1. Introduction

The chaotic movement of the liquid outer core of the Earth creates the magnetic field. Sediment cores give records of the history of the magnetic field. When a storm passes or a flood occurs the water carries out sediments to the ocean and eventually these sediments fall to the bottom. As the grains fall they align to the magnetic field though out time. When we recover a core we see the direction the ancient magnetic field.

In this study, a sediment core (SMB-0111) from the Santa Monica basin is used to better understand magnetic field. The Santa Monica basin in located off the coast of southern California. The basin periodically becomes anoxic, meaning the oxygen concentration goes to zero at the bottom.

This lack of oxygen creates an environment making bioturbation less likely saving all information in the sediments. Unfortunately, these sediments my undergo dissolution because the reducing environment that anoxia creates. We use Natural Remnant Magnetization, also known as NRM, that measures of the directions and intensity of the magnetic field at the time of deposition.

2. Methods

1. First we measured the NRM using a Minispin Molspin.
2. Demagnetized at 10mT, 20mT, and 40mT (milli-Tesla) steps, using D-2000 A.F. Demagnetizer
3. Measuring each step with the Minispin Molspin
4. Magnetic Susceptibility was measured using a KYL-4 Kappabridge system.
5. We examined the data using the software Microsoft Excel and Kaleidagraph
6. Examined Coercivity Spectrum by calculating NRM10/NRM0, NRM40/NRM0 and NRM40/NRM10
7. The Excel macro developed by Mazaud (2005) to calculate principle component and maximum angular deviation (MAD).

3. Data

4. Interpretation

• Decrease in coercivity spectrum throughout the core implies that dissolution occurred leaving larger magnetic particles deeper in the core. (Larger magnetic particles exposed to a dissolving environment for a longer period of time.)
• An increase in magnetic susceptibility suggests the formation of greigite by dissolved iron and sulfur in a reducing environment.
• Dissolution and formation of new minerals might have changed the directional record from its original position. This makes correlation between cores and insights into the behavior of earth’s magnetic field almost impossible.
• High MAD values add to the evidence that the record has gone through many stages.

5. Conclusion

Our study shows that reducing environments are not ideal for collecting paleomagnetic data. Making the Santa Monica Basin one of the environments where it’s almost impossible to get robust data. The SMB-0111 indicates that it has a low correlation with other records from this basin. With low correlation we are not able to compare our data with other data taken from the same basin at any period of time. However, evidence of the dissolving magnetic material and the formation of new magnetic minerals show an active reducing environment, making this environment perfect for studies relating to geochemistry. Further study is needed to confirm these conclusions.

Reference: