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- ◇ [Branches](#)

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New evidence suggests Earth may have spun on its side



A Princeton University scientist combing ancient muck on a remote Norwegian island has come across evidence that could revive a little-known, 140-year-old geological theory. The idea, known as "true polar wander," suggests that the Earth over history may have spun on its side from time to time. The planet would do this to restore its own balance if an unequal distribution of weight ever developed either on its surface or within. The theory postulates that if an object of sufficient weight -- such as a supersized volcano -- ever formed far from the equator, the force of the planet's rotation would gradually yank the heavy object from its spot and relocate it. Though the poles themselves would still point in the same direction with respect to the solar system, the process could conceivably shift entire continents from the tropics to the Arctic, or vice versa, within a relatively brief geological time span. If the volcanoes, land and other masses that exist within the spinning Earth ever became sufficiently unbalanced, the planet would tilt and rotate itself until this extra weight was relocated to a point along the equator. It could be tilted so far, in fact, that Alaska may once have sat there. Adam Maloof, the Princeton scientist, has led a team that has found what many are viewing as the most compelling evidence yet of this theory by analyzing the magnetic composition of sediments in the Norwegian archipelago of Svalbard. "The sediments we have recovered from Norway offer the first good evidence that a true polar wander event happened about 800 million years ago," said Maloof, an assistant professor of geosciences. "If we can find good corroborating evidence from other parts of the world as well, we will have a very good idea that our planet is capable of this sort of dramatic change." Maloof's team, which also included scientists from Harvard University, the California Institute of Technology and the Massachusetts Institute of Technology, published their findings in the Geological Society of America Bulletin last month. True polar wander is different from the more familiar idea of "continental drift," which is the inchwise



movement of individual continents relative to one another across the Earth's surface. True polar wander can tip the entire planet on its side at a rate that is far more rapid than the more leisurely drift of continents due to underground geological stresses."Planetary scientists still talk about polar wander for other worlds, such as Mars, where a massive buildup of volcanic rock called Tharsis sits at the Martian equator," Maloof said. "But because Earth's surface is constantly changing, as the continents move and ocean crustal plates slide over and under one another, it's more difficult to find evidence of our planet twisting hundreds of millions of years ago, as Mars likely did while it was still geologically active. The sediments examined by the team seemed to confirm this scenario. Their main clue -- tiny magnetic grains in rocks that are aligned to the Earth's magnetic fields at the time the rock was formed. If a rock has been spun around by a dramatic geological event, its magnetic field will have an orientation that is far different from the norm. That's what the team found. The scientists, who have been at this since 1999, plan to keep looking. Australia may be next.

19 Tuesday September 2006 10:3

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