'Lost' sediments show details of polar magnetic field

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UC Davis researchers studying cores of sediment collected 40 years ago have found evidence for magnetic field vortices in the Earth's core beneath the South Pole. The results contrast with earlier studies at lower latitudes, and could lead to a better understanding of processes in the core.

The results came from a seabed sediment core collected by the U.S. Navy in the Antarctic Ross Sea in 1968 as part of Operation Deep Freeze. Samples from the core, covering almost 2.5 million years of the Earth's history, were stored at the Antarctic Marine Geology Research Facility in Tallahassee, Fla., before being re-discovered by Ken Verosub, professor of geology at UC Davis, who brought them back to Davis for magnetic analysis.

Exposed rock on land is weathered into fine grains that are washed out to sea and settle to the bottom. If the grains are magnetic, they will tend to align themselves with the Earth's magnetic field as they settle through the water column.

Verosub's lab uses highly sensitive equipment to measure the orientation of these magnetic grains in the sediments. That ancient magnetic record can be precisely dated by comparison to other rocks, and gives information about the behavior of the planet's magnetic field in the distant past.

"I think this is one of the best palaeomagnetic records yet from the Ross

Sea," Verosub said.

Verosub, graduate student Luigi Jovane, postdoctoral researcher Gary Acton and Fabio Florindo at the National Institute for Geophysics and Vulcanology in Rome, Italy, found that there was more "scatter" in the magnetic directions than would be predicted, based on what is known about the Earth's magnetic field from cores collected closer to the equator.

But the results do compare well with recent computer simulations of fluid movement in the planet's core, which predict the existence of vortices in the magnetic field near the poles, Verosub said.

The paper is published online by the journal *Earth and Planetary Science Letters*, and will appear in the March 30 print edition of the journal.

Source: University of California - Davis