

2012 has been a transformative year. It saw the completion of some long term existing projects (e.g., the magnetostratigraphic framework for Wilkes Land cores recovered during IODP Expedition 318; Fig. 1) and the initiation of several new ones (expeditions to the Republic of Georgia and to Iceland; Figs. 2 and 3 respectively).

IODP Expedition 318 to the Wilkes Land margin of Antarctica in 2010 recovered a sedimentary succession ranging in age from lower Eocene to the Holocene. Excellent stratigraphic control is key to understanding the timing of paleoceanographic events through critical climate intervals. Tauxe et al. (2012) established the magneto-biostratigraphic framework for Sites U1356, U1359 and U1361 by integrating the magnetostratigraphy with the diatom, radiolarian, calcareous nannofossils and dinoflagellate cyst (dinocyst) biostratigraphy. Southern Ocean records with reliable magnetostratigraphies are notably scarce, and the data reported by Tauxe et al. (2012) provide an opportunity for improved calibration of the biostratigraphic records. In addition it further provided tight constraints on the duration of regional hiatuses inferred from seismic surveys of the region.

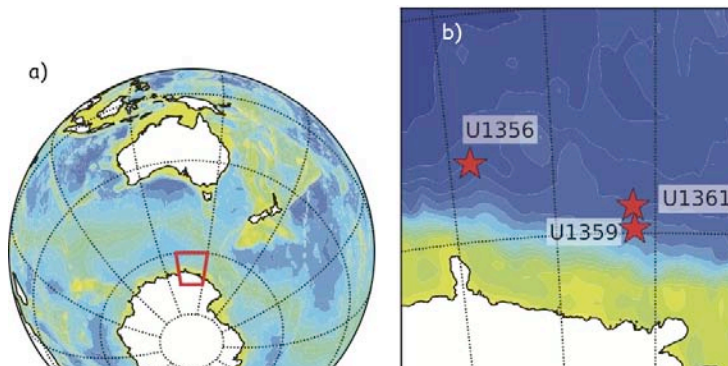


Figure 1: Map of IODP Expedition 318 sites studied by Tauxe et al., 2012.

In April, 2012, a team from SIO including Lisa Tauxe Ron Shaar and Maggie Avery joined an expedition to the Republic of Georgia to initiate a collaboration between Avto Goguitchaivilli of UNAM in Morellia, Mexico, Prof. Vakhtang Lichelli and Marina Devidze of Tblisi State University and Manuel Calvo of Spain. Our objective was to improve the archaeomagnetic record from Georgia (Fig. 2). We obtained samples from many ceramics, both from existing collections (Fig. 2a) and newly excavated (Figs. 2b-d). Our preliminary results, presented at the Mexican Geophysical Union meeting in Puerto Vallarta, 2012 (Shaar et al., 2012), confirmed the existence of very high geomagnetic fields around 900 BCE, similar in age to the geomagnetic field “spikes” of Ben-Yosef et al., (2009) and Shaar et al. (2011).

The SIO laboratory has a long term interest in paleosecular variation of the geomagnetic field over the last 5 million years. A look at the MagIC database (<http://earthref.org/MAGIC>) shows a dearth of data from high northerly latitudes, in particular, there are very few estimates for ancient field strength. In order to improve the database, Geoff Cromwell and Lisa Tauxe went to Iceland in July, 2012. Our objective was to collect dated or datable material that had erupted in a sub-glacial environment (Fig. 3). The advantage of this material is that it is quenched and behaves exceptionally well during the paleointensity experiment.



Figure 2: a) Vakhtang Lichelli with some of his extensive pottery collections. b) Lisa Tauxe, collecting oriented samples. c) Ron Shaar, d) Tauxe discussing archaeological excavation with Marina Devidze and Maggie



Figure 3: Geoff Cromwell sampling subglacial glass material in Iceland.

#### Relevant Publications

Tauxe, L., C. E. Stickley, S. Sugisaki, P. K. Bijl, S. M. Bohaty, H. Brinkhuis, C. Escutia, J.-A. Flores, A. J.P. Houben, M. Iwai, F. Jiménez-Espejo, R. McKay, S. Passchier, J. Pross, C. R. Riesselman, U. Roehl, F. Sangiorgi, K. Welsh, A. Klaus, A. Fehr, J. A. P. Bendle, R. B. Dunbar, J. Gonzalez, T. Hayden, K. Katsuki, M. Olney, S. F. Pekar, P. K. Shrivastava, T. van de Flierdt, T. Williams, and M. Yamane, Chronostratigraphic framework for the IODP Expedition 318 cores from the Wilkes Land Margin: constraints for paleoceanographic reconstruction, *Paleoceanography*, 27, doi:10.1029/2012PA002308, 2012.

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.

Ben-Yosef, E., Shaar, R., Tauxe, L., Ron, H., A new chronological framework for Iron Age copper production at Timna (Israel), *Bulletin of the American Schools of Oriental Research*, 367, 31-71, 2012