

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*

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>

Peer review of over 85 teaching activities elevates exemplary activities to the top of search lists

On the Cutting Edge - Professional Development for Geoscience Faculty



Oceanography

Topical Resources

Cutting Edge > Oceanography > Teaching Activities Search

Cutting Edge

- Affective Domain
...click to see 29 more...
- Mineralogy
- Oceanography**
- Course Descriptions
- Teaching Activities**
- Datasets and Tools
- Visualizations
- Additional Resources
- 2013 Workshop
- 2005 Workshop
- Contribute Materials
- Discussion Board
- Online Games
- Online Teaching
- Paleontology
- Petrology
- Problem Solving & Problem-based

Activities

[Help](#)

Results 1 - 10 of **208 matches**

[2004 Asian Earthquake and Tsunami Disaster Project](#)
 Char Bezanson, Eastview High School, Apple Valley, Minnesota
 Students are employees of a unit of the United Nations responsible for coordinating disaster relief after a major disaster (the 2004 Asian Earthquake and Tsunami) occurs. The agency needs to understand the ...
On the Cutting Edge Exemplary Collection

[Detecting El Nino in Sea Surface Temperature Data](#)
 David Smith, GLOBE; Betsy Youngman
 DATA: Sea Surface Temperature (SST). TOOL: My World GIS.
 SUMMARY: Examine 15 years of SST data from the Pacific Marine Environmental Laboratory. Create and analyze average SST maps to identify El Nino and La Nina events.
CLEAN Selected

[Sea Ice Extension for the Earth as a System Learning Activity](#)

Refine the Results

Subject: Oceanography

[74 matches](#) General/Other
[Physical 62 matches](#)
[Chemical 21 matches](#)
[Biological 29 matches](#)
[Marine Geology and Geophysics 23 matches](#)
[Marine Resources 37 matches](#)
[Marine Hazards 25 matches](#)
[Marine Policy 1 match](#)
[Ocean-Climate Interactions 28 matches](#)

Earth System Topics: Oceans

[63 matches](#) General/Other
[Currents, Tides and Circulation 62 matches](#)
[Biological Oceanography 14 matches](#)
[Marine Chemistry 18 matches](#)
[Ocean Basin Topography 21 matches](#)

Ocean Environments

Coastal and Estuarine [10 matches](#)
 Shallow Sea Floor/Continental Shelf

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

Sedimentary

to connect observations made within the Earth Systems Poster to

Deep Waters [4 matches](#)

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>

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

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)

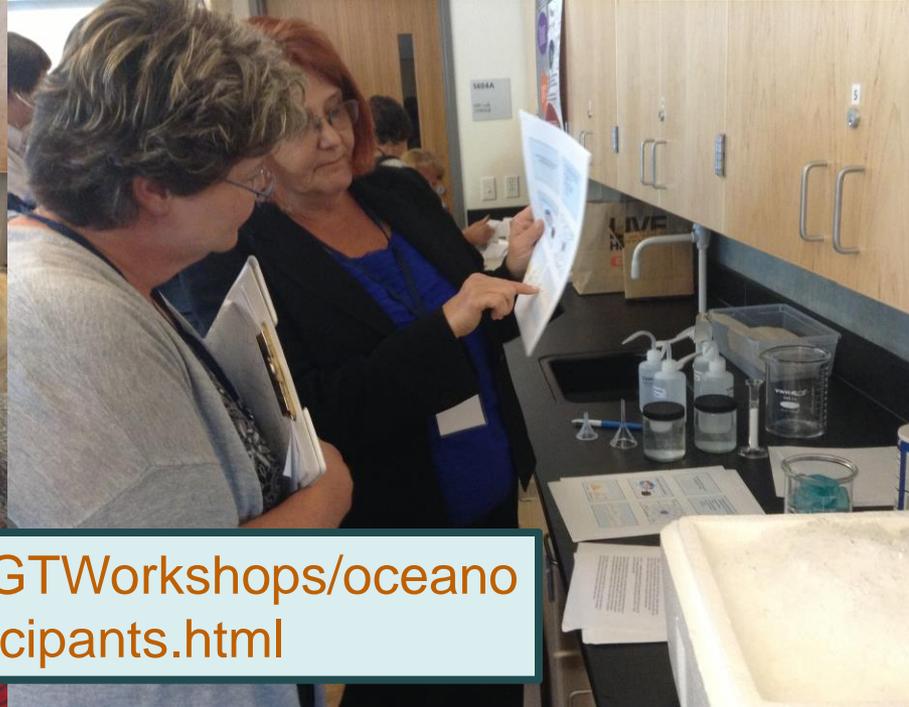
10:30- 11:45 am **Invited Plenary Talk** - Sustainable Oceans and Educating Future Citizens - [Dr. Sylvia Earle](#) - Main Conference Room (402)

► [Show related links](#)

11:45 am - 12 pm Reflection/Action Plan



SHARE FAIR PRESENTATIONS



<http://serc.carleton.edu/NAGTWorkshops/oceanography/workshop2013/participants.html>



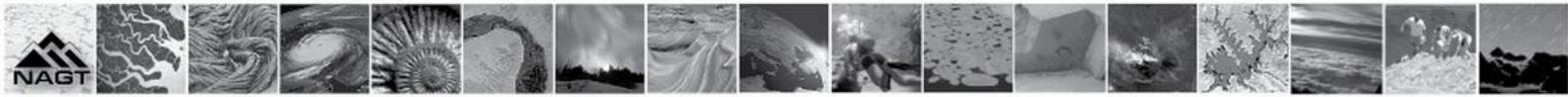
Journal of Geoscience Education

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:

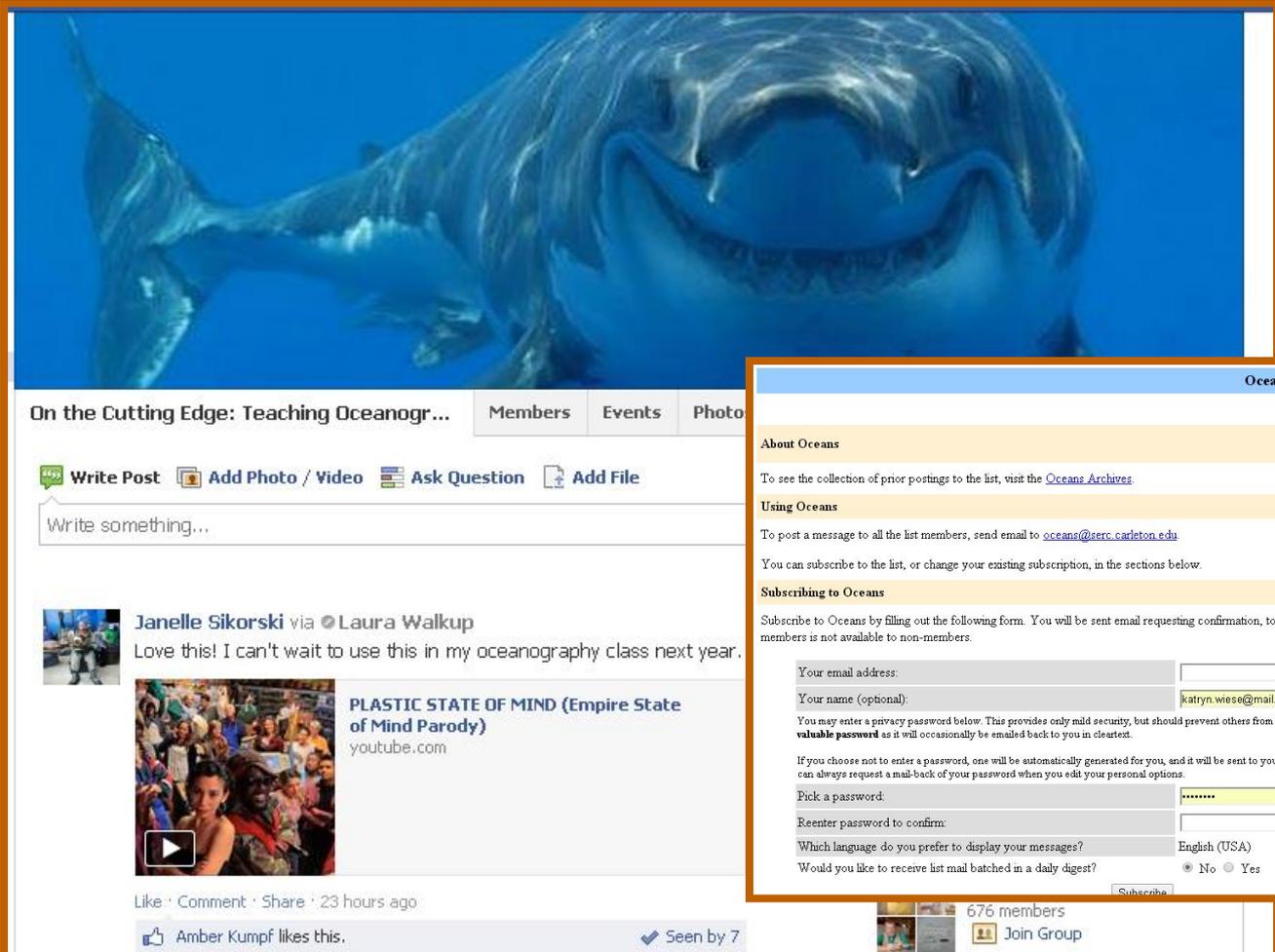
Recommended Strategies for overcoming common challenges in geoscience education publication

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/>

Email list & Facebook page

Development and support of an ongoing network of faculty teaching oceanography



The image shows a Facebook page for "On the Cutting Edge: Teaching Oceanogr...". The page features a cover photo of a shark swimming in blue water. Below the cover photo, there are navigation tabs for "Members", "Events", and "Photo". A "Write Post" section is visible with options to "Add Photo / Video", "Ask Question", and "Add File". A post by Janelle Sikorski via Laura Walkup is shown, featuring a video thumbnail and the text "Love this! I can't wait to use this in my oceanography class next year." Below the post, there are interaction options: "Like", "Comment", "Share", and "23 hours ago". At the bottom, it says "Amber Kumpf likes this." and "Seen by 7".

Oceans --

About Oceans

To see the collection of prior postings to the list, visit the [Oceans Archives](#).

Using Oceans

To post a message to all the list members, send email to oceans@serc.carleton.edu.

You can subscribe to the list, or change your existing subscription, in the sections below.

Subscribing to Oceans

Subscribe to Oceans by filling out the following form. You will be sent email requesting confirmation, to prevent others from gratuitously subscribing members is not available to non-members.

Your email address:

Your name (optional):

You may enter a private password below. This provides only mild security, but should prevent others from messing with your subscription. **Do not use a valuable password** as it will occasionally be emailed back to you in cleartext.

If you choose not to enter a password, one will be automatically generated for you, and it will be sent to you once you've confirmed your subscription. You can always request a mail-back of your password when you edit your personal options.

Pick a password:

Reenter password to confirm:

Which language do you prefer to display your messages? English (USA)

Would you like to receive list mail batched in a daily digest? No Yes

676 members

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>



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](#).)



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!”*