Preface

This handbook is a work in progress. Its intent is to describe how the “Our Dynamic Planet” CDROM can be used to engage students in a realistic research investigation supported by a rich variety of earth data.

Writing is a key part of a scientific investigation, so we provide practical information about teaching and grading science writing assignments.

This handbook is currently targeted at a high school and introductory college level. Future versions will address issues particularly important for middle schools.

Feedback is very welcome and will help us improve this handbook. Please let me know what you think at prothero@magic.ucsb.edu

Table of Contents

Introduction

Plate tectonics is an ideal subject for engaging students in scientific investigations with a minimum of math. It is also a powerful theory that describes the processes that shape most of the important global features of the earth. Students also benefit by developing 3 dimensional visualization skills and easy access to a vast library of real earth data. This handbook shows how to engage students in authentic science investigations with data and tools on the "Our Dynamic Planet" CDROM. It illustrates many of the interesting investigations that can be performed and provides guidance in teaching science process and science writing.

The pedagogy described here is modeled after the work of practicing scientists. Scientists expend a great deal of effort on the analysis and presentation of their results, in addition to selecting and performing experiments. Writing and scientific argumentation is at the core of science practice. As such, it is difficult to see how students could understand science without talking and writing about their findings. There is a great need for this. In my large introductory Oceanography class at UCSB, a large percentage of the students come completely unprepared to engage in scientific thought. They cannot tell the difference between observations and interpretations and lack the ability to put together an effective scientific argument. If the general population is equally ignorant of science process (and I suspect they are), how will they cope in a world where scientific results often have political and economic consequences (e.g. global warming and grfeenhouse emissions), or where personal sacrifices must be made to serve the common good? The future support for science and public understanding of its applicability in solving environmental problems requires that we do our best to educate our students in both scientific concepts/facts and how to think critically about the claims of scientists and interpretation of scientific findings.

The "Our Dynamic Planet" CDROM contains a complete set of tools for inquiry into data that support the theory of plate tectonics. The **Virtual Plate Tectonics Lecture** provides 30 minutes of animated video, narrated by Prof. Tanya Atwater, and explains the theory of plate tectonics. It is divided into segments illustrating key concepts, with notes for each. The **Profile Game** teaches students how to use elevation profiles to classify geological features such as trenches, ridges, mountains and basins. The **Geography Game** helps them learn the names of the oceans, seas, and continents. The **MAP** allows students to explore and capture representations of vast amounts of real earth data that can be used in their investigations. The **Graphics Workshop** allows them to edit and print the images captured in the **MAP** and create their own computer drawings for incorporation into presentations or writing.

Bug Alert symbol: Version 1.0 of the "Our Dynamic Planet" CDROM has no version number on the CD itself (future version will have a number and date). The bugs mentioned in this handbook refer to this version of the CD. Updates are available at: http://oceanography.geol.ucsb.edu/support/Index