

# On The Cutting Edge Emerging Theme Workshops: A Pathway for Geoeducation Innovation



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OTCE *Emerging Theme workshops* were designed to catalyze rapid forward motion on high-priority topics for geoscience education

The screenshot displays the "On the Cutting Edge" website. At the top, there is a search bar with the text "Search" and a "Go" button. Below the search bar, the main heading "On the Cutting Edge" is followed by the subtitle "Strong Undergraduate Geoscience Teaching". A breadcrumb trail reads "Teach the Earth > Workshops > Emerging Theme Workshops". On the left, a sidebar menu lists several options: "Workshops", "Workshop Schedule", "Workshop Participant Information", "Emerging Theme Workshops" (which is highlighted in a dark blue box), "Workshop Stipends", and "Registration Fees". The main content area is titled "Emerging Theme Workshops" and includes links for "Workshop Goals", "Developing an Action Plan", and "Resources". The text below the title explains that geoscience education is undergoing rapid change and that emerging theme workshops are designed to move important new topics from isolated leaders to widespread implementation in undergraduate courses. It lists two criteria for topic selection: 1) the importance of the topic and its potential to enhance student understanding, and 2) the potential for a workshop to have a substantial impact on the content or pedagogy. The text concludes by inviting geoscientists and educators to [recommend topics](#).

On the Cutting Edge  
Strong Undergraduate Geoscience Teaching

Teach the Earth > Workshops > Emerging Theme Workshops

**Workshops**

- Workshop Schedule
- Workshop Participant Information
- Emerging Theme Workshops**
- Workshop Stipends
- Registration Fees

## Emerging Theme Workshops

[Workshop Goals](#) | [Developing an Action Plan](#) | [Resources](#) |


Geoscience education is in the midst of rapid change as research on learning provides new guidance for how we teach, as the revolution in understanding the Earth system changes what we teach, and as information technology provides new opportunities for teaching and research. Emerging theme workshops move important new topics from an initial stage of early activity by isolated leaders in the field toward widespread implementation in undergraduate geoscience courses. Topics are chosen where 1) it is clear that incorporation of the emerging topic into geoscience courses is important and will significantly enhance student understanding about the Earth and 2) a case can be made that a workshop will have a substantial impact in moving the content or pedagogy into broader use by geoscience faculty. Geoscientists and educators are invited to [recommend topics](#).





Workshops  
addressed  
both  
pedagogic and  
content  
opportunities  
spanning  
topics from  
teaching  
*metacognition*

.....



## The Role of Metacognition in Teaching Geoscience

Carleton College, Northfield, Minnesota

[Teach the Earth](#) > [Metacognition](#) > [The Role of Metacognition in Teaching Geoscience](#)

### Metacognition

**Workshop 08**

[Overview](#)

[Program](#)

[Posters](#)

[Tactics Discussion](#)

[Recommendations](#)

[Working Groups](#)

[Participants and their Contributions](#)

[Participant Checklist](#)

[Logistics](#)

[Example Essays](#)


[Contribute a Teaching Activity](#)

## The Role of Metacognition in Teaching Geoscience

November 19–21, 2008 at Carleton College, Northfield, MN


**Note: this workshop has already taken place. Workshop presentations and summaries of discussions are available on the [program](#) page; participants' posters, essays, and submitted activities are available via the [participants](#) page.**

[Show credits](#)



Metacognition, one's knowledge of one's own cognitive processes, is known to play a critical role in learning and the development of expertise (see, for example, [How People Learn](#)). However, strategies for teaching metacognition are not yet widely developed or discussed in the geosciences. How do we help students become aware of their own thinking and learning to monitor their own learning strategies? What metacognitive skills are particularly important in developing geoscience expertise? How can these skills be effectively taught?

Workshops addressed both pedagogic and content opportunities spanning topics from teaching metacognition to **Mars**



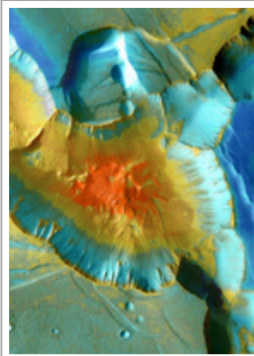
## Discoveries from Mars:

Using a Planetary Perspective to Enhance Undergraduate Geoscience Courses

Teach the Earth > Discoveries from Mars

### Discoveries from Mars

- Internet Resources
- Activities and Assignments
- Mars Visualizations
- Catalyst Ideas
- Workshop presentations
- Contribute a resource
- 2006 Workshop




## Discoveries from Mars: Using a Planetary Perspective to Enhance Undergraduate Geoscience Courses

[Noctis Labyrinthus](#) NASA/JPL /Arizona State University

*The wealth of recent data from Mars on everything from geophysics to climate change provides an opportunity to expand examples beyond the terrestrial realm in undergraduate courses ranging from hydrogeology to petrology, from structural geology to sedimentary geology. This site contains a variety of resources for faculty members who wish to integrate examples from Mars into a variety of undergraduate courses such as sedimentology, petrology, and hydrology.*

### Related Links


- [Mars Exploration and Geology Visualizations](#)
- [Exploring the Geology of Mars using Mars Orbiter Laser Altimeter \(MOLA\) Data](#)
- [Mars for Earthlings: Integrating introductory geology with Mars planetary data](#)



Planetary Science resources from across Teach the Earth



# On the Cutting Edge

An  Professional Development Program for Geoscience Faculty

Workshops were both in person and online





**Emerging Theme Workshops** moved fields toward widespread implementation within undergraduate geoscience courses.





This synergy helped develop a leadership community, and **workshops** led to **online collections** that support wide dissemination

The screenshot shows the Teach the Earth portal search results for "Teaching Activities" in the "Geoscience" subject. The page includes a navigation bar with links to Themes, Key Resources, News & Events, and Community. A sidebar on the left lists categories like Earth Education Project Sites, Community, News, Workshops, Webinars and Events, and About this Portal. The main content area displays the search results, including a list of matches and a detailed view of a specific resource titled "Teaching Stable Isotope Geochemistry in an Undergraduate Petrology or Geochemistry Course".

**TEACH THE EARTH**

A Portal to Earth Education Resources

Themes Key Resources News & Events Community

Teaching Activities

**Teach the Earth**

Search the Portal

Earth Education Project Sites

Community

News

Workshops, Webinars and Events

About this Portal

## Search the Portal

This page allows you to search across all of the sites within the *Teach the Earth* portal.

Teaching Activities Go

Help

Current Search Limits:

Text Search Teaching Activities

Subject Geoscience

Results 1 - 10 of **3363 matches**

**Teaching Stable Isotope Geochemistry in an Undergraduate Petrology or Geochemistry Course**

part of Petrology Teaching Examples

This assignment includes three reading assignments for students that (1)

### Refine the Results

#### Information Type

Activity [2473 matches](#)

Course Description [486 matches](#)

Course Module [212 matches](#)

DataSet [18 matches](#)

Event [26 matches](#)

Essay [5 matches](#)

Project Site [9 matches](#)

#### Subject

Show all

##### Geoscience

[425 matches](#) General/Other

[569 matches](#) Atmospheric Science

[22 matches](#) Biogeosciences

[1941 matches](#) Geology

[387 matches](#) Hydrology

[76 matches](#) Lunar and Planetary Science

[272 matches](#) Oceanography

[201 matches](#) Paleontology

[138 matches](#) Soils

Example: Several participants in a workshop on the role of the ***affective domain in teaching*** moved forward a successful study of introductory courses.



## Student Motivations and Attitudes: The Role of the Affective Domain in Geoscience Learning

Search Go

[Teach the Earth](#) > Affective Domain

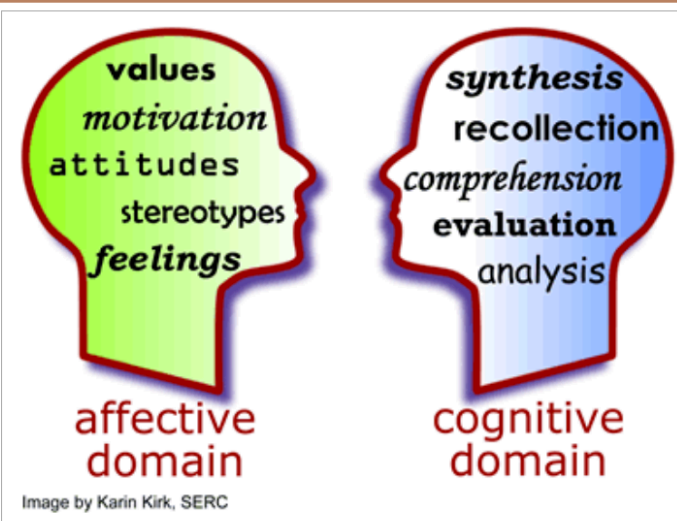
### Affective Domain

- Introduction
- The Affective Domain in Science Education
- Literature Review
- Motivating Students
- Self-Efficacy
- Immediacy in the Classroom
- Teaching Controversial Topics

## The Affective Domain in the Classroom

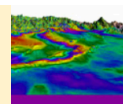
As science faculty, we naturally emphasize the cognitive domain in our teaching. After all, students think and learn with their brains (we hope!). Yet the affective domain can significantly enhance, inhibit or even prevent student learning. The affective domain includes factors such as student motivation, attitudes, perceptions and values. Teachers can increase their effectiveness by considering the affective domain in planning courses, delivering lectures and activities, and assessing student learning.

Resources for learning more about the affective domain





Some other pedagogically focused workshops addressed teaching with *large data sets*, MATLAB, STELLA, GIS, online games, undergraduate research, videos, geoethics, and geophotography



## Teaching Geophysics in the 21st Century Topical Resources

 Search 

[Teach the Earth](#) > [Data, Simulations and Models](#) > [Workshop Home](#)

### Data, Simulations and Models

New Geoscience Tools

3D Printing

#### Online Data Sets 2015

Overview

Program

Participants

Teaching Activities

Share a Teaching Activity

Teaching with MATLAB 2015

Workshop 02

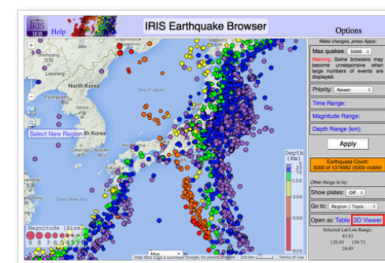
Workshop 03

## Student Learning About Critical Earth Issues Through the Use of Large Online Digital Data Sets

### May (6, 13, 20, 27) and June (17, 24), 2015 Virtual Workshop

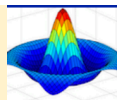
One of the best ways for students to understand the critical Earth issues facing humanity is through the analysis and interpretation of actual data. Fortunately, there are now many organizations that not only monitor many geophysical and geochemical properties of the earth but provide the data in user-friendly ways. Whether it is through maps, images, animations, or raw data, these data can be mined and interpreted by undergraduates in ways that allow them to develop an understanding of both the relevant critical Earth issues and of issues related to the reliability, errors, and significance associated with scientific conclusions and assertions.

This workshop aims to help instructors of undergraduate classes develop classroom activities, demonstrations, and research opportunities on topics of current societal relevance and interest using new online resources of geoscience data. These activities will be added to the extensive Cutting Edge online teaching activities collection.



Show caption

Some other pedagogically focused workshops addressed teaching with large data sets, **MATLAB**, STELLA, GIS, online games, undergraduate research, videos, geoethics, and geophotography



## Teaching Geoscience with MATLAB®

Workshop: Carleton College- Northfield, MN

Teach the Earth > Data, Simulations and Models > Teaching with MATLAB

### Data, Simulations and Models

New Geoscience Tools

3D Printing

Online Data Sets 2015

Teaching with MATLAB 2015

Workshop Synthesis

Workshop Outcomes

Overview

Program

Workshop Participants

Teaching Activities

Essays

Courses

## Teaching Geoscience with MATLAB® Workshop

October 18–20, 2015  
Carleton College, Northfield, MN

*Note: this workshop has already taken place. Read the [workshop synthesis](#) for a summary of key ideas and see the [workshop outcomes](#) for materials developed in association with the workshop. Workshop presentations and summaries of discussions are available on the [program page](#); participants' essays and program descriptions are available via the [participants page](#). [br]*

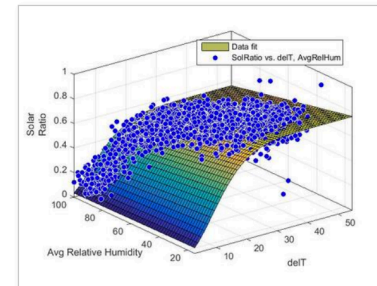
This workshop is designed to explore how teaching with MATLAB can enhance the student learning environment in undergraduate Earth Science and related courses. MATLAB can be applied to solving problems and developing systems involving mathematical computation, data analytics and statistics, signal and image processing, geographical mapping, and more in the scientific and engineering domains. As a participant, you will help build a collection of teaching activities that showcase how you utilize MATLAB in your classroom.

Search

Go

### Related Links

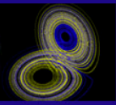
[Computation in the Sciences Using MATLAB](#)





Some other pedagogically focused workshops addressed teaching with large data sets, MATLAB, **STELLA**, GIS, online games, undergraduate research, videos, geoethics, and geophotography

[Themes](#)
[Key Resources](#)
[News & Events](#)
[Community](#)




## Developing Student Understanding of Complex Systems in the Geosciences

AGU Fall 2010

[Teach the Earth](#) > [Complex Systems](#) > Teaching About Complex Systems Using the STELLA Modeling Software

### Complex Systems

- AGU Modeling Workshop 2010
- Overview
- Program
- Participants
- Pre-Workshop Assignment
- Modeling Exercise Ideas
- Workshop 2010



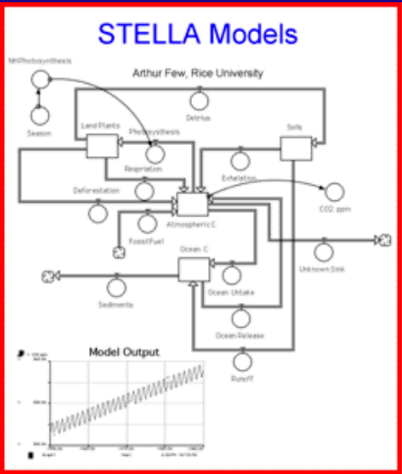
Complex Systems resources from across Teach the Earth »

## Teaching About Complex Systems Using the STELLA Modeling Software

Sunday, December 12, 2010, 9:00 am – 5:30 pm

In conjunction with the AGU Annual Meeting in San Francisco, CA  
City College of San Francisco Ocean Campus

Fee: US \$50 | Limit: 25 participants |  
Registration deadline: November 22, 2010

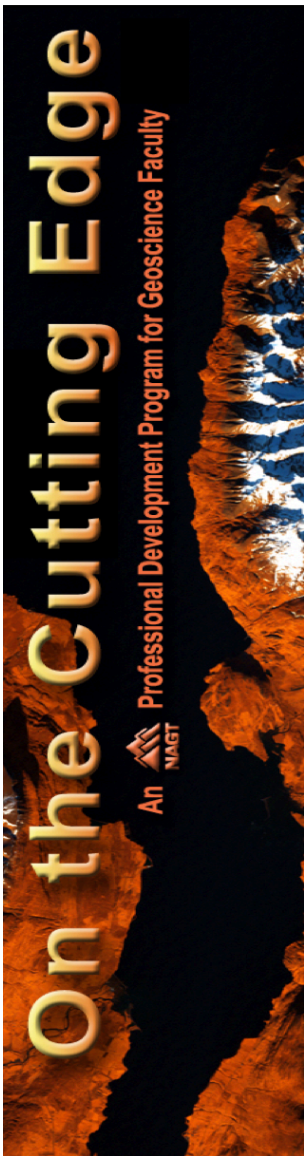


**STELLA Models**


Arthur Few, Rice University

[Show caption](#)

**Note:** This workshop has already taken place. See the [workshop program](#) for links to presentations and other material from the workshop.



Some other pedagogically focused workshops addressed teaching with large data sets, MATLAB, STELLA, **GIS**, online games, undergraduate research, videos, geoethics, and geophotography



# Designing Effective and Innovative Courses

## Topical Resources

Teach the Earth > Course Design > Designing GIS and Remote Sensing Courses

### Course Design

- Course Design Tutorial
- ...click to see 6 more...
- Workshop 2010
- Workshop 2011**
  - Overview
  - Program
  - Participants
  - Participant Workspace
  - Schedule summary
  - Assignments
  - Discussion board
  - Submit resource
- Workshop 2012



### Designing GIS and Remote Sensing Courses, Modules, and Activities for Teaching Geoscience Students

An online workshop with opportunities for face-to-face interaction

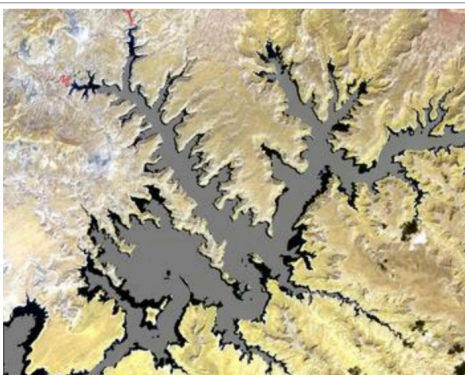
Beginning March 2011 and ending October 2011.  
**Registration is closed for this workshop.**

Finding the time, energy, and inspiration to develop a new GIS or Remote Sensing course and activities, or to re-design an existing one, can be a challenge for faculty. Furthermore, many GIS and remote sensing courses are taught in departments other than geology departments and incorporate few geological examples, and many geology majors graduate with little experience using GIS and remote sensing to solve geology-related problems.

This workshop is designed for 1) geology faculty who want to develop GIS and remote sensing courses or modules for their geology courses and 2)

#### Related Links

- [Participant Workspace](#)



Some other pedagogically focused workshops addressed teaching with large data sets, MATLAB, STELLA, GIS, *online games*, undergraduate research, videos, geoethics, and geophotography



## New Worlds for Geoscience Teaching: Using Online Games and Environments

Search

Go

Teach the Earth > Online Games > Online Games 2008

### Online Games

#### Workshop 08

Overview

Workshop Program

Workshop Participants

Big Ideas

References, Examples, and ideas

Share Ideas



## New Worlds for Geoscience Teaching: Using Online Games and Environments

A Virtual Workshop taking place over April 21–24, 2008

On-line games and environments are poised to take geoscience education in new directions. On one hand they have the capacity to totally immerse learners in virtual exploration and interaction. On the other, they are closely related to models and simulations – tools we use routinely in our research to explore data and hypotheses. This virtual workshop will explore the current use of on-line games and simulations in undergraduate geoscience education, and explore their potential for the future.

As the first virtual workshop in the Cutting Edge series, the 10 participants in this workshop will also be engaged in exploring formats for long-distance interaction and collaborative work over the course of the four-day experience.





Some other pedagogically focused workshops addressed teaching with large data sets, MATLAB, STELLA, GIS, online games, *undergraduate research*, videos, geoethics, and geophotography



## Undergraduate Research as Teaching Practice

Montana State University- Bozeman, MT

Teach the Earth > Undergraduate Research > Undergraduate Research in Earth Sciences 2014 Workshop

### Undergraduate Research

- 2014 Workshop
  - Overview
  - Participants
  - Activities
  - Program
  - Participant Workspace
  - Stream Table Modeling
- 2015 AGU Workshop



Undergrad Research resources from across Teach the Earth »

# Undergraduate Research in Earth Science Classes: Engaging Students in the First Two Years

Related Links

- Convener Workspace

## August 10–13, 2014

### Montana State University, Bozeman MT

This workshop has already taken place. For more information about what happened at the workshop, please see presentations and other materials linked from the [Workshop Program](#).

This workshop is designed to explore the many ways that authentic research experiences can be embedded in introductory Earth Science courses. This follows the recent recommendations from the President's Council of Advisors on Science, Technology, Engineering and Mathematics ([PCAST, 2012](#) (Acrobat (PDF) 5.3MB Feb8 17)): **Advocate and provide support for replacing standard laboratory courses with discovery-based research courses.** Access to Earth data, information technology, instrumentation, field experiences and new understanding of how students learn (e.g., through [Discipline-Based Education Research, NRC 2012](#)) provide unprecedented opportunities for students to engage authentic research at early stages in their careers. Early exposure to research experiences has shown to be effective in the recruitment of students, improved retention and

Some other pedagogically focused workshops addressed teaching with large data sets, MATLAB, STELLA, GIS, online games, undergraduate research, **videos**, geoethics, and geophotography



## Teaching with Video

### Topical Resources

 Search 

Teach the Earth > Videos > Teaching with Video Virtual Workshop 2014

#### Videos

##### Videos Workshop 2014

[Overview](#)[Program](#)[Participants](#)[Video Collection](#)[Technology and Logistics](#)[Assignments & Discussions](#)[Participant Workspace](#)

Teaching with  
Video resources  
from across Teach  
the Earth »

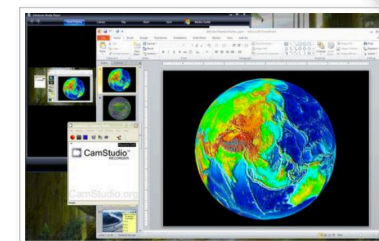
## Designing and Using Videos in Undergraduate Geoscience Education

#### Related Links

[Teaching Geoscience with Visualizations](#)

### Feb 7, March 7, April 4, May 2 – 2014 Virtual Workshop

Video-based educational resources are well suited to explaining the dynamic nature of geosciences, specifically processes that challenge students to think both temporally and spatially. Sample topics that can be better visualized through video include coastal erosion, the development of disconformities, the retreat of a glacier, and the formation of a dune. In addition, online educational resources and the shift toward digital courseware available through free online academies are testaments to the increasing integration of instructional videos into college educational resources. In this workshop, through a series of four monthly sessions, we will explore the best practices for designing and using videos, review the existing technology (hardware and software), share resources, develop new ones, and discuss the challenges and opportunities. We are especially interested in building a community to develop and share resources and research on using short, self-produced videos to strengthen geoscience teaching and learning.



Some other pedagogically focused workshops addressed teaching with large data sets, MATLAB, STELLA, GIS, online games, undergraduate research, videos, **geoethics**, and geophotography



Teaching GeoEthics Across the Geoscience Curriculum

## Teaching GeoEthics Across the Geoscience Curriculum

Search the Site

Go

### GeoEthics

[What Is GeoEthics?](#)

[Why Teach GeoEthics](#)

[How to Teach GeoEthics](#)

[GeoEthics and Self](#)

[GeoEthics and Profession](#)

[GeoEthics and Society](#)

[GeoEthics and Earth](#)

[Selected GeoEthics Resources](#)

[Case Studies Collection](#)

## Teaching GeoEthics Across the Geoscience Curriculum

David Mogk, Department of Earth Sciences, Montana State University and Monica Bruckner, SERC, Carleton College

*Jump down to:* [What do we mean by GeoEthics](#) | [Why Teach GeoEthics](#) | [How to Teach GeoEthics](#) | [Multiple Facets of GeoEthics: Self, Profession, Society, and Earth](#) | [Teaching Resources](#) | [2014 Workshop](#) | [Get Involved/Contribute](#)


Ethics Education is an increasingly important component of the pre-professional training of (geo)scientists. Funding agencies (NSF, NIH) require training of graduate students in the responsible conduct of research, employers are increasingly expecting their workers to have basic training in ethics, and the public demands the highest standards of ethical conduct by scientists. Yet, few faculty have the requisite training to effectively teach about ethics in their classes, or even informally in mentoring students working in their labs.

This module has been developed to meet the need of introducing ethics education into the geoscience curriculum:





Some other pedagogically focused workshops addressed teaching with large data sets, MATLAB, STELLA, GIS, online games, undergraduate research, videos, geoethics, and *geophotography*



## Geophotography

### Topical Resources

Search

[Teach the Earth](#) > [Geophotography](#) > Geophotography Workshop 2013

#### Geophotography

##### Workshop 2013

- Feb 26 – Getting the Most out of Your Images
- Mar 5 – From Shooting to Processing
- Mar 19 – Beyond the Snapshot
- Mar 26 – Geophotography as Public Outreach
- Apr 2 – Geophotography as Pedagogy
- Participant Workspace


## Geophotography Webinar Series

**This event has already taken place**

The geosciences rely heavily on photographic images as one of the most important means by which information is recorded and shared. **Geophotography** encompasses a number of genres: landscape and outcrop photography, mineral specimen photography, paleontological photography, repeat photography, time-lapse photography, photomicroscopy, and much more. However, rarely is any training afforded or forethought given to the photography of geologic features and processes. This workshop was convened to help geoscientists improve their photographic skills to enhance the creation and use of geo-imagery in research and instructional practices.

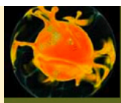
#### Related Links

[Teaching Geoscience with Visualizations](#)



[Show caption](#)

Content workshops involved topics such as the **Deep Earth**, the Early Earth, Biocomplexity, Geologic Time, Geology and Human Health, Visualizing Seismic Waves, and Seismic Tomography



## Understanding the Deep Earth Online Workshop

 Search 

Teach the Earth > [Deep Earth](#) > Understanding the Deep Earth

### Deep Earth

#### Workshop 2010

[Overview](#)[Program](#)[Participant  
Workspace](#)[Discussions](#)[Activities in  
Progress](#)[Hot Topics](#)[Participants](#)[Participant  
Checklist](#)[Activity Design](#)

**Deep Earth**  
resources from  
across Teach the  
Earth »

## Understanding the Deep Earth: Slabs, Drips, Plumes and More

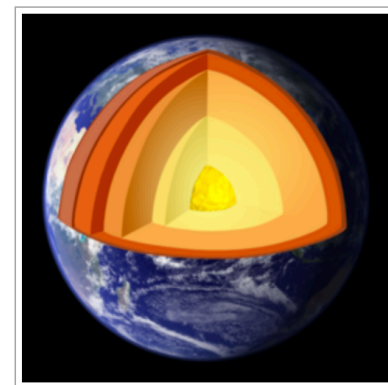
February 17–19, 24–26, 2010  
Virtual Workshop

*This workshop has already taken place. See the [Workshop Program](#) for links to presentations, discussions, and other material from the workshop.*

Be a part of this virtual workshop that will explore some of the latest science relating to the deep earth and how to use it in the undergraduate classroom. In this context, "deep earth" is considered to include the deep crust as well as the core and mantle. The workshop will consist of a blend of synchronous presentations, online discussions, work time and collaborative efforts.

This workshop is for faculty who are currently invested in research and teaching about the deep earth.

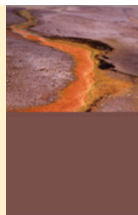
Participants will learn more about data, tools, and research related to the deep earth and then spend time developing and reviewing teaching activities for use in the classroom.



*Image courtesy of Wikimedia Commons*



Content workshops involved topics such as the Deep Earth, the **Early Earth**, Biocomplexity, Geologic Time, Geology and Human Health, Visualizing Seismic Waves, and Seismic Tomography



## Teaching about the Early Earth: Evolution of Tectonics, Life, and the Early Atmosphere

University of Massachusetts, Amherst, MA

[Teach the Earth](#) > [Early Earth](#) > Early Earth 2007

### Early Earth

Key Questions  
about the Early  
Earth

#### Workshop 07

Workshop  
Program

Overview

Participant List

Logistics

Key Questions  
about the Early  
Earth



**Early Earth**  
resources from  
across Teach the  
Earth »

## Workshop on Teaching about the Early Earth: Evolution of Tectonics, Life, and the Early Atmosphere

April 12–14, 2007, University of Massachusetts, Amherst, MA

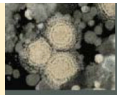
Many a geology professor has told their students "the present is the key to the past," but what about the deep past? What do we know about the formation of the continents, oceans and atmosphere and the emergence of life?



Algae pattern in hot spring run off, Yellowstone National Park. NPS photo by JR Douglass

How are these early developments related to modern processes? Recent research about the early earth has not only shed light on some of the formative processes at work but has also provided new ideas and hypotheses to use in undergraduate teaching.

Content workshops involved topics such as the Deep Earth, the Early Earth, **Biocomplexity**, Geologic Time, Geology and Human Health, Visualizing Seismic Waves, and Seismic Tomography



## Teaching Biocomplexity in the Geosciences

Montana State University, Bozeman, MT

[Teach the Earth](#) > [Biocomplexity](#) > Teaching Biocomplexity in the Geosciences Workshop

### Biocomplexity

#### Workshop 03

Workshop Program

Participants

Icebreaker

Posters

Share Fair



Biocomplexity resources from across Teach the Earth »

## Teaching Biocomplexity in the Geosciences Workshop

April 2 – 5, 2003

Chico Hot Springs Resort – Pray, Montana

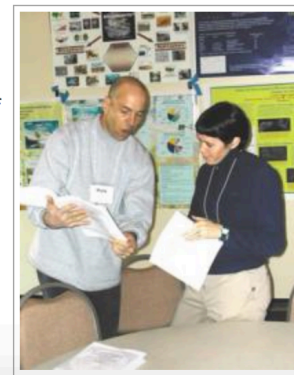


This workshop was intended to provide the first steps towards addressing the questions of "where" and "how" we are teaching biocomplexity in the geoscience undergraduate curriculum. From instructional modules in introductory physical geology/geography or Earth system science courses to upper division courses or seminars, there is an increasing interest in integrating biocomplexity in the geoscience curriculum.

The workshop was held at Chico Hot Springs Resort (just north of

Yellowstone National Park). Workshop activities included small group discussions and planning/writing sessions to determine the next steps towards the creation of biocomplexity instructional materials for the geosciences. Workshop activities included opportunities to demonstrate and share current educational activities about biocomplexity and a one-day field trip to Yellowstone National Park to explore biocomplexity at Mammoth Hot Springs and the northern range ecosystem.

Applications were invited from individuals who have active interests in teaching and research about biocomplexity from all institutions of higher learning (e.g. 2YC, liberal arts colleges, comprehensive and research universities), and from all





Content workshops involved topics such as the Deep Earth, the Early Earth, Biocomplexity, **Geologic Time**, Geology and Human Health, Visualizing Seismic Waves, and Seismic Tomography



## Teaching About Time

Arizona State University, Tempe, AZ

Teach the Earth > Rates and Time > Teaching About Time

### Rates and Time

- Workshop 2012
- Overview
- Program
- Participants and their Contributions
- Logistics
- Participant Checklist
- Temporal Learning Journal Club



Rates and Time resources from across Teach the Earth »

## Workshop: Teaching About Time

February 26–28, 2012  
Arizona State University

*Note: This workshop has already taken place. See the [workshop program](#) for links to presentations, discussions, and other material from the workshop, and the [workshop synthesis](#) for a summary of key ideas.*

Time and temporal concepts are critically important in a wide range of disciplines, from geoscience and other natural sciences to history and archeology. Students struggle with rates and scales of processes that are beyond their personal experiences, with the complex interactions of slow processes over long time scales, and with the enormous numbers involved in Deep Time. A sophisticated understanding of these temporal concepts is an essential foundation for unraveling the complex histories of the Universe, solar system, and Earth; of species; and of civilizations. It is also key for contextualizing the natural and anthropogenic changes occurring on our planet today.

Join us for a workshop that will bring together faculty teaching about time with researchers studying temporal learning to

1. Understand current best practice in teaching about time,
2. Bring forward ideas from education and cognitive psychology that can inform improved practice, and
3. Work together in ways that support improved teaching about time.



*On the Trail of Time at the Grand Canyon. Photo by Steve Semken.*

Content workshops involved topics such as the Deep Earth, the Early Earth, Biocomplexity, Geologic Time, **Geology and Human Health**, Visualizing Seismic Waves, and Seismic Tomography



## Geology and Human Health

### Topical Resources

[Teach the Earth](#) > [Geology and Human Health](#) > [Geology and Human Health Workshop 2010](#)

#### Geology and Human Health

2010 North Central and South Central GSA Workshop

[Overview](#)

[Program](#)

[Recommended Readings](#)

[Workshop 04](#)



Geology and Health resources from across Teach the Earth »

## 2010 Geology and Human Health Workshop

April 11, 2010 8:00 – 12:00

In conjunction with the [North Central and South Central sectional GSA meeting](#) in Branson, MO, April 11–13, 2010

**Note** - This workshop has already taken place.



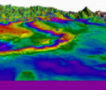
[Show credits](#)

### Workshop Description

This workshop on *Geology and Human Health* is a follow-up to the original [2004 workshop](#). We will focus on the importance of geological materials and processes in human health. Historical evolution of the new subspecialty, referred to as *Medical Geology* (in Europe and elsewhere) and *Geology and Human Health* (U.S.) will be reviewed and case histories linking geology to occurrence of disease and its



Content workshops involved topics such as the Deep Earth, the Early Earth, Biocomplexity, Geologic Time, Geology and Human Health, **Visualizing Seismic Waves**, and Seismic Tomography



## Teaching Geophysics in the 21st Century

### Topical Resources

[Teach the Earth](#) > [Geophysics](#) > Visualizing Seismic Waves for Teaching and Research

Search

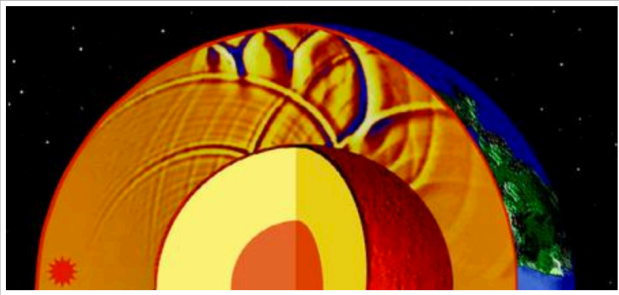
[Participant Workspace](#)

### Geophysics

- Visualizing Seismic Waves for Teaching and Research**
- Overview
- Program
- Visualization Collections
- Share an Activity
- Workshop Participants
- Participant Workspace
- Discussions
- Workshop Upload
- End of Workshop Evaluation
- Workshop 07
- Interpreting and Teaching with Tomograms

## Visualizing Seismic Waves for Teaching and Research

A hybrid online/face-to-face workshop running February through April, 2011, with a follow-up meeting at the Fall, 2011, AGU meeting

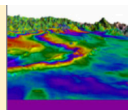


[Show caption](#)

**Registration for this workshop is closed.**

Remarkable new advances in visualizing seismic waves now provide exciting opportunities for teaching and learning in the areas of geophysics dealing with earthquakes, earth structure, and seismic wave propagation. Following the [Understanding Deep Earth](#) workshop in 2010, participants recommended that new collections of visualizations were needed to help students (and colleagues in related geoscience disciplines) to understand the underlying principles of seismology, to visualize what earthquake waves look like as they propagate through Earth, and to be able to work with seismograms and the comprehensive seismological data that are now available via [IRIS](#) , [EarthScope \(more info\)](#) , and [SCEC](#) .

Content workshops involved topics such as the Deep Earth, the Early Earth, Biocomplexity, Geologic Time, Geology and Human Health, Visualizing Seismic Waves, and *Seismic Tomography*



## Teaching Geophysics in the 21st Century

### Topical Resources

 Search 

Teach the Earth > [Geophysics](#) > Interpreting and Teaching with Tomograms

#### Geophysics

Visualizing Seismic Waves for Teaching and Research

Workshop 07

#### Interpreting and Teaching with Tomograms

Overview

Technical Information

Program

Participants

Participant Checklist

Submit a Teaching Activity

Submit a Course Description

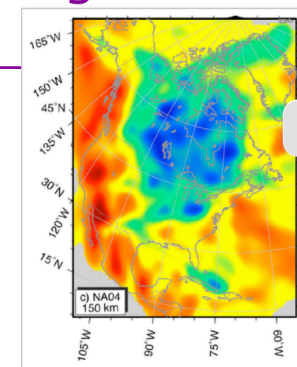
## Seismic Tomography for Teaching and Research

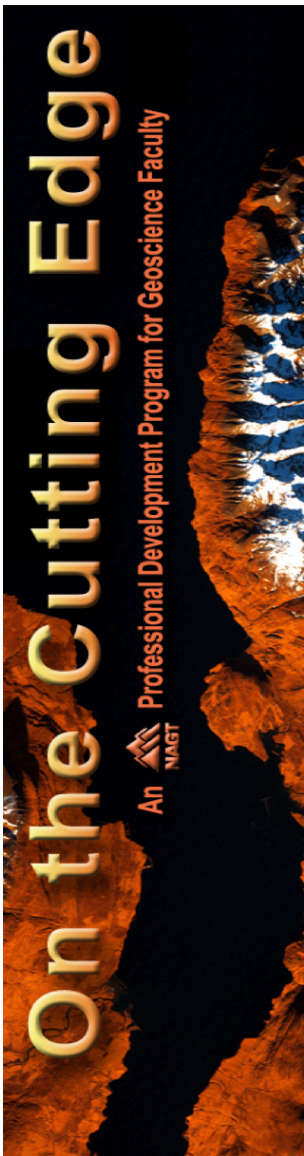
An online virtual workshop; Six 2-hour virtual sessions in April (3, 10, 17, 24) and May (22, 29), 2013

Registration for this workshop is Closed.


Seismic Tomography plays a vital role in conveying information about the structure, composition, and state of Earth's interior. The images produced by seismic tomography, however, are difficult to construct and complex to interpret. This workshop will follow upon two previous solid-Earth geophysics workshops (the [Understanding Deep Earth](#) workshop in 2010, and the [Visualizing Seismic Waves](#) workshop in 2011) to help faculty member bring geophysics into their classroom and labs; in this case, in the area of the construction and interpretation of seismic tomographic images, or "tomograms."


During April-May, 2013, a virtual workshop will be held in six 2-hour sessions (Wednesday, 12-2 pm Central Time) to help the geoscience community identify, develop, and organize a comprehensive collection of activities that will facilitate learning about seismic tomographic images, the information they convey, and how they are used for a wide variety of geoscience applications. The first four of














Workshop outputs include presentations, classroom activities, publications, course syllabi, reference lists, tutorials, etc., and are available on the *Teach the Earth* website.




A Portal to Earth Education Resources

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  - Complex Systems
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  - Ethics and Environmental Justice
- Teaching Topics**
  - Biocomplexity
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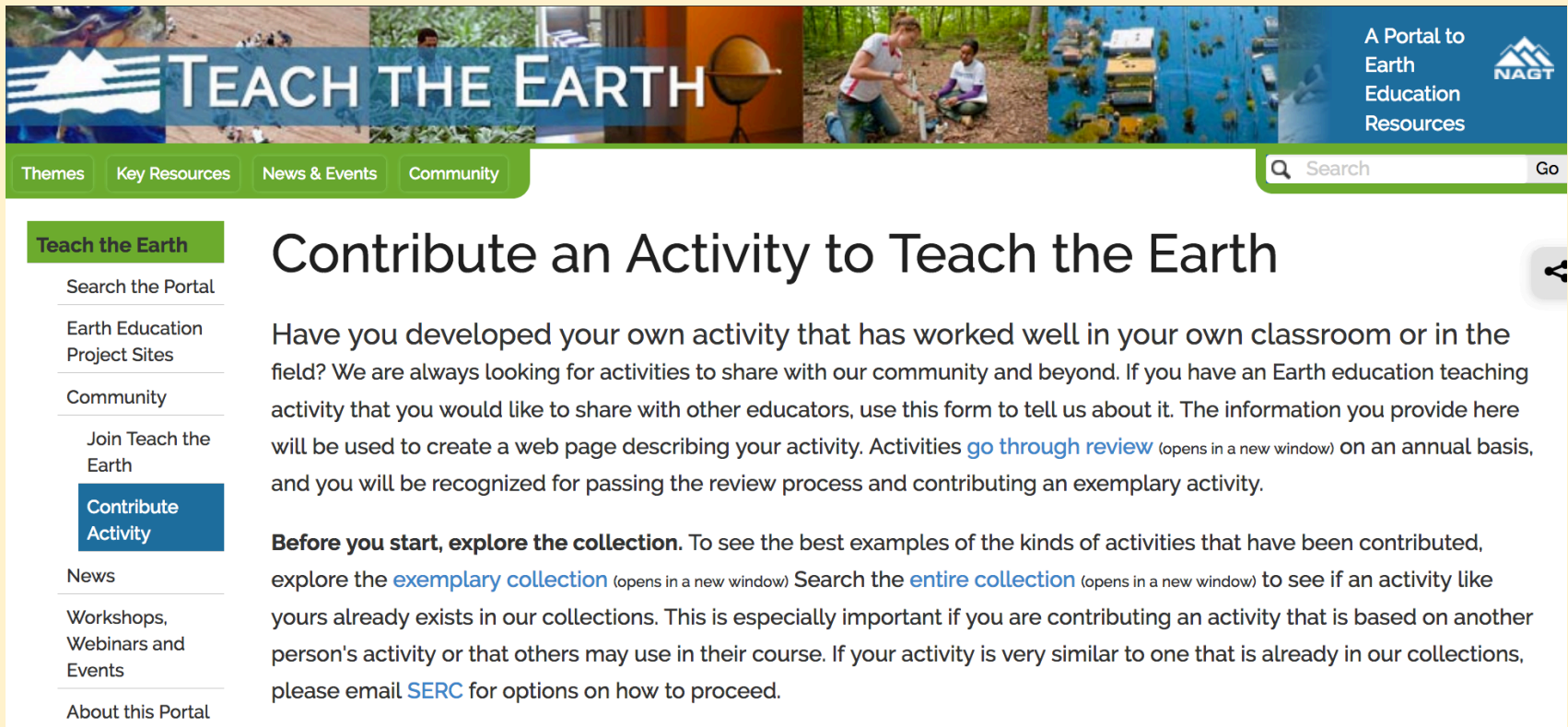
- Workshops, Webinars and More »

**NAGT Announces New Editor of the Journal of Geoscience Education (JGE)**

The National Association of Geoscience Teachers (NAGT) is pleased to announce that Dr. Anne



New teaching activities can still be added by community members, and discussion lists remain available to support interaction among interested parties.



The screenshot shows the Teach the Earth website. At the top is a banner with the title "TEACH THE EARTH" and a subtitle "A Portal to Earth Education Resources" with the NAGT logo. Below the banner is a green navigation bar with links: Themes, Key Resources, News & Events, and Community. A search bar is on the right. On the left is a sidebar with links: Search the Portal, Earth Education Project Sites, Community, Join Teach the Earth, Contribute Activity (highlighted in blue), News, Workshops, Webinars and Events, and About this Portal. The main content area has the heading "Contribute an Activity to Teach the Earth" and a paragraph explaining the process of contributing an activity, including a link to the "exemplary collection" and "entire collection".

## Contribute an Activity to Teach the Earth

Have you developed your own activity that has worked well in your own classroom or in the field? We are always looking for activities to share with our community and beyond. If you have an Earth education teaching activity that you would like to share with other educators, use this form to tell us about it. The information you provide here will be used to create a web page describing your activity. Activities [go through review](#) (opens in a new window) on an annual basis, and you will be recognized for passing the review process and contributing an exemplary activity.

**Before you start, explore the collection.** To see the best examples of the kinds of activities that have been contributed, explore the [exemplary collection](#) (opens in a new window) Search the [entire collection](#) (opens in a new window) to see if an activity like yours already exists in our collections. This is especially important if you are contributing an activity that is based on another person's activity or that others may use in their course. If your activity is very similar to one that is already in our collections, please email [SERC](#) for options on how to proceed.




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