



Magnetic Mineralogy of the Quaternary Blackwater Draw Formation, Southern High Plains, Texas, United States of America: A study in the use of magnetic proxies to better understand the Quaternary paleoclimatic conditions of the Southwestern United States

Jonathan Stine (1), John Geissman (1), Dustin Sweet (2), and John Ferguson (1)

(1) University of Texas at Dallas, School of Natural Science and Mathematics, Department of Geosciences, Richardson, United States , (2) Texas Tech University, Department of Geosciences, Lubbock, Texas, United States

The Blackwater Draw Formation consists of Quaternary aged (1.4 Ma- Holocene) loose eolian sand and silt that mantle the Southern High Plains region of Texas, United States. These sediments are composed of multiple paleosols capped by a modern soil, each of which represents periods of landscape stability and thus potentially record climate variability of the region throughout the Quaternary. In order to determine climatic variability, rock magnetic parameters were measured from the formation's type locality, which is located north of Lubbock, Texas. Magnetic Hysteresis, First Order Reversal Curves (FORC), in addition to Isothermal Remanence Acquisition (IRM) and Backfield demagnetization measurements all suggest that the magnetic signal of the sediments are dominated by a low coercivity ferrimagnetic phase. In addition, low and high temperature magnetic measurements suggest that said phase is likely magnetite with varying degrees of maghemitization. Furthermore, IRM acquisition experiments indicate that a higher coercivity component contributes to a small percentage of the magnetic signal while Mossbauer spectra indicate that this high coercivity phase is likely hematite.

In addition to the previously discussed experiments, various rock magnetic parameters including: Bulk magnetic susceptibility (MS), Anhysteretic Remanent Magnetization (ARM), IRM at various field intensities, and various environmental magnetic ratios (ARM/MS, ARM/IRM, IRM/MS, S-ratio, and HIRM) were all measured from the type section. Cyclic variations become evident when these measurements are compared to depth. The sinuous behavior of the data is tentatively interpreted to represent astronomically forced Milankovitch cycles recorded within the Blackwater Draw Formation. Suggesting that the Blackwater Draw Formation indeed records Quaternary climate variations of the Southern High Plains.