NSF Award in Geosciences

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- **Project:** Upgrade of Sedimentary Geology Preparation and Marine Sedimentary Biogeochemistry Laboratories
- **Start Date:** September 1, 2009
- **Total Award Amount:** $81,450

**How the results of this project will benefit society:**
This award will provide funding to replace equipment used in sedimentary geological and biogeochemical research. This research is directed at understanding the causes and consequences of large-scale perturbations in the Earth's carbon cycle and climate during Earth's history, and thus the award benefits basic research on paleoclimate and global environmental change. The instruments to be upgraded are fundamental to most sedimentary geology studies, and their use impacts multiple faculty members, undergraduates, and graduate students in the department. As such, the new equipment will significantly benefit education and technical training. The iLabs program, which exposes high school science students to geochemical laboratory techniques, will also benefit from this acquisition. Plans to develop collaborative research projects with Northeastern Illinois University (NEIU), a large minority-attended campus, and our ongoing participation in Project Excite, will allow diverse students access to the new instrumentation.

**How this project will work:**
The equipment will be installed in the newly-renovated analytical laboratories of the Department of Earth and Planetary Science at Northwestern. The PIs will use the new instruments for ongoing research projects investigating ocean-atmosphere evolution through Earth's history, including studies in the Neoproterozoic (700 Ma), the Paleozoic (~400 Ma) and the Mesozoic (~100 Ma) eras. The concentrations of elements to be studied (e.g., carbon and sulfur), as well as their stable isotopes, provide evidence of the rates at which these elements were transferred or stored in different reservoirs, such as the atmosphere, ocean, and lithosphere. Major changes in transfer rates of carbon, sulfur, and phosphorous may have led to the development of ocean anoxic events in the Mesozoic, and perhaps during other time intervals.

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**The problem the project is trying to solve:**
The main activities of the laboratory are preparation and geochemical analysis of rock and sediment samples. The items that will be improved or replaced include a rock saw, shatterbox, centrifuge, ovens, a balance, coulometer and spectrophotometer. This list includes the instruments needed to prepare powders for geochemical analysis, as well as devices that quantitatively measure the concentrations of key elements (e.g., carbon, sulfur, iron, phosphorous) in the powdered samples. All instruments slated for augmentation are presently 15 to >25 years old with increasing maintenance costs and vendor discontinuance.