

Brad Rosenheim
Blessey 210
Earth and Environmental Science
Tulane University
504.862.3196
brosenhe@tulane.edu

Project 2. “Applying a novel pyrolysis-radiocarbon dating technique to questions of the global carbon cycle – What is the role of the Mississippi River?” – NSF-EAR

Description: Rivers transport not only water to the ocean, but also sediments. Particulate organic carbon is associated with these sediments, and constitutes a large proportion of the carbon buried with river sediments. It has generally been assumed that this carbonaceous material comes from the atmosphere via photosynthesis; thus river deltas are generally thought of as sinks of carbon. Furthermore, large river systems are usually regarded as large carbon sinks. But is this correct if the particulate organic matter is old and not actively scrubbed from the atmosphere during recent times? For this research, we will employ a novel technique funded by the National Science Foundation to study the age distribution of particulate organic material transported by the Mississippi River. We will sample the Mississippi/Atchafalaya system during summer low-flows and compare measurements of this sediment to higher flows. The results of this study will enable us to recommend revisions to carbon budget calculations, including those that are incorporated into carbon dioxide concentration forecasts by the Intergovernmental Panel on Climate Change (IPCC) Reports.

Objectives:

During the ten week period, participants will:

- gain experience with techniques of isotope ratio mass spectrometry
- learn principles of climate change and pre-historical variability in climate
- develop an understanding of the role of greenhouse gases and carbon cycling in climate control of our planet
- travel to Woods Hole Oceanographic Institution to gain experience in radiocarbon (^{14}C) determination
- organize a data set, complete necessary calculations, formulate interpretations, and present findings orally and in writing.

Pre-requisites:

Completion of sophomore year, 3.00 GPA (or higher), introductory chemistry laboratory and lecture, one course in one of the following areas: oceanography, geology, climate change, atmospheric science, and one course in one of the following areas: Calculus II, Calculus III, Linear Algebra, Ordinary Differential Equations