest there was a rapid acceleration period within the steady movement of the field.

According to some [geologists](#) a polarity reversal is overdue, since the [Earth's](#) magnetic field has been weakening for the last century, and the last stable reversal was about 780,000 years ago. Even if it was a super-fast flip-flop, however, it would not be noticeable to most people. No one is certain why such reversals take place, although many scientists believe they are connected in some way with the convective movements of the liquid iron in the Earth's outer core.

The findings are due to appear in *Geophysical Research Letters*.

More information: Bogue, S. W et al., Very rapid geomagnetic field change recorded by the partial remagnetization of a lava flow, *Geophysical Research Letters*, [doi:10.1029/2010GL044286](https://doi.org/10.1029/2010GL044286) , in press.

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