Using an Earth History Approach: A Starting Point Module for Faculty

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"Teaching with an Earth History Approach" is a web site built for faculty developing and teaching historical geology courses, or units within other science courses that deal with changes in the Earth System over time. Not only does Earth history have an initial appeal to students who might not otherwise take geoscience classes, this approach makes it possible, even straightforward, to teach the foundations of Earth science. The module also includes bibliographies, course information, and annotated links lists.

Teaching the Big Ideas of Science

The major scientific themes that enable us to prepare for the future are based on understanding the past.

Evolution

- The search for extraterrestrial life depends on understanding the origin of life
- The evolutionary history of modern taxa affects their current distributions and their ability to survive environmental change.
- Human genetics and DNA extracted from fossils have given us a new perspective on race.

Plate Tectonics

- Help determine geography and atmosphere
- Understanding plate tectonic patterns reduces the danger and destruction earthquakes and volcanoes cause.
- Many valuable minerals and useful rocks are the products of intrusive magmas.

Climate Change

- Dealing with global warming requires knowledge of the causes and effects of past climate change.
- Data-model comparisons allow us to test climate models used to predict the future.

Organizing Principles for Earth History

There are many ways to structure a course or unit

The Geologic Timescale

Topics in chronological order. Challenges include teaching:

- The huge scale of geologic time.
- Change in terms of cause and effect.
- Relationships between
  - scientific evidence,
  - the big ideas of science
  - Details (extinctions, eruptions, interesting fossils)

History of Geology

- Biographies and discoveries
- Debates: how science works

Development of a Landscape

Teach students the geology of a region.

- Enable them to work out:
  - The origins of different rock units
  - Their rate of formation

Land, Life, and Climate Change

For intro students, you may want to teach the development of Earth's systems separately.

Some Time Periods to Teach

Age of the Dinosaurs

Scientific debates:

- The K/T extinction: impact or volcanoes?
- Dinosaurs: warm-blooded or cold-blooded?

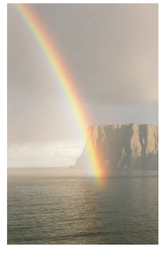
The Precambrian

- Big changes in Earth's systems
- New and controversial theories:
  - The first cells
  - The Oxygen Revolution
  - Snowball Earth

Addressing Creationism

Young-Earth Creationists in College

- ~30-40% of US public university students



Why Address Creationism?

- Students' learning is affected by the beliefs they bring into the classroom with them

How to Address Creationism

- Inquiry-based lab and field work
- Teach the nature of science vs. other beliefs
- History of evolutionary theory & geology

Starting Point Module - http://serc.carleton.edu/introgeo/earthhistory/
Reviews - http://serc.carleton.edu/introgeo/usesurvey.html

Funding from NSF 0226243