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The Whole AMS Matrix: Using the Owens Lake, Ardath Slump, and Gaviota Slide cores to explore classification of ellipsoid shapes

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Categorizing sediment history using Anisotropy of Magnetic Susceptibility (AMS) has been a long standing challenge for the paleomagnetic community. The goal is to have a robust test of shape fabrics that allows workers to classify sediments in terms of being primary depositional fabric, deposition in with currents, or altered fabrics. Additionally, it is important to be able to distinguish altered fabrics into such classes as slumps, crypto-slumps, drilling deformation (such as fluidization from drilling mud and flow-in), and so forth.

To try to bring a unified test scheme to AMS interpretation, we are using three example test cases. First is the Owens Lake OL92 core, which has provided previous workers with a long core example in a lacustrian environment. OL92 was classified into five zones based on visual observations of the core photographs. Using these groupings, Rosenbaum et al (2000) was able to use the deflection of the minimum eigen vector from vertical to classify each individual AMS sample. Second is the Ardath Shale location, which provides a clear case of a lithified outcrop scale problem that showed success with the bootstrap eigen value test. Finally is the Gaviota Slide in the Santa Barbara Basin, which provides usage of 1-2 meter gravity cores.

Previous work has focused on Flinn, Jelinek, and bootstrap plots of eigen values. In supporting the shape characterization we have also used a 95% confidence F-Test by means of Hexts statistical work. We have extended the F-Test into a promising new plot of the F12 and F23 confidence values, which shows good clustering in early tests. We have applied all of the available techniques to the above three test cases and will present how each technique either succeeds or fails. Since each method has its own strengths and weaknesses, it is clear that the community needs to carefully evaluate which technique should be applied to any particular problem.

Additional Resources: http://schwehr.org/agufall2004

American Geophysical Union Abstract Form

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