

Reconstruction of Local and Regional Biomass Combustion History Using Black Carbon

Beizhan Yan, Yongming Han and Dorothy Peteet

As a product of incomplete combustion, black carbon (BC) has been suggested as a major contributor to climate change due to its light-absorbing properties. Prior to the industrial revolution, vegetation fires were the predominant source of BC to the atmosphere. Sediment cores that contain an archive of deposition of combustion products can help reconstruct the history of such past vegetation fires. In an ongoing project, PIs Yan and Peteet are utilizing pyrogenic polycyclic aromatic hydrocarbon (PAHs), which are also incomplete combustion products, to reconstruct the paleo-combustion history. The joining of co-PI Yongming Han, a one-year visiting scientist with expertise in black carbon analysis, provides us with a unique opportunity to reconstruct this history in more detail. In the proposed study, we plan to add BC as a tracer to indicate local and regional fires. The proposed study seeks to explore the relationship among charcoal, char, soot, and PAHs in a sediment core (~12 meters) collected by Dr. Peteet from Linsley Pond, Connecticut in the early 1990s. In this study, we plan to investigate the following questions: 1) whether charcoal levels counted under microscopy can predict char levels in sediments? 2) Which is the major PAH source, char or soot? 3) Can local fires, reflected by char, substantially influence soot levels?