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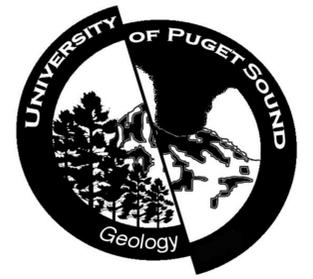
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# Paleomagnetic Applications in Archaeology: Analysis of Fire-Cracked Rocks at Camano Island Site



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Summer 2011  
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## Abstract

Both archaeological and paleomagnetic data (specifically thermal remnant magnetization, or TRM) are being utilized in an effort to determine the temperature of heating for fire-cracked rocks (FCRs) found at a pre-contact site on Camano Island in Island County, WA. If temperatures were high enough to reach the Curie temperatures of any magnetic minerals contained within the rocks, the resulting information may permit inferences as to the fuels used and the purpose of the fires. The Camano Island site is thought to be a later pre-contact Kikiallus site, containing shell debris and human remains in addition to the FCRs. Samples show three distinct responses: 1) changes of direction at low temperature, 2) no change of direction (suggesting either that the FCRs were never altered, or alteration occurred at higher temperatures than testing), or 3) erratic results that cannot be easily analyzed.

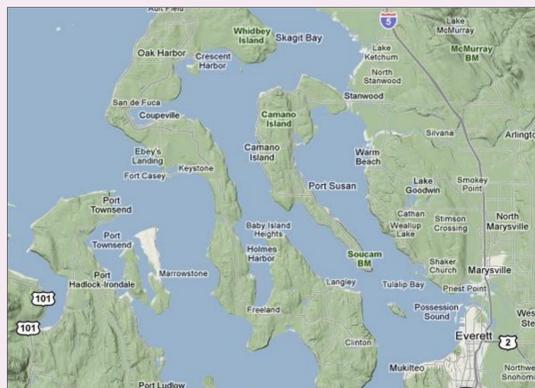


Figure 1. Map of Camano Island in relation to Whidbey Island, Everett, and Interstate 5.

## Research Methods

Sample cores were extracted with a hand-held drill and diamond-tipped attachment. These cores were then heated in defined temperature steps using the thermal demagnetization oven. In between temperature steps, the intensity and direction of magnetization was determined using the spinner magnetometer.

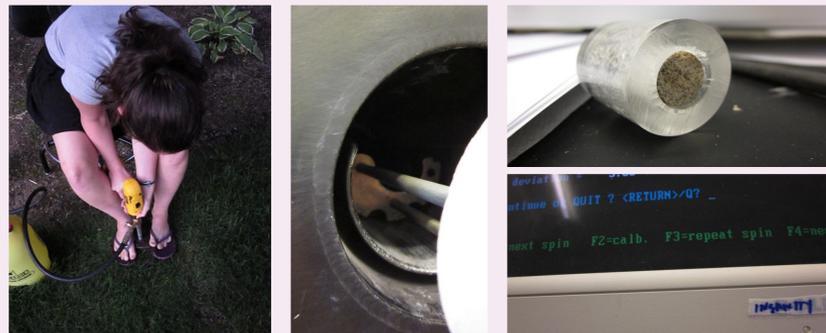


Figure 3. Steps of thermal demagnetization process: drilling to obtain cores (left), heating with demagnetization oven (center), preparing cores for spinner magnetometer (upper right), analyzing results with spinner software (lower right).

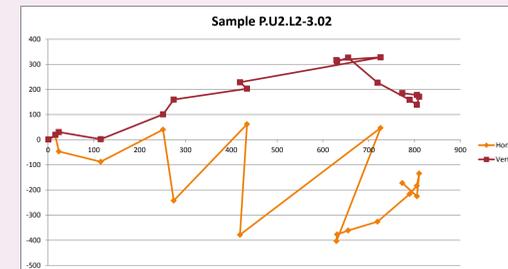


Figure 3. Zijderveld diagram of sample P.U2.L2-3.02 showing inconsistent data points.



Figure 4. Zijderveld diagram of sample P.U1.L2-3.07 showing consistent data points, but without any significant direction change.

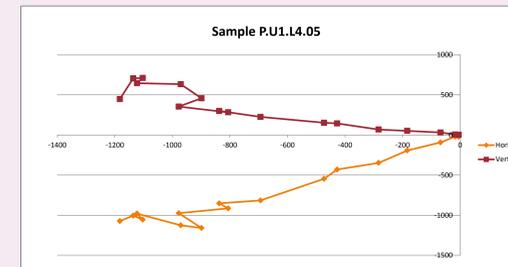


Figure 5. Zijderveld diagram of sample P.U1.L4.05 showing consistent data, and at least one direction change around 200-250 degrees Celsius.

## Analysis

In order to determine if magnetization direction changes had occurred, each core's thermal demagnetization steps were plotted in Zijderveld diagrams and on stereonets. Not all cores showed directional changes, but some had promising initial results. More investigation may result in other samples with similar clearly defined results.

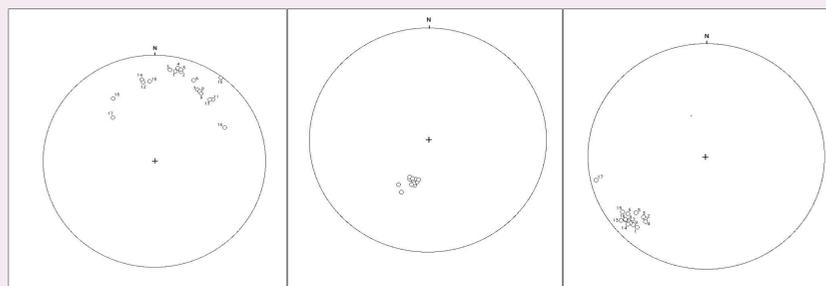


Figure 4. Stereographic projections for samples P.U2.L2-3.02, P.U1.L2-3.07, and P.U1.L4.05 (arranged from left to right, respectively) of direction of magnetization at each temperature step. The directions for sample P.U2.L2-3.02 are noticeably varied while the directions for samples P.U1.L2-3.07 and P.U1.L4.05 show much more consistency.

## Continuing Work

Further study will include additional core samples along with in-depth comparisons between cores. If multiple samples are found to have changed their magnetic directionality at the same temperature, then comparison of that temperature with the existing literature on FCR magnetism could help to determine what sorts of fuels were used in the fire, which in turn could indicate the use of the fires and the site as a whole.

## Acknowledgements

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**The University of Puget Sound** for funding this research  
**Professor Jeff Tepper** for bringing the project to my attention  
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**Doug McFarland** for passing along the rocks and information and for showing me archaeology in the field  
**Elli McKinley and Chelsea Jaeger** for providing paleomag lab camaraderie

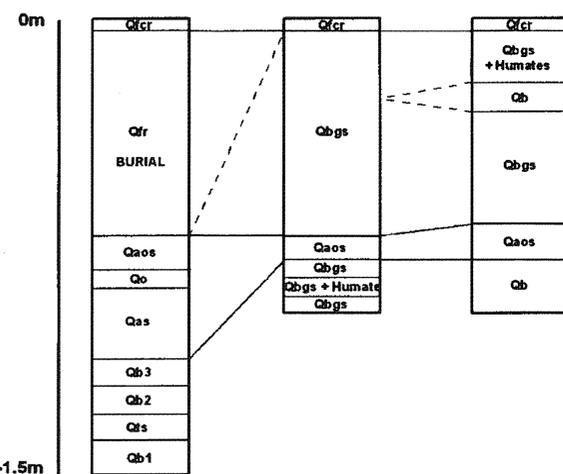


Figure 2. (above) Stratigraphic column of Camano Island site. Layer Q1r (also labeled 'burial') contained the human remains found on the site; layers Q4os and Q4s contained the shell debris and FCRs.