

High Resolution Stratigraphy using Records of Paleomagnetic Secular Variations and Aborted Reversals of the Earth's Magnetic Field

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Paleomagnetic secular variations (PSVs) are low amplitude ($\pm 30^\circ$) variations in the Earth's magnetic field vector with periods varying from hundreds of years to tens of thousands of years. Under ideal circumstances magnetic field vectors can be recorded with a precision of a degree or two in a variety of geological and archeological materials including fine grained sediments, lava flows, and hearths. Because PSVs are uniform over continent-sized regions of the Earth, they have great potential as chronostratigraphic tools for correlating sedimentary records at century-scale resolution.

Lake sediments from the Summer Lake Basin, OR, have been correlated using PSVs to sediments deposited in Pyramid Lake, NV and Mono Lake, CA for a $\sim 15,000$ yr time interval starting 35,000 years ago. This previous work has confirmed a Great Basin-wide drought during the early part of this time interval and has also confirmed that a geomagnetic excursion (i.e., aborted polarity reversal) occurred just before the drought. New cores taken in September of 2010 should extend this correlation both back in time to at least 50,000 years ago and geographically to sediments from the North Atlantic Ocean. Implications of this work include bettering our understanding of geodynamo processes, improving the correlation of paleoclimate records between marine and nonmarine environments, and improving corrections in radiocarbon dating due to variations in the earth's magnetic field intensity. This technique is potentially applicable to test proposed correlations of fine grained sediments of any age.

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