Can We Use Unusual Events to Date Local Sediments and to Develop a Longer Pollution and Volcanic Ash History for the Hudson River?

Josephine Noble[1], Dallas Abbott[2]
[1]Emory University, GA, [2]Lamont-Doherty Earth Observatory, Columbia University

We sought to develop a longer and more robust history of pollution in the Hudson River by studying LWB1-8, a high sedimentation rate core retrieved near Yonkers, NY. Because the Hudson River is a very fast-moving river and deposits sediment quickly, each 1 cm thick layer represents about 1 year, making it relatively easy to date when each layer was deposited. The sediment has been affected both by industrial pollution and natural disasters such as distant volcanic eruptions. It is surprising that the Hudson River sediments contain volcanic ash coming from volcanoes located thousands of miles away. In order to study this core, we analyzed its elemental composition in a variety of ways. Previous data from ITRAX scanning of the core years ago was lined up with new elemental analyses done with an XRF machine in order to pick which layers would be most likely to contain volcanic ash. If ash particles were deemed likely, samples were run through a Franz, or magnetic materials were separated out using a Nb magnet. Then, particles of potential ash were picked out by hand. These ash candidates were then run through an SEM machine to provide a more in-depth elemental analysis of the particles as well as obtain high-resolution photos of them. Peaks in uncalibrated Ni, Ti, and SI (peaks in counts) from the ITRAK can be used to locate the depths of prospective volcanic ash layers. Ni peaks were especially good at identifying which layers may contain volcanic ash. .We found at least four layers containing volcanic ash, but there is still uncertainty about their source volcanoes. Many of the volcanic ash particles have very high Fe and very low K contents. These likely come from explosive Icelandic eruptions like those of Hekla. Other ashes have very low Fe, higher K and higher Si. These ashes likely come from volcanic arcs located at high latitudes, such as the Cascade and Aleutian arcs. This experiment has shown that it is possible to find volcanic ash in Hudson River cores. However, the number of ash particles we have retrieved so far is very small, from one to nine per age horizon. We do best at finding ash below 100 cm, where there is little industrial pollution. In future, we need to refine our methods of segregating ash from industrial debris. We must also analyze our ash particles on a microprobe and an ICPMS to determine their source volcanoes. Only then can we convert our measurements of metals versus depth into a pollution history.