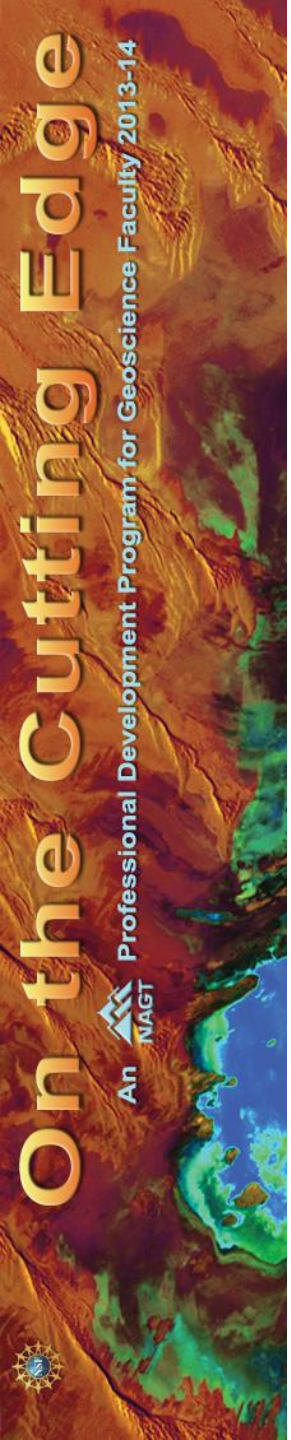


Teaching Introductory Oceanography:

An On the Cutting Edge Workshop Report

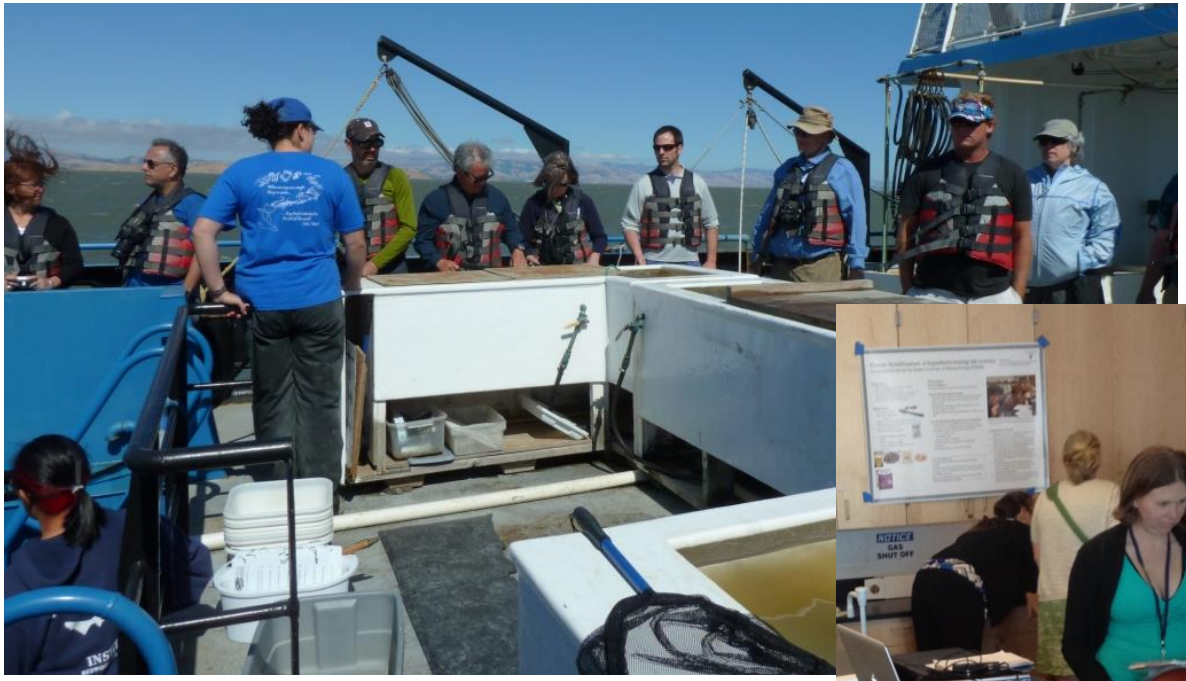
Workshop Conveners and Support:

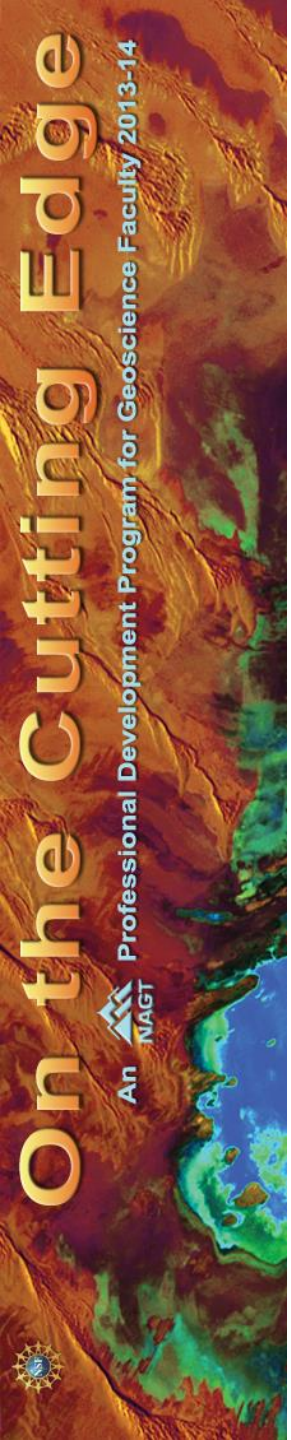
- **Wiese**, **Katryn –** *Department of Earth Sciences*, City College of San Francisco
- **Mogk**, **Dave –** *Department of Earth Sciences,* Montana State University
- **Bruckner, Monica –** *Science Education Resource Center, Carleton College*
- **St. John**, **Kristen –** *Department of Geology & Environmental Science*, James Madison University
- **Hodder, Jan –** *Oregon Institute of Marine Biology*, University of Oregon
- **Trujillo**, **Al –** *Department of Earth, Space, & Aviation Sciences*, Palomar College
- **Dekens**, **Petra –** *Departments of Geosciences*, San Francisco State University

On the Cutting Edge

An NAGT Professional Development Program for Geoscience Faculty 2013-14

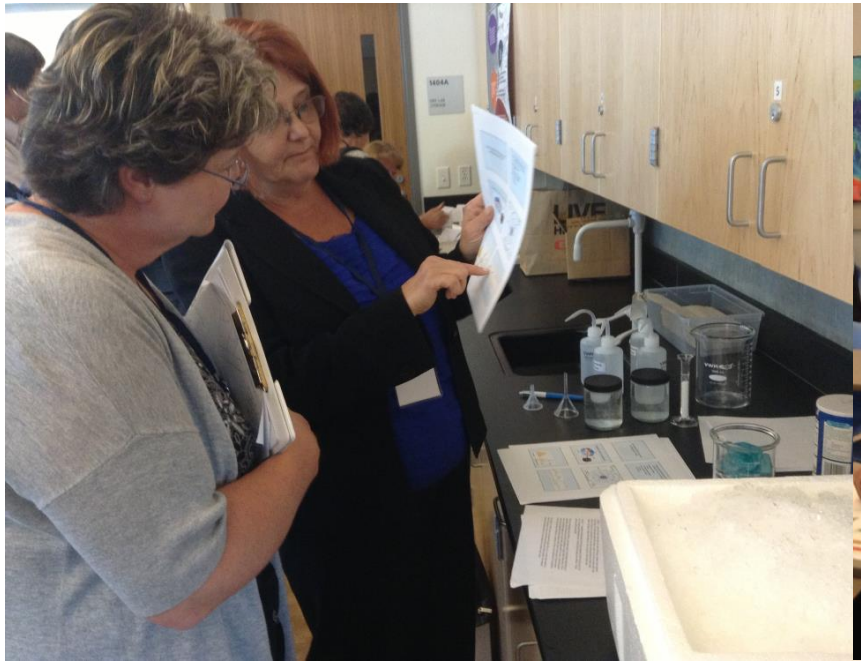
June 2013, in San Francisco,
over 65 educators from a wide range of
higher education settings
participated in an NSF-funded
***On the Cutting Edge* workshop**

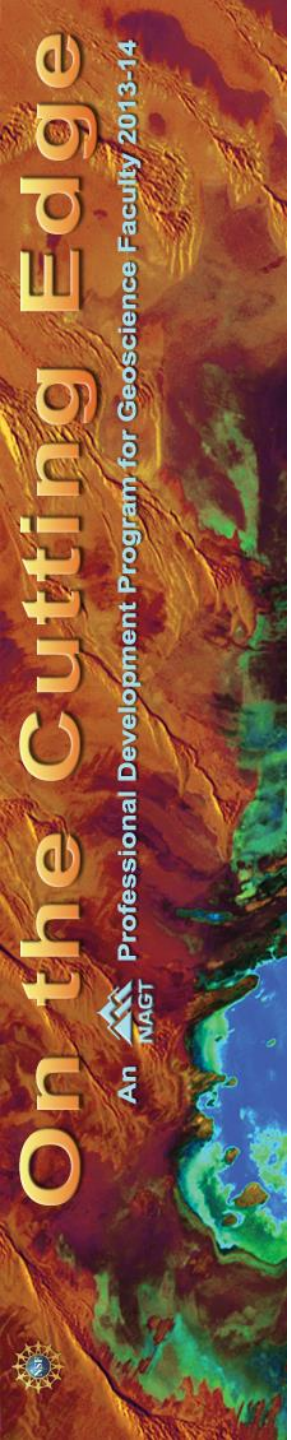




Goals

- Share ideas, strategies, case studies, and tested models for improving the pedagogy and content of Introductory Oceanography curricula.
- Develop a networking community for oceanography educators.





Format

3-day workshop program:

- Keynote talks
- Small group breakout sessions
- Simulated lab and lecture classes
- Interactive demonstrations
- Best-practice share-fair
- Networking opportunities
- New resource development
- Field trips *(before, after, and during the workshop)*

Participants

65 participants

Number of years teaching

Mean: 12 years

Max: 34 years

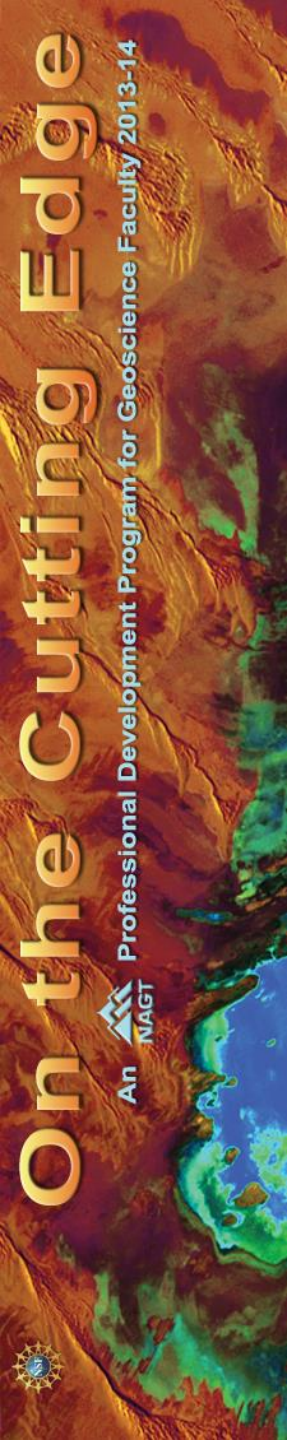
Min: 0.5 years

Institution type:

2 year college: 34

Private 4-year: 6

Public 4 year: 35



Outcomes

- Teaching activities
- Resource pages
- Community building
- And more…

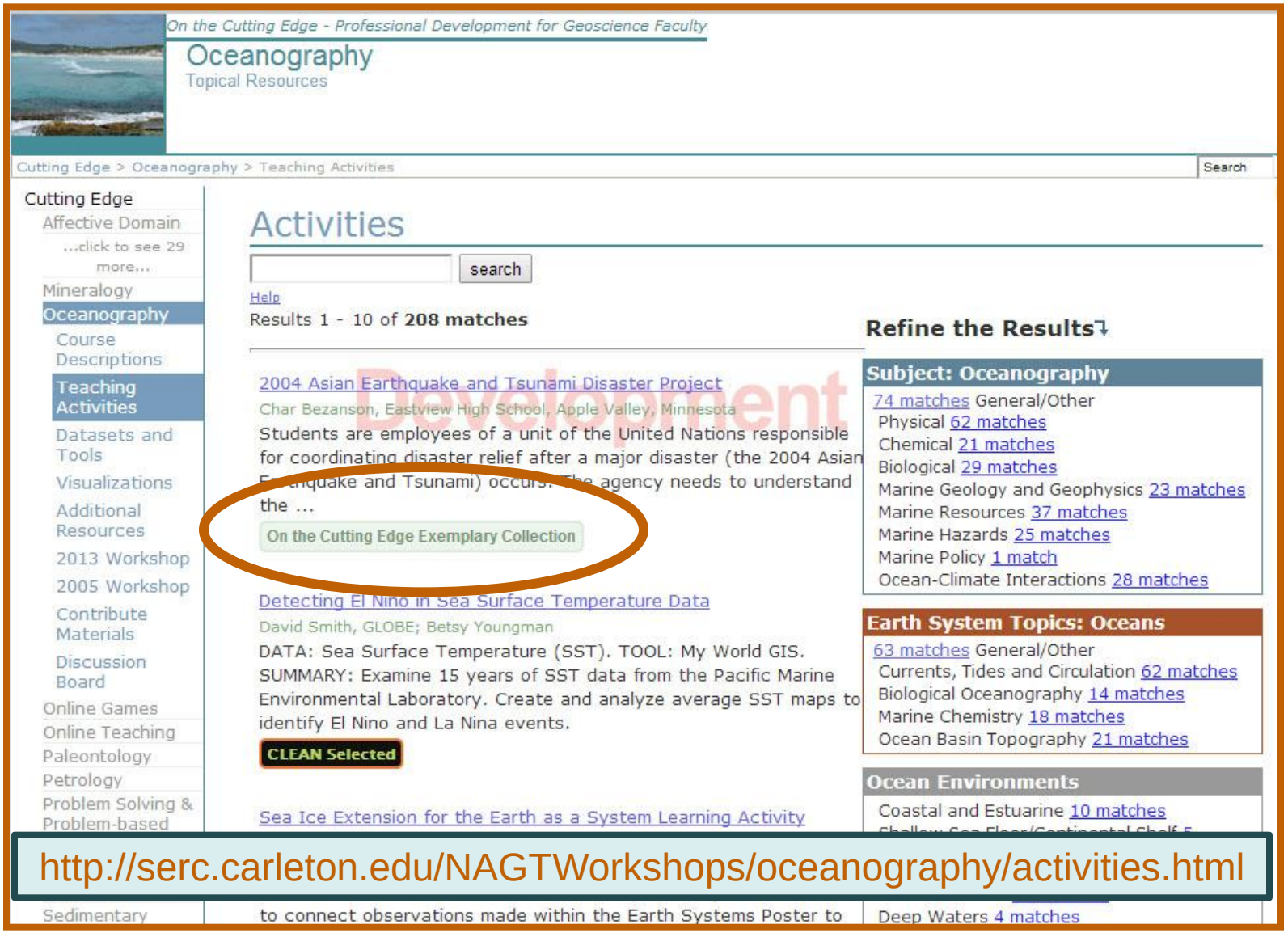
http://serc.carleton.edu/NAGTWorkshops/oceanography/workshop2013/outcomes.html

On the Cutting Edge

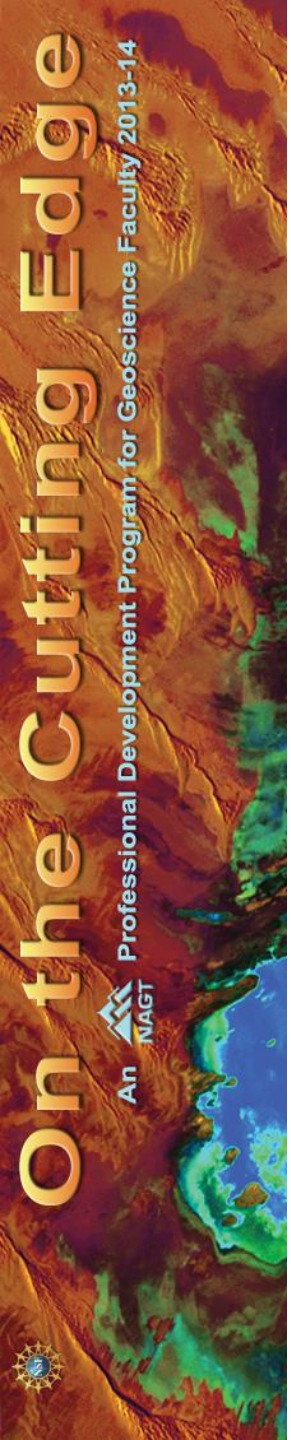
An NAGT Professional Development Program for Geoscience Faculty 2013-14

Peer review of over 85 teaching activities

elevates exemplary activities to the top of search lists



http://serc.carleton.edu/NAGTWorkshops/oceanography/activities.html



Contribution of 115 new online resources

including syllabi, visualizations, and activities

Oceans and Climate Debate

Branwen Williams, Claremont McKenna-Pitzer-Scripps Colleges Author Profile

Summary

This activity orally tests students understanding of the links between ocean processes and global climate change. It is set up as a debate with students serving as the science experts and volunteer faculty serving as the opposition team.

Context

Audience

This activity was designed for a small upper level undergraduate global climate change class but could just as easily be adapted to an oceanography class that includes some coverage of climate issues. The topic could be adapted to any other oceanographic issue that can be debated.

Skills and concepts that students must have mastered

Students should have an understanding of:

- Earth's energy budget
- Greenhouse gases
- Ocean-atmosphere interactions
- Ocean circulation
- Carbon cycle
- Anthropogenic climate change

http://serc.carleton.edu/NAGTWorkshops/oceanography/activities/72607.html

On the Cutting Edge

An NAGT Professional Development Program for Geoscience Faculty 2013-14

NEW WEB RESOURCES

Additional Resources for Teaching about the Ocean

The collections of materials on this page were derived from faculty discussions and presentations at workshops and faculty contributions to our collections. We welcome you to contribute to the collections or to join the discussion on our Oceanography discussion board.

Student Learning Outcomes in Introductory Oceanography

Explore outcomes as recommended assessments compiled by participants at the June 2013 Teaching Introductory Oceanography workshop.

Field Trip Ideas and Student Learning Outcomes

Get inspired: check out these field trip ideas and student learning outcomes compiled by participants at the June 2013 Teaching Introductory Oceanography workshop.

Sustainability and Stewardship Topics in Intro Oceanography

Take a look through activities, web resources, and teaching suggestions for incorporating a variety of sustainability and stewardship topics into the classroom. Resources were compiled by participants at the June 2013 Teaching Introductory Oceanography workshop.

Internet Resources

Browse a collection of the community's favorite websites, books, journal articles, websites, and more.

http://serc.carleton.edu/NAGTWorkshops/oceanography/additional_resources.html

On the Cutting Edge

An NAGT Professional Development Program for Geoscience Faculty 2013-14

Program Presentations

Workshop Program

Monday June 17 - Optional Field Trip

8 am -8 pm **Optional Field Trip - Pacific Coast South of San Francisco & South San Francisco Bay**- includes South Bay Cruise -- Dinner on return (on own dime) (Click here for details, maps, and images.)

6:30 pm **Optional dinner gathering** in downtown San Francisco for those who've arrived early (on your own dime) - gather in front of 808 Kearny at 6:30 pm. Group will head toward Belden Place (parallel to Kearny between Pine and Bush) or into North Beach.

Tuesday, June 18

Theme: WHAT do we teach in Oceanography?

http://serc.carleton.edu/NAGTWorkshops/oceanography/workshop2013/program.html

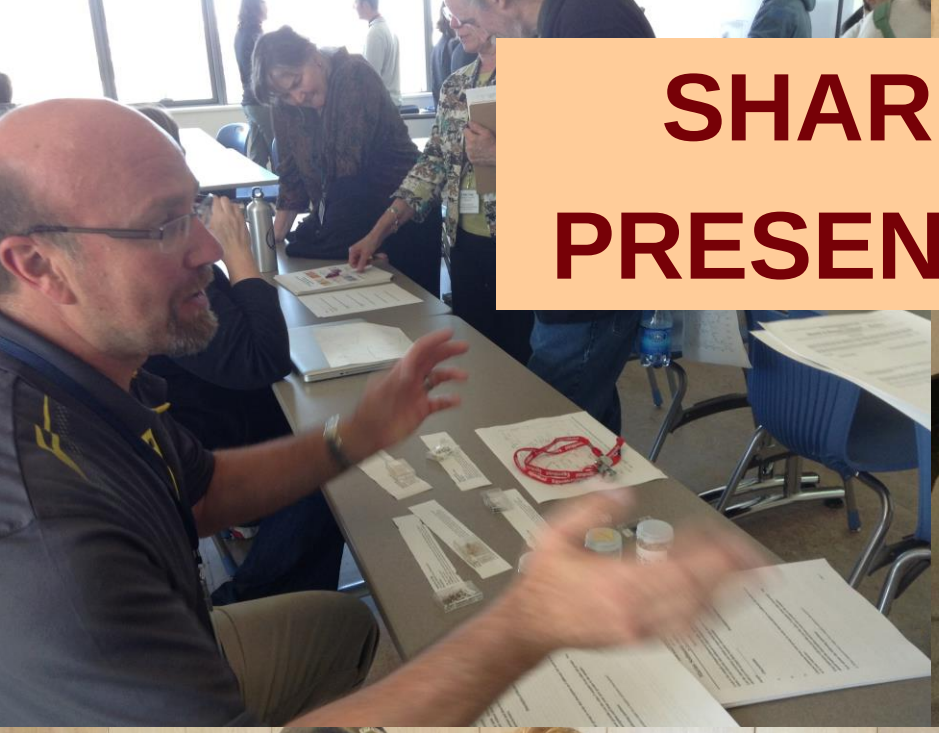
10:15-10:30 am Break *(light snack provided)* (402)

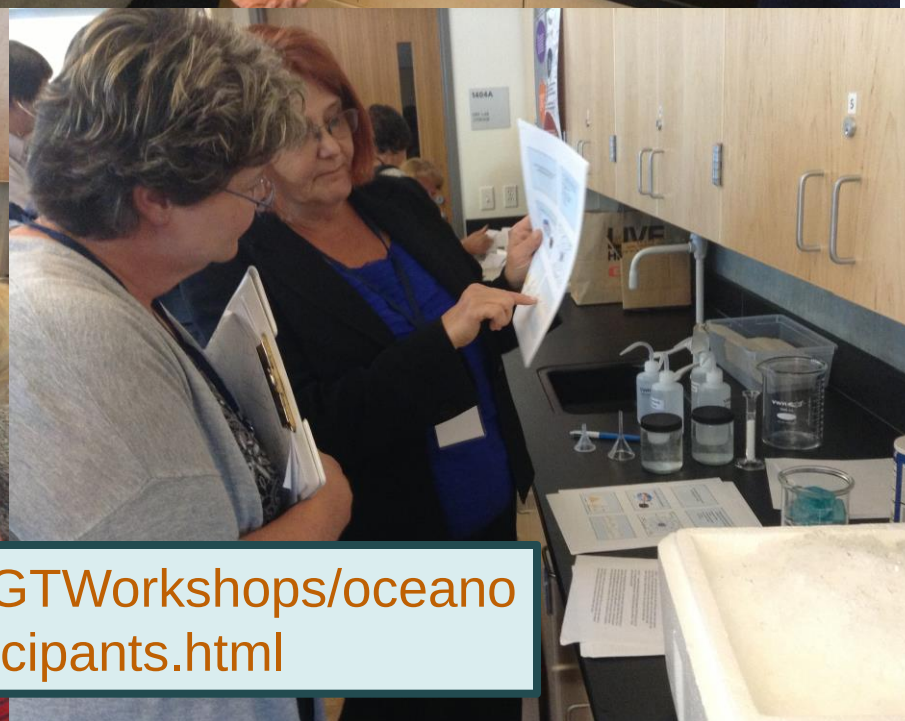
10:30-11:45 am **Invited Plenary Talk** - Sustainable Oceans and Educating Future Citizens - Dr. Sylvia Earle - Main Conference Room (402)

▶ Show related links

11:45 am -12 pm Reflection/Action Plan

SHARE FAIR PRESENTATIONS





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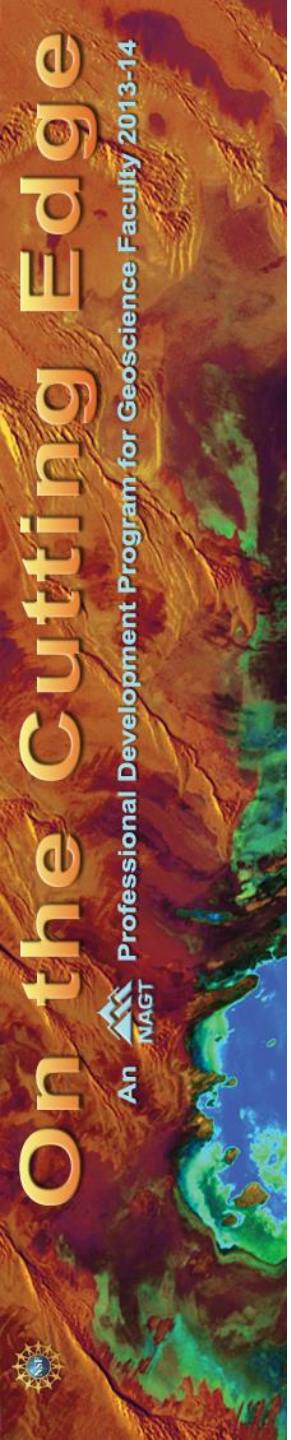


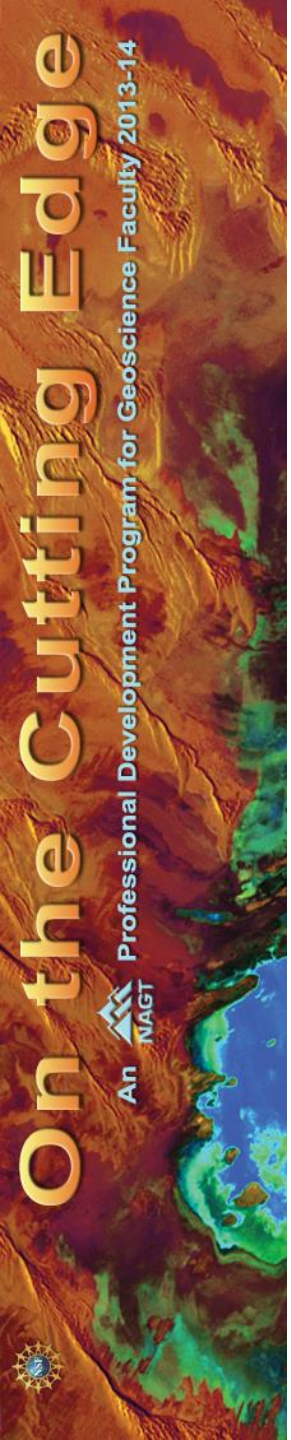
Journal of Geoscience Education

Journal of Geoscience Education
Teaching Oceanography-theme issue

highlighting tested best-practice techniques in teaching Introductory Oceanography

An upcoming Journal of Geoscience Education Oceanography theme issue highlighting tested best-practice techniques in teaching Introductory Oceanography.

- Guide to aspiring authors
- Call for papers: JGE Call for Papers



Journal of Geoscience Education

GUIDE TO ASPIRING WRITERS:

Recommended Strategies for overcoming common challenges in geoscience education publication

1. Do your homework by putting your work in a literature-based context.
2. Provide evidence of effectiveness.
3. Get familiar with IRB (Instructional Review Board)
4. Consider collaborating.
5. Be concise but complete in describing what you did, how you did it, and who you did it with.
6. Discuss the meaning of your results.
7. Make the most of the review feedback.

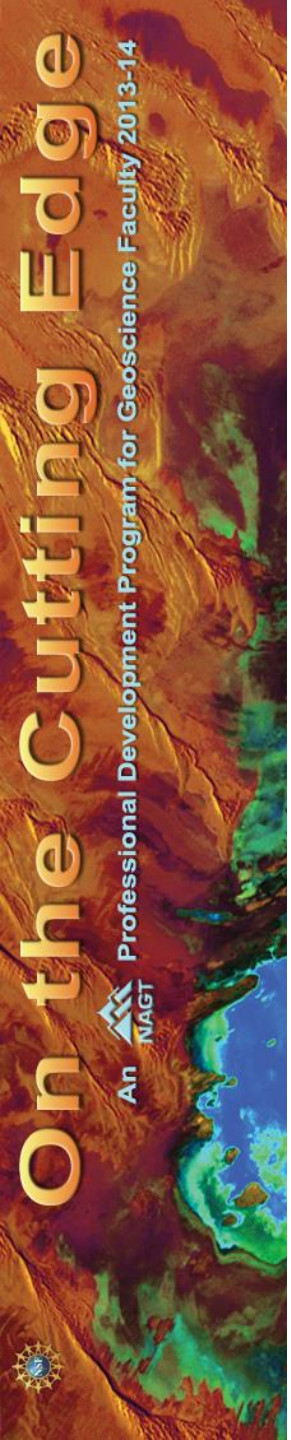
For full article see: *St. John, Dickerson, & McNeal, 2013. Guide to Aspiring Authors. Journal of Geoscience Education, 61 (3), 253-255. Open access article at:* *http://nagt-jge.org/*

On the Cutting Edge

An NAGT Professional Development Program for Geoscience Faculty 2013-14

Email list & Facebook page

Development and support of an ongoing network of faculty teaching oceanography



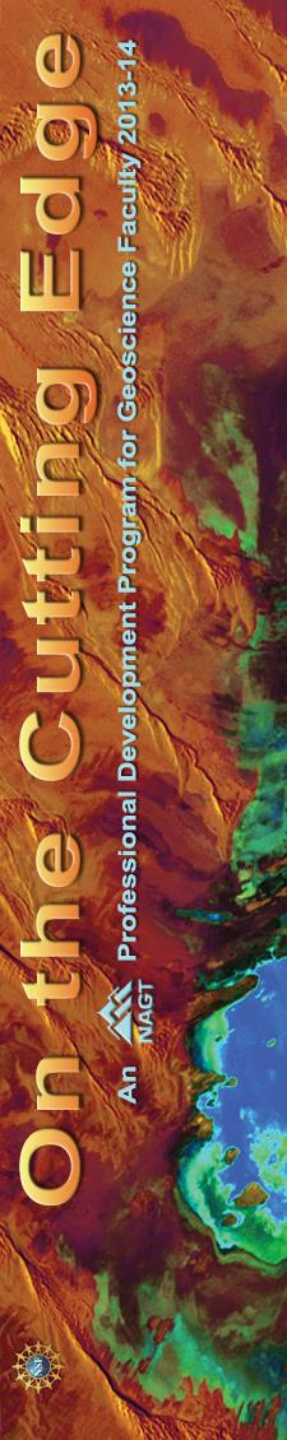
Participant Feedback

- *"…using class demos, short experiments, and active learning techniques are critical in engaging student interest and increasing student understanding in lecture classes. I will spend much time this summer embedding demos/experiments, active learning techniques, and ocean conservation into my lectures."*
- *"…allowed me to move from my tunnel vision of daily classes and grading to the bigger picture of student learning. Also reinforced the idea that teaching a course successfully requires constant revision and reinvigoration and a community of enthusiastic and intelligent educators to support this cycle."*

Participant Feedback

"The workshop helped me be sure that I really wanted to focus on how students learn and what we can do to support learning. So now I am doing research into students' misconceptions in mechanics and fluid dynamics. I started a blog and I changed jobs and am now the "coordinator of teaching innovation" at Hamburg University of Technology, Germany. " -- Mirjam Glesser

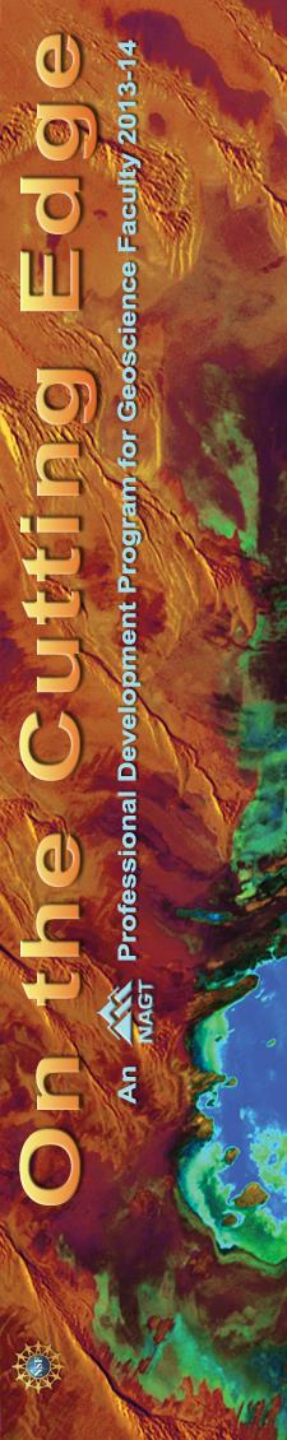
http://mirjamsophiaglessmer.wordpress.com



Participant Feedback

"At the workshop a group of us began to plan to do a case study on the Pacific Garbage Patch. Subsequently I have enlisted a group of fellow faculty at my institution to work on this."

"Also, I attended a session by Debra Woodall on building underwater remotely operated vehicles. Debra provided information and materials that made it easy to acquire the needed kits and put them to good use. This particular lab will now be a permanent addition to my class." -- Lauren Sahl

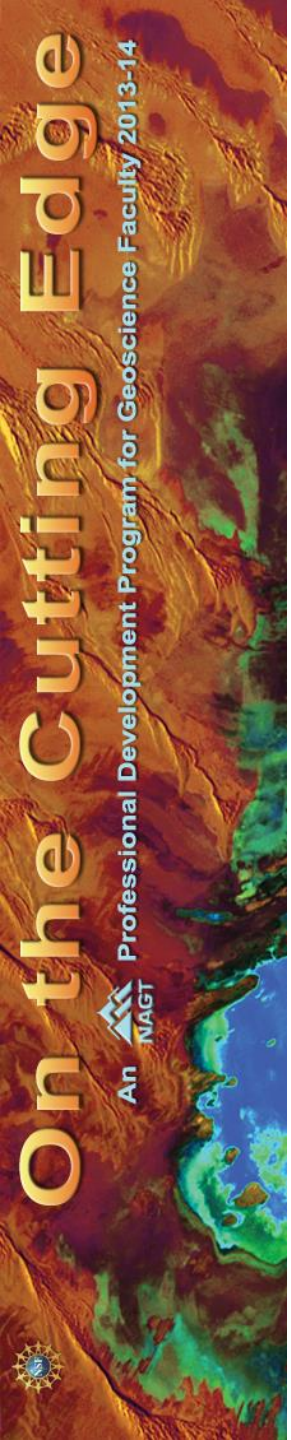


GET INVOLVED!

2013-2014 On The Cutting Edge, NAGT, and InTeGrate workshops:

- **Getting the Most out of Your Introductory Courses** Mar 10-18 2014
- **Teaching at Scale: Effective strategies for higher order learning in large, very-large and massive courses** Apr 7-18 2014
- **Teaching about Risk and Resilience: Sea Level Rise, Flooding, and Earthquakes** May 14-16, 2014
- **Teaching GeoEthics Across the Geoscience Curriculum** June 10-13, 2014
- **Innovative Approaches to Teaching Sedimentary Geology, Geomorphology, and Paleontology** Jun 16-20 2014
- **Early Career Geoscience Faculty: Teaching, Research, and Managing Your Career** June 22-26, 2014
- **Undergraduate Research in Earth Science Classes: Engaging Students in the First Two Years** August 10-13, 2014

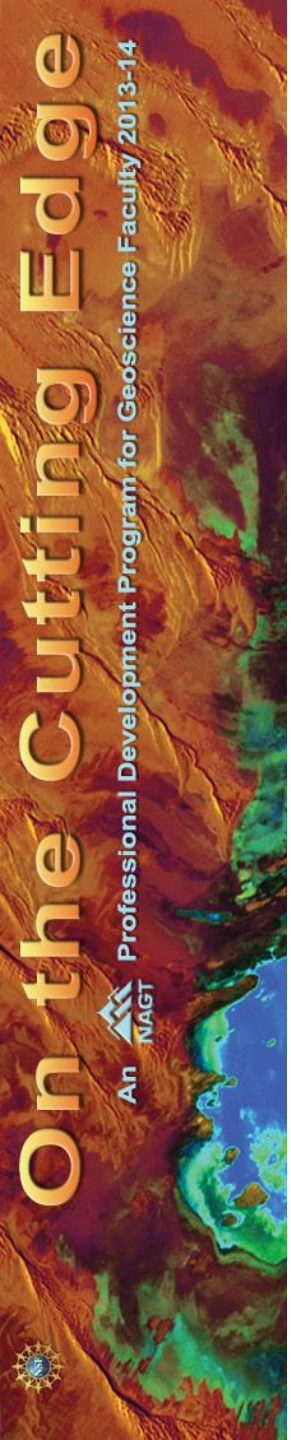
http://serc.carleton.edu/NAGTWorkshops/workshops.html



NAGT
Journal of Geoscience Education

Call for Papers for JGE Theme Issue: ***Teaching STEM Principles through Oceanography Content***

- **Goal**: to capture the role of oceanography in STEM education and how instructional strategies promote conceptual change and move students towards more accurate understanding of the oceans and the Earth system.
- Submission deadline is **November 30, 2014**, for publication in Fall 2015.
- Submit to: **http://jge.allentrack.net**



Contribute to and share in the community through the Teaching Oceanography Website

Teaching Oceanography

Oceans cover about 70% of the globe and have a major influence on all of Earth's systems. Oceanography offers a fascinating context to connect science with human dimensions through the study of current events and issues such as hazards, pollution, energy resources, and more. Dive into the resources below for exciting ways to incorporate oceanography and its multi-disciplinary facets into your classroom and laboratory.

Jump down to: Course Design & Pedagogy | Resource Collections | Special Topics | Workshops & Events | Get Involved

Designing an Effective Oceanography Course

1. Set goals

Explore example student learning outcomes from your colleagues. Learn more about setting effective course goals in the Course Design Tutorial. You can also explore course goals from others' oceanography courses using the syllabi available in the course collection.

2. Consider assessment options

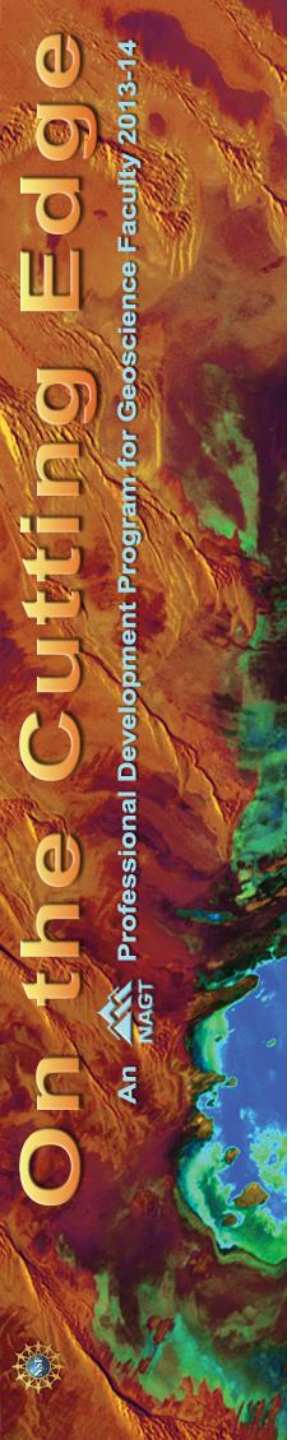
Aligning your assessment strategies with the goals of your course is an essential part of the design process. You can learn more about assessment in the section about Assessing Student Learning in the Course Design Tutorial and through our module on Observing and Assessing Student Learning.

3. Select pedagogies and teaching activities

The **resource collections** below are organized to provide a rich set of materials to draw from in constructing the specific set of learning experiences you want for your students. You may also want to explore specific pedagogies to incorporate into your classroom such as those listed below. Learn more about teaching methods from the *On the Cutting Edge* teaching methods module.

- Teaching Geoscience in the Field provides students important data-gathering, observation, and real world relevancy experiences. (Review this list of field trip ideas.)

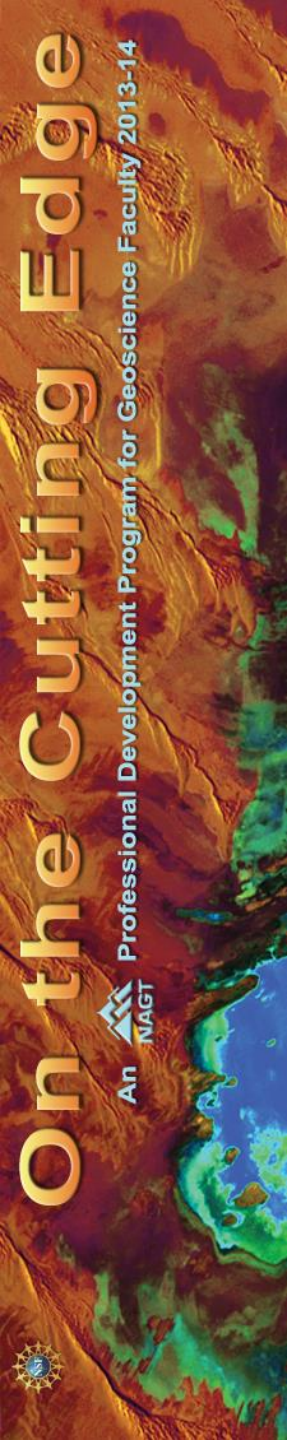
http://serc.carleton.edu/NAGTWorkshops/oceanography/index.html



GET INVOLVED!

- Attend a future workshop
- Contribute to JGE
- Join the email list
- Volunteer to review activities
- Contribute new activities
- Recommend resources
- Join the discussion

CONTACT
Katryn Wiese (katryn.wiese@mail.ccsf.edu)
for more information.



Participant Feedback

- *"I am encouraged to move to more activity based classroom experiences."*
- *"I love the new, short activities that I heard about...simple ones that could immediately included with little effort such as concept tests and instant smart phone searches."*
- *"I knew virtually nothing about "flipped" courses (or at least how to successfully do it) and now am confident to try this new approach in my fall term classes (maybe not all)."*
- *"Made a number of new contacts and learned many new teaching concepts and modalities. Also feel more confident in teaching this content and teaching in general."*
- *"I really learned a lot and feel a growing sense of teaching transformation. I know the realities of integrating all this once the busyness of the semester begins will be difficult but I also know my teaching will change. I was inspired by all - thank you!"*