PROJECT SUMMARY

Bringing Relevance to Earth Science Introductory Curricula through Images Showing Human/Landscape Interaction

Anyone who has taught an introductory Physical Geology or Geography course knows how hard it is to keep students interested, attentive, and engaged. Despite the significance of Earth Science to diverse, important, and contemporary topics (including geologic hazards, land-use management, and resource extraction), students view much of the material presented at the introductory level as irrelevant and disconnected from their lives. Without perceived relevance, Earth Science is often a marginalized curriculum, fewer students pursue Earth Science majors than other sciences, and the applied-science literacy of the college-age population as a whole suffers.

Using both current and historical photographic imagery, and the stories these images convey, we seek to address directly the problem that Earth Science is considered irrelevant by today’s students. Images linking human actions and surface processes allow students to understand the importance and concept of change over time while adding a human element to the learning process. Our approach follows directly from discoveries we have made teaching with a digital image archive of landscape change catalyzed by five years of NSF funding (www.uvm.edu/perkins/landscape). In this proposal, we seek support to develop the first 4 “proof of concept” learning modules that teach fundamental concepts in Earth Science by demonstrating their relevance to society. In short, our work will attempt to solve the problem of perceived irrelevancy by using images to link major topics in Earth Science to the human condition.

Our objective is to demonstrate that student interest, attention, and learning all increase when Earth Science is taught and learned visually in the context of the human experience. We expect the outcome of this work will be students who recognize the relevance of Earth Science as a discipline and its ability to inform debate on a variety of pertinent societal issues.

We will accomplish our objective by developing, testing, and evaluating 4 modules, each focused on different ways in which the Earth and people interact. Flows and Floods illustrates the complex relationship between people and moving water in order to convey basic concepts in river behavior including channel migration and flood frequency. Sliding Slopes uses imagery of human-induced erosion and landsliding as a catalyst for understanding the physical behavior of Earth materials. Rocks and People focuses on resources people take from the Earth and the environmental and landscape consequences of such extraction. Plants from a Stone exposes linkages between the solid Earth and the plants that cover its surface, focusing on geochemistry and biotic/abiotic interactions. Each module will include image-rich interactive web-based introductory learning tools as well as a PowerPoint template and accompanying active learning exercises for use in the classroom.

This project targets the Earth Science (Geology and Geography) student population at the introductory level in order to make the broadest possible impact. Collaborations with other institutions and with the University of Vermont Center for Teaching and Learning will assure that the materials we develop are tested using a cross-section of the student population. Assuming that evaluation of these “proof of concept” modules is favorable, we will apply for support to develop additional modules for national testing, evaluation, and implementation.

Intellectual merit – Developing educational materials that explicitly use photographic imagery to provide temporal scale, human context, and societal relevance is an innovative approach to teaching Earth Science at the introductory level. The PI and others involved in the proposal have demonstrated expertise in teaching, development of educational resources, and the technology needed to deliver effectively such content-rich educational materials.

Broader impacts – Using imagery of human-Earth interaction as a catalyst for engaging students will have significant broader impacts. Generating educational materials that are less abstract and more relevant to daily occurrences in students’ lives will allow those who learn visually and those whose interests lie outside the sciences to become more engaged personally and scientifically. Working closely with faculty and staff, graduate students will be key players in the development of these educational materials. Such intensive student/faculty interaction will develop the human resources infrastructure in both science and education.