Lisa Tauxe

Distinguished Professor of Geophysics

Email address: <u>ltauxe@ucsd.edu</u>, website: <u>http://magician.ucsd.edu/~ltauxe/;</u> phone: x46084

Research Interests: Behavior of the ancient geomagnetic field. Statistical analysis of paleomagnetic data. Applications of paleomagnetic data to geological problems.

My research over the past year expanded on our efforts to document the extraordinary geomagnetic field behavior observed in copper mining slags recovered from the 10th Century BCE in Jordan (Ben-Yosef et al., 2009) and Israel (Shaar et al., 2011). These studies document the highest geomagnetic fields ever published using modern paleointensity methods. This year, we carried out two new expeditions to Hawaii and to Cyprus. There we sampled lava flows (Hawaii) and copper mining debris (Cyprus) from the last four millenni, including the period of the so-called "geomagnetic field spike" seen in both Israel and Jordan.

In March 2011, we (L. Tauxe, H. Staudigel and H. Ron) went to Hawaii in search of reliable records of ancient field strength dated by radiocarbon methods (F. Trusdell, pers. comm.) to between two and four thousand years BP. As nearly all Hawaiian lavas give the "wrong answer" when compared to known fields, we developed a new approach, targeting the freshest quenched material available To demonstrate the reliability of the new approach, we also sampled lava flows extruded over the 20th Century (CE) for which the actual geomagnetic field is reasonably well known (e.g., see Figure 1).



Figure 1: Example of quenched material targeted for Hawaiian expedition.

In August, 2011, a team of UCSD, Cypriot and Israeli archaeologists and archeomagnetists, led by myself and T.E. Levy from the Anthroppology Dept., UCSD excavated numerous copper mine slag heaps, including one small section thought to be about 8th Century BCE (Figure 2). A brief account of our expedition is available in Ben-Yosef et al. (2011; <u>http://antiquity.ac.uk/projgall/ben-yosef330/</u>).



Figure 1: Excavation in Politico, Kokkinorotsos Archaeological Site, Cyprus thought to be from the 8th Century BCE. (Photo courtesy of Philip Staudigel.)

Relevant Publications

Ben-Yosef, E., Tauxe, L., Levy, T.E., Shaar, R., Ron, H., and Najjar, M., Archaeomagnetic intensity spike recorded in high resolution slag deposit from historical biblical archaeology site in Southern Jordan, Earth Planet. Sci. Lett., doi:10.1016/j.epsl.2009.09.001, 2009

Shaar, R., Ben-Yosef, E., Ron, H., Tauxe, L., Agnon, A., Kessel, R., Geomagnetic field intensity: How high can it get? How fast can it change? Constraints from Iron-Age copper-slag, Earth Planet. Sci. Lett., 301, 297-306, 2011.

Shaar, R., Ron, H., Tauxe, L., Kessel, R., Agnon, A., , Estimating geomagnetic field intensity from non-SD recorders: testing the Thellier method on MD slag material, Earth Planet. Sci. Lett.,doi:10.1016/j.epsl.2011.08.024, 2011.