

CATHRYN ALLEN MANDUCA

Science Education Resource Center
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Education

California Institute of Technology, Pasadena, CA: 1983-1988, Ph.D. Geology
California Institute of Technology, Pasadena, CA: 1980-1982, M.S. Geology
Williams College, Williamstown, MA: 1976-1980, B.A. Geology
University of Idaho, Moscow, ID: 1978-1979, Junior Year Exchange Student
Miami of Ohio, Field Camp, Summer 1978

Thesis

Geology and Geochemistry of the Oceanic Arc-Continent Boundary in the Western Idaho Batholith Near McCall, Dr. Leon T. Silver, Advisor.

Employment

June, 2007 -: Executive Director, National Association of Geoscience Teachers. Responsible for management of the 1500 member organization and its finances under the direction of the elected Executive Committee.

September, 2001 -: Director Science Education Resource Center; responsible for raising funds and directing a suite of programs that improve STEM education. The office has special expertise in effective pedagogies, geoscience education, community organization, workshop leadership, digital libraries, website development and program and website evaluation.

March 2000-August, 2001: Digital Library for Earth System Education (DLESE) Outreach Coordinator; responsible for engaging the geoscience community in building and using a web-based facility to support teaching and learning about the Earth.

December 1994-June 2000: Coordinator, Keck Geology Consortium; Administered program for a twelve-college national consortium including student-faculty research projects for 60-80 students per year, workshops and an annual symposium. Responsible for program development, evaluation, dissemination, and fundraising in addition to administration. This position was expanded from 3/8 to 3/4 time in March 1997 to accommodate an increase in fundraising activities aimed at establishing long-term financial support for the program.

July-August 1996: Project Faculty, Environmental Geochemistry and Hydrology of the Payette Lake Watershed, Idaho; Keck Geology Consortium student-faculty research project involving twelve students and four faculty determined that the impact of burning and logging in the area depends on the surficial geology within a watershed.

May 1995-March 1997: Assistant Professor of Science at Rochester Community and Technical College: Part-time position teaching Introductory Earth Science and a physical geology course designed primarily for pre-service teachers.

September 1994-December 1994: Assistant Professor of Physics at St. Olaf College. Part-time position teaching Introductory Geophysics.

September 1992 -: Research Associate at Carleton College.

September 1991-June 1992: Assistant Professor of Geology at Carleton College; full-time teaching appointment as petrologist. Taught Introductory Geology, Igneous and Metamorphic Petrology, and Advanced Petrology.

September 1989-August 1991: Assistant Professor of Geology on the W.M. Keck Foundation at Carleton College; a half-time teaching, half-time research, two year appointment as petrologist. Research focused on geochemistry, geobarometry and field geology. Emphasis on collaborative research with undergraduate students. Courses included Igneous and Metamorphic Petrology, Advanced Petrology, and SEM, EDAX and XRF Methods.

1980-1982 and 1983-1987: Teaching and research assistant, California Institute of Technology; teaching assistant 9 semesters; research supervised by Dr. L.T. Silver, Dr. H.P. Taylor, Dr. J.B. Saleeby and Dr. B. Hager involved isotope geochemistry, field geology and computer modeling.

Summers 1982-1985: Geologist, U.S. Geological Survey, student appointment to map part of the western border zone of Idaho Batholith in conjunction with Dr. M. Kuntz.

Summer 1979, 1980: Field assistant, U.S. Geological Survey, assisted in mapping in western Idaho Batholith for mineral potential evaluations.

Academic year 1977 and 1979: Teaching assistant, geology and physics, Williams College.

Awards

Geological Society of America Fellow, elected 2010.

American Association for the Advancement of Science Fellow, elected 2010.

Science Prize for Online Resources in Education, 2010 for On the Cutting Edge website.

Best Website Award, Geoscience Information Society, 2009 for On the Cutting Edge website.

Best Paper Award, Geoscience Information Society, 2006 for Manduca, C.A., S. Fox, and E.R. Iverson (2006). *Influencing user behavior through digital library design: An example from the geosciences*. D-Lib, 11(5).

AGU Excellence in Geophysical Education Award, 2004

Conoco Fellowship, 1986

Achievement Rewards for College Scientists Scholarship, 1984,1985

Danforth Fellow, elected 1980

Phi Beta Kappa, elected 1979

Grants Received

2011-2016, PI, Collaborative Research, Interdisciplinary Teaching of Geoscience for a Sustainable Future, NSF, \$10,000,000

2011-2014, Co-PI, Developing and Testing Materials to Improve Spatial Skills in Upper Division Geoscience Courses, NSF, \$174,800

2011-2013, Co-PI, Collaborative Research: Cyber Enabled Data and Modeling Driven Curriculum Modules for Hydrology Education, NSF, \$41,338

2010-2015, PI, Collaborative Research: On the Cutting Edge: A Community Resource Transforming Geoscience Education, NSF, \$2,096,215

2010-2012, PI, Collaborative Research: Climate Literacy & Energy Awareness Network (CLEAN) Pathway, NSF, \$254,886

2009-2011, PI, Website support of ACM FaCE workshop series, Associated Colleges of the Midwest, \$30,000

2009-2011, Co-PI, Tracing the Effects of Faculty Development into Student Learning Outcomes, Spencer Foundation, \$186,967

2008-2012, Co-PI, CISMI-2: Preparing for Complexity, Mentoring for Access, HHMI, \$142,554

- 2008-2011, PI, Collaborative Research: Improving the Geoscience Major: Developing Community Expertise in Curriculum Design and Assessment, NSF, \$224,132
- 2008-2011, Co-PI, Integrative Spatial Modeling Project, Luce Foundation, \$23,008
- 2008-2010, Co-PI, Collaborative Proposal: Synthesis of Research on Thinking and Learning in the Geosciences, NSF, \$61,039
- 2007-2008, PI, Collaborative Research: Using MARGINS Research Data Resources in the Classroom: Developing and Testing Multidisciplinary Mini-Lessons, NSF, \$52,691
- 2007-2012, PI, Collaborative Research: On the Cutting Edge: Building a Culture in Which the Cycle of Educational Innovation Can Thrive, NSF, \$981,419
- 2006-2008, PI, Collaborative Research: Building Strong Geoscience Departments II- Developing Resources and Networks to Address Priority Challenges, NSF, \$119,088
- 2005-2010, PI, Pedagogic Services for Digital Libraries, NSF, \$649,998
- 2005-2007, PI, Engaging the NAGT Membership in Creating Web Resources, NSF, \$44,827
- 2005-2006, PI, Faculty Participation in the NSDL - Lowering the Barriers, NSF, \$356,400
- 2005-2008, PI, Pedagogic Services for Digital Libraries, NSF, \$649,998
- 2004-2007, PI, Collaborative Proposal: Geoscience Departments: Developing Pathways to Strong Programs for the Future, NSF, \$128,020
- 2003-2006, PI, Collaborative Research: The DLESE Community Services Center, NSF, \$570,830
- 2002, PI, Linking Pedagogy, Resources, and Community Interaction to Support Entry-level Undergraduate Geoscience Courses, NSF, \$600,000
- 2002, Co-PI Earth Exploration Toolbook: A Collection of Examples of Educational Uses of Earth System Science Tools, Datasets and Resources, NSF, \$755,898
- 2002, PI, Bringing Research on Learning to the Geosciences: A Workshop Proposal, NSF, \$57,181; co-sponsored by the Johnson Foundation
- 2002-2007, PI, Collaborative Project: Combining Real and Virtual Professional Development for Current and Future Geoscience Faculty, NSF, \$673,189
- 2001-2002, Co-PI, Collaborative Research: Core Integration of the National SMETE Digital Library, \$2,624,620
- 2000-2002, Co-PI, The Digital Library for Earth System Education: Implementing the DLESE Community Plan, NSF \$1,754,110
- 2000-2001, Co-PI, Core Integration Services for a Federated NSDL, NSF, \$1,029,380
- 1999-2001, Co-PI, Collaborative Research for a Geoscience Education Digital Library, NSF \$1,271,114
- 1993-1994, Experimental Study of Epidote Stability Near the Solidus at 10 Kbars, NSF Research Opportunity Award with John Holloway, Arizona State University- \$7,000.
- 1990-1992, Co-PI A Test of Magmatic Epidote and Hornblende Geobarometers in Plutons of the Northern Sierra Nevada, California. Funding for summer research for six students and two faculty- Petroleum Research Fund (Type B): \$20,000.

Keck Geology Consortium Grants

The W.M. Keck Foundation:

- Two year Continuation of the Keck Geology Consortium, 1995 and 1996, \$900,000
- Two year Continuation of the Keck Geology Consortium, 1997 and 1998 - \$900,000
- Three year Continuation of the Keck Geology Consortium, 1999-2001 - \$750,000

National Science Foundation:

- Continuation of the Keck Geology Consortium: A Core Undergraduate Research Program, 2001-2005 - \$630,579

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Minority Participation in Keck Geology Consortium Undergraduate Student-Faculty Research Program, 1995 and 1996 - \$191,554

Minority Participation in Keck Geology Consortium Undergraduate Student-Faculty Research Program, 1997 and 1998 - \$196,469

Minority Participation in Keck Geology Consortium Undergraduate Student-Faculty Research Program, 1999 and 2000 - \$198,174

Expanded Participation in Keck Geology Consortium Undergraduate Student-Faculty Research Program, 1999 and 2000 - \$110,748

Consortium Colleges:

Extension of Keck Geology Consortium Programs - 1999 to 2003 - \$300,000

Extension of Keck Geology Consortium Programs - 1995 and 1996 - \$60,000

Extension of Keck Geology Consortium Programs - 1997 and 1998 - \$60,000

Other:

Exxon Educational Foundation - 1999 to 2001 - \$75,000

American Association of Petroleum Geologists Foundation - 1999-2001 - \$30,000

Professional Activities

NASA Science Directorate Peer Review (October 2011)

AGI Leadership Forum (September 2011)

Invited video interview of experienced NSF PIs to provide advice and guidance to new and prospective PIs on project management. National Academy of Engineering, (February 2011)

President's Council of Advisors on Science and Technology (PCAST) planning meeting regarding a study to make recommendations to President Obama on how to enhance science, technology, engineering, and mathematics (STEM) education from a student's transition from high school through earning a technical, community college, or bachelor's degree to create a STEM capable workforce. (January 2011)

Consortium for Ocean Science Education, Steering Committee for the COSEE Community Meeting (2010)

National Numeracy Network: Board of Directors (2010-present)

Gifted and Talented Advisory Committee, Rochester Public Schools (2009-present)

American Institute of Physics: Education Advisory Committee (2006-present)

American Association for the Advancement of Sciences: Nominating Committee, Section on Education (2006-present)

National Association of Geoscience Teachers: Distinguished Lecturer (2000-2001); 2nd Vice President (2001); 1st Vice President (2002); President (2003); Past-President (2004); Webmaster (2004-present)

American Geophysical Union: Committee on Education and Human Resources (1998-2001; Chair, 2004-present); Chair, Survey Effectiveness and Assessment Team (1998-2000); Chair, Volcanology, Geochemistry and Petrology Education and Outreach Committee (1998-2000)

Sigma Xi: Board of Directors (1994-2001); Executive Committee (2000-2001; 1997-1998); Long Range Planning Committee (1996-1999); Sigma Xi North Central Regional Director (1994-2001); Treasurer, Carleton College Chapter (1991-1994); Education Committee (2004-present)

NSF GEO Education Working Group (2004-2005)

National SMETE Digital Library Coordinating Committee-Chair (2000-2001)

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Digital Library for Earth System Education: Steering Committee-Chair (1999-2001); Quality Workshop Leadership Team (2004); Co Chair Quality Working Group on Educational Metadata (2004)
Geological Society of America: Task Force to Assess Strategic Plan-Goal 1: Attract and Sustain a Viable and Dynamic Membership (1996-1998)
Project Kaleidoscope: Networking Advisory Board (2002-); Summer Institute Workshop Planning Teams (2000, 2001, 2002); Earth and Planetary Science Workshop Task Force Co-Chair (1996 to 1999); Faculty 21 Village Elder (1996)
Olmsted County Environmental Commission (1996-2000) Chair (1998); Chair-Elect (1997)
Facilitator, Gifted and Talented Program, Lincoln at Mann Elementary School (1994-1998)
Review Panels, National Science Foundation, 1997-present
Science, Technology, Engineering, and Mathematics Talent Expansion Program
Opportunities for Enhancing Diversity in the Geosciences
Earth Science Research Experiences for Undergraduates
Science and Technology Center, Preliminary Proposals
Awards to Facilitate Geoscience Education
Instrumentation and Laboratory Improvement Program
Reviewer, Environmental Geology, An Earth System Science Approach, Freeman 1996
Reviewer, Education Testing Service, 1995

Advisory Boards

An Active Vision Approach to Understanding and Improving Visual Training in the Geosciences (2009-)
ComPADRE Advisory Board (2009-2010)
Biology Scholars Programs (2010-)
PIRE: A US-China partnership in research and education of intraplate earthquakes (2009-2011)
Whitaker Center for STEM Education at Florida Gulf Coast University (2008-2009)
Building Core Knowledge (2008-2010)

Initiative for Quantitative Education Research Infrastructure, Ohio State University (2006-present)
Teaching the Process of Science, John Jay University (2006-present)
MARGINS Education and Public Outreach Committee (2005-present)
NCAR Strategic Planning Meeting (2005)
Visuality Working Group, Carleton College (2004-present)
Quantitative Reasoning Steering Committee, Carleton College (2002-present)
Perlman Center for Learning and Teaching, Carleton College (2002-present)
Data Inquiry in Geoscience, SRI (2005-present)
SRI Evaluation of NSF's Undergraduate Research Opportunities Programs. (2003-2004)
Building Dissemination Networks: A Next Step In National SME&T Reform, Project Kaleidoscope (2003-2004)
Earth Science and the Humanities, Colorado School of Mines (2001-2002)
Bridging the Gap Between Libraries and Data Archives, Scripps Institute of Oceanography (2001-2003)

Workshops and Fora: *Convener, Program Chair, or Planning Committee*

On the Cutting Edge Program Workshops

Classroom Observation Working Group, February 20-22, 2012
Teaching About Time, February 26- 28, 2012, Arizona State University, Phoenix, AZ.
Temporal Learning Journal Club - A Series of Virtual Meetings, five 1-hour virtual sessions between January 1 and May 31, 2011, Science Education Resource Center (SERC), Carleton College, Northfield, MN
Embedded Assessment Working Group, November 2011
Teaching About Earth's Climate Using Data and Models: A Virtual Workshop Follow-On Workshop, October 21-22 and October 25-27, 2010, Science Education Resource Center (SERC), Carleton College, Northfield, MN
Teaching Geoscience Online - A Workshop for Digital Faculty, June 23-25, 2010 and June 28-29, 2010 (virtual workshop), Science Education Resource Center (SERC), Carleton College, Northfield, MN
Developing Student Understanding of Complex Systems in the Geosciences, April 18-20, 2010, Carleton College, Northfield, MN
Understanding the Deep Earth: Slabs, Drips, Plumes and More, February 17-19, 24-26, 2010 (virtual workshop), Science Education Resource Center (SERC), Carleton College, Northfield, MN
Teaching Service Learning in the Geosciences, February 3-5 and 8-9, 2010 (virtual workshop), Science Education Resource Center (SERC), Carleton College, Northfield, MN
Teaching About Energy in Geoscience Courses: Current Research and Pedagogy, May 17-19, 2009 with optional field trip May 20, University of Wyoming, Laramie, WY
Teaching Introductory Geoscience in the 21st Century, December 14, 2008 American Geophysical Union Fall Meeting, San Francisco, CA
The Role of Metacognition in Teaching Geoscience, November 19-21, 2008, Carleton College, Northfield, MN
The Hurricane - Climate Change Connection: Bringing Cutting Edge Research into the Classroom, October 20-24, 2008, (virtual workshop), Science Education Resource Center (SERC), Carleton College, Northfield, MN.
Teaching Introductory Geoscience in the 21st Century, July 14-17, 2008, Carleton College, Northfield, MN
Teaching Climate Change with Ice Core Data, June 2-3, 2008, with optional field trip June 4, Pennsylvania State University, University Park, PA
New Worlds for Geoscience Teaching: Using Online Games and Environments, April 21-24, 2008, (virtual workshop), Science Education Resource Center (SERC), Carleton College, Northfield, MN
Teaching with New Geoscience Tools: Visualizations, Models, and Online Data February 10-12, 2008, University of Massachusetts, Amherst
Motivations and Attitudes: The Role of the Affective Domain in Geoscience Learning, February 11-13, 2007, Carleton College, Northfield, MN
Teaching about the Early Earth: Evolution of Tectonics, Life, and the Early Atmosphere, April 12-14, 2007, University of Massachusetts, Amherst, MA
Preparing for an Academic Career in the Geosciences, July 27-30, 2006, Stanford University, Stanford, CA
Understanding What Our Geoscience Students Are Learning: Observing and Assessing, May 12-14, 2005, Carleton College, Northfield, MN
Teaching About the Ocean System Using New Research Techniques: Data, Models and Visualization, July 6-9, 2005, University of Washington, Seattle, WA
Teaching with Visualizations, Technical session and one-day workshop at Fall AGU meeting 2004

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Teaching Geoscience with Visualizations: Using Images, Animations and Models Effectively, February 26-28, 2004, Carleton College, Northfield, MN

Early Career Faculty Workshop: Teaching, Research, and Managing Your Career, June 12-17, 2004, College of William and Mary, Williamsburg, VA

Design Principles for Creating Effective Web-based Learning Resource in the Geosciences, February 9 - 11, 2003, University of Michigan, Ann Arbor, MI

Building Strong Geoscience Departments Program Workshops:

Strengthening Your Geoscience Program: A Practical Workshop with Ideas and Examples, June 2-4, 2009, College of William and Mary, Williamsburg VA

Assessing Geoscience Programs: Theory and Practice, February 22-24, 2009, Carleton College, Northfield MN

Connecting Geoscience Departments to the Future of Science: New Structures for Research and Curriculum, April 25-27, 2007, Carleton College, Northfield, MN,

The Role of Departments in Preparing Future Geoscience Professionals, January 10-12, 2007, College of William and Mary, Williamsburg, VA

Developing Pathways to Strong Departments for the Future, February 24-26, 2005, College of William and Mary, Williamsburg, VA

Other:

CLEAN Energy Education Workshop, October 12 & 13, 2011

Teaching Energy Awareness: Understanding Sources and Uses, April 11-12 and April 18-19, 2011(virtual workshop), Science Education Resource Center (SERC), Carleton College, Northfield, MN

NCSE/NSF Climate Education at NAS meeting, March 2011

CLEAN Pathway and EarthLabs-Climate (DRK12) Meeting, February 2011

Teaching and Learning Economics: Developing Modules for Teaching Economics, April 11-13, 2010, Science Education Resource Center (SERC), Carleton College, Northfield, MN

Developing Modules for Teaching Economics, October 11 - 13, 2009, Science Education Resource Center (SERC), Carleton College, Northfield, MN

Teaching the Process of Science, July 14-16, 2009, Carleton College, Northfield, MN

Mellon 23: Broadening Access to STEM Workshop, June 25-26, 2009
Carleton College, Northfield, MN

Teaching Genomics at Small Colleges, June 22-23, 2009, Williams College, Williamstown, MA

Using MARGINS Data in the Classroom, May 28-29, 2009 at Lamont-Doherty Earth Observatory

National Numeracy Network: NSF Projects Supporting QL Education, April 30 and May 1, 2009, University of Washington—Bothell

Developing Modules for Teaching Economics, April 5-7, 2009
Science Education Resource Center (SERC), Carleton College, Northfield, MN

2008 PKAL Pedagogies of Engagement Summit, September 19 - 21, 2008,
Century College - White Bear Lake, Minnesota

"Big Science at Small Colleges" Curriculum Development Workshop
July 19-July 23, 2008, Williams College, Williamstown, MA

National Numeracy Network: Writing with Numbers Workshop, Organized by the National Numeracy Network and Carleton College's Quantitative Inquiry, Reasoning, and Knowledge (Quirk) Initiative, May 15-16, 2008, Colby-Sawyer College, New London, NH

Enduring Resources Earth Science Education: Developers Workshop, March 2-5, 2008, Scripps Institute of Oceanography, San Diego, CA

Geoscience Courses that Prepare Future Teachers, May 10-12, 2007, Carleton College, Northfield, MN

Bringing Big Science to Small Schools: Genomics Curriculum Development Workshop, July 22-July 25, 2007, Vassar College, Poughkeepsie, New York

Bringing MARGINS Science to the Classroom, April 5-6, 2007, Arlington, VA

CAUSE: Activity Developers Workshop, May 16 & 17, 2007, Columbus, OH

Teaching With CHRONOS Data and Tools: Developing Web-based Activities for Teaching Stratigraphy and Sedimentary Geology, June 13-15, 2006, Iowa State University, Ames, IA

Reconsidering the "Textbook", May 24-26, 2006, National Academy of Sciences, Washington DC

Infusing Quantitative Literacy into Introductory Geoscience Courses, June 26-28, 2006, Carleton College, Northfield, MN

Improving the Quantitative Training of Earth Science Graduate Students: February 21-22, 2006. Carleton College, Northfield, MN.

Developing Quantitative Activities for Upper Division Geoscience Students: June 27-29, 2005. Carleton College, Northfield, MN.

Teaching Quantitative Skills in a Geoscience Context: July 15 - 17, 2004. Carleton College, Northfield, MN.

Developing the Earth Science Teacher Workforce: The Role of Geoscience Departments and Introductory Courses; co-convener May 2003, American Geophysical Union

Teaching Quantitative Skills in the Geosciences; co-convener, July 2002, Carleton College NAGT workshop/NSF funding

Bringing Research on Learning to the Geosciences; co-convener, July 2002, Wingspread Conference Center, WI

Departmental Strategies for Strengthening Undergraduate Earth and Planetary Science Programs; co-convener, June 2002, College of William and Mary, PKAL Summer Institute

NSDL PI meeting, program committee, December, 2001, Washington DC

NSDL Virtual PI meeting; program committee, September, 2001

2nd DLESE Annual Meeting; program chair, August, 2001, Northern Arizona University

Digital Libraries: A Vehicle for Transforming Education; program chair, July 2001, PKAL Summer Institute

Developing Successful Curricular and Co-Curricular Programs for Earth and Planetary Science Majors; planning team and presenter, July 2001, PKAL Summer Institute

Earth System Education Partnerships with Research Institutions; co-convener, January 2001, National Corporation for Atmospheric Research

NSDL Working Session; co-convener, November 2000, University Corporation for Atmospheric Research

NSDL Project PI Meeting, planning team, October 2000, Washington DC

Digital Library for Earth System Education Workshop; 2000, in conjunction with the fall meeting of the AGU

Bringing the Earth Into the Classroom; co-convener, July 2000, PKAL Summer Institute

DLESE Leadership Workshop; co-convener, June 2000, Montana State University
SX Education Programs Workshop, convener, November 2000, Sigma Xi Annual Meeting, Albuquerque, NM
Reshaping Undergraduate Science and Engineering Education: Tools for Better Learning, Sigma Xi Annual Forum; planning committee, November, 1999, Minneapolis, MN
Portal to the Future: A Digital Library for Earth System Education; co-convener, August 1999, Coolfont Conference Center, WV
Portal to the Future: A Digital Library for Earth System Education, Steering Committee Meeting; co-convener, May 1999, National Science Foundation
Building the Quantitative Skills of Non-Majors and Majors in Earth and Planetary Science Courses; co-convener, January 1999, College of William and Mary, PKAL Workshop
Guiding Undergraduate Research-Strategies for Success; co-convener, Fall 1998, in conjunction with the annual meeting of the Geological Society of America, co-sponsored by National Association of Geoscience Teachers, Council on Undergraduate Research, and the Keck Geology Consortium
Reforming Earth and Planetary Science Curricula-What Works; co-convener, Fall 1997, Whitman College, PKAL Workshop.
Spheres of Influence - Shaping the Future of Earth System Science Education; co-convener, October, 1996, American Geophysical Union, Washington, DC
Spheres of Influence: Shaping the Future of Earth Systems Sciences Education Steering Committee Meeting; co-convener, August 1996, American Geophysical Union
Innovative Approaches to Teaching Earth and Planetary Science; co-convener, 1996, Franklin & Marshall College, PKAL Workshop

Workshops and Fora: *Participant*

Workshop for Heads and Chairs of Geoscience Departments: American Geological Union Fall Meeting, December 2011, San Francisco
ACM: FaCE Value: Advances through Collaboration, October 28-30, 2011
Forum on Characterizing the Impact and Diffusion of Transformative Innovations in Engineering Education, Invited Participant, National Academy of Engineering, February 2011
2011 CCLI-TUES PIs Conference in Washington, D.C., January 26-28, 2011.
Workshop for Heads and Chairs of Geoscience Departments: American Geological Union Fall Meeting, December 2010, San Francisco
AGI Education Summit, February 2010
Planning for the Future of Geo-CyberEducation Workshop, January 2009
Tectonic Significance of Vertical Boundaries in the Cordillera: Geological Society of America Field Forum, August 2006, McCall Idaho,
EarthScope in the Northern Rockies, September 2005, Montana State University, Bozeman, MT
The Broader Impacts Toolbox Workshop, invited participant, May 2005, Washington DC.
Earthscope Education and Outreach, Planning Meeting, invited participant, February 2002, University Corporation for Atmospheric Research
Promoting the Revolution Through Digital Collections and Communities, January 2002, Coalition for Earth Science Education, Annual Meeting, Washington DC
PKAL Technology Roundtable, March 2001, ExxonMobile Headquarters
Collaborations for Research roundtable discussion, invited participant, April 1999, Council on Undergraduate Research, Washington, DC,

Developing an Earth System Science Curriculum for the Geosciences, invited participant, 1998, American Geological Institute, Trinity University
Earth System Science Curriculum Development; 1999, Keck Geology Consortium Workshop
Terrestrial Remote Sensing Curriculum Development – in cooperation with the Jet Propulsion Laboratory; 1999, Keck Geology Consortium workshop
Processes of Crustal Differentiation - Mantle Interactions, Melting, and Granite Migration Through the Crust, Geologic Society of America Penrose Conference; invited participant, 1998, Verbania, Italy
Preventing Harassment on Campus, Carleton College; 1998, Employer Education Service University of Minnesota
Academic Leadership in a Time of Change: The Role of the Departmental/Divisional Chair; AGU representative, 1998, College of Charleston, PKAL workshop
Minnesota Evaluation Studies Institute; 1997, University of Minnesota
Geological Exploration of the Solar System, Planetary Geology Division workshop; 1996, Geological Society of America Annual Meeting
Teaching Earth System Science - in cooperation with the University of California, Irvine; 1996, Keck Geology Consortium workshop
GIS Systems; 1996, Trinity University, Keck Geology Consortium workshop
The Research Rich Environment; 1995, Harvey Mudd College, PKAL workshop
Teaching Geophysics - in cooperation with the University of Arizona; 1995, Keck Geology Consortium workshop
Theory and Application of Pearce Element Data Analysis to Igneous Petrology; 1990, Washington and Lee University, Keck Geology Consortium workshop

Special Sessions Convened at Professional Society Meetings

Spatial Skills in the Geosciences; Geological Society of America, Fall 2009
Visualization in the Geosciences; Geological Society of America, Fall 2006
Geohazards-Teachable Moments for Students and the Public: An Illustrated Community Discussion; Geological Society of America, Fall 2006
Teaching the Quantitative Aspects of Geosciences; American Geophysical Union, Fall 2006
Global Geoscience Education: Projects and Best Practices; American Geophysical Union, Fall 2006
Communicating Broadly: Perspectives and Tools for Ocean, Earth, and Atmospheric Scientists; American Geophysical Union, Fall 2006
Global Geoscience Education and Outreach: The World's Best Practices in Earth and Space Science; American Geophysical Union, Fall 2005
Geosciences Education around the world: a diversity of models; European Geophysical Union, Spring 2005
Educational Research Sessions, International Conference on Geoscience Education, 2005
Recruitment and Retention of Students, Faculty, and Staff: Departmental Strategies That Work/Building Strong Geoscience Departments - Challenges, Opportunities, and Successes; American Geophysical Union, Fall 2005
Geoscience Education: Geology and Citizenship, Research on Learning, Developing Quantitative Skills, Role of State Education Standards in K/12 Classrooms; North Central Section GSA, Spring 2005
Using Field Observations and Field Experiences to Teach Geoscience: An Illustrated Community Discussion; Geological Society of America, Fall 2004

- Building Strong Geoscience Departments: Opportunities, Successes, and Challenges; Geological Society of America, Fall 2004
- Teaching With Visualizations; American Geophysical Union, Fall 2004
- Developing Strong Geoscience Programs: Examples that Work; American Geophysical Union, Fall 2003
- Using Data to Teach Earth Processes: An Illustrated Community Discussion; Fall 2003, Geological Society of America
- Towards a Better Understanding of the Complicated Earth: Insights from Geologic Research, Education, and Cognitive Science; Geological Society of America, Fall 2002, Pardee Symposium
- Math and Science Partnerships: School-College Collaborations on a New Scale, American Geophysical Union, Spring 2002
- Increasing Diversity in the Geosciences; American Geophysical Union, Spring 2001
- Building Bridges Between Research and Education to Enhance Learning About the Earth; American Geophysical Union, Fall 2000
- Geoscience Education in a Changing World: New Discoveries, New Technologies, New Opportunities; Geological Society of America, Fall 2000
- Hot Topic – The Digital Library for Earth System Education; Geological Society of America, Fall 2000
- Portal to the Future: The Digital Library for Earth System Education; American Geophysical Union, Spring 2000
- Shaping the Future of Undergraduate Earth Science Education: Where are we 3 years later?; American Geophysical Union, Fall 1999
- Town Meeting – The Digital Library for Earth System Education; Geological Society of America, Fall 1999
- Shaping the Future of Undergraduate Earth Science Education: Innovation and Change Using an Earth System Approach; American Geophysical Union, Spring and Fall Meetings, 1997

Publication

- Rutz, C., Condon, W., Manduca, C., Willett, G. (2012) Faculty Professional Development and Student Learning: What is the Relationship? *Change: The Magazine of Higher Learning*, May/June 2012.
- Narum, Jeanne and Manduca, Cathy (2012) Workshops and Networks in Brainbridge, William Sims, editor, *Leadership in Science and Technology*, A Reference Handbook. ISBN 978-1-4129-7688-6 p. 443-451
- Manduca, Cathryn A. and Kastens, Kim A. (2012) Geoscience and geoscientists: Uniquely equipped to study the Earth in Kastens, K.A., and Manduca, C.A., eds., *Earth and Mind II: A Synthesis of Research on Thinking and Learning in the Geosciences*: Geological Society of America Special Paper 486, p. 1–12, doi:10.1130/2012.2486(01)
- Kastens, K.A., and Manduca, C.A., eds., *Earth and Mind II: A Synthesis of Research on Thinking and Learning in the Geosciences*: Geological Society of America Special Paper 486
- Manduca, Cathryn A. (2011). Improving undergraduate geoscience education – A Community Endeavor: *GSA Today*, v. 21, n. 9, p. 12-14.
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- Manduca, C.A., Kuntz, M.A., and Silver, L.T. (1993). Emplacement and Deformation History of the Western Margin of the Idaho Batholith near McCall—Influence of a Major Terrane Boundary: *Geological Society of America Bulletin*, 105 p. 749-765.
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Aliberti, E. and Manduca, C.A. (1988). A Transect Across an Island Arc-Continent Boundary: West-central Idaho in Guidebook to the Geology of Central and Southern Idaho, Paul Karl Link and William R. Hackett, eds.: Idaho Geological Survey Bulletin 27, p. 99-107. Revised and reprinted in *Precambrian and Mesozoic Plate Margins*, Sharon E. Lewis and Richard B. Berg, eds.: Montana Bureau of Mines and Geology Special Publication 96, p. 181-190.

Invited Presentations

Trail of Time, Grand Opening, Grand Canyon, AZ, October, 2010; *New Trends in Geoscience Education*.

NSDL webinar, April 2010, *Pedagogy in Action and the NSDL Pedagogic Service - Helping Users Teach With Your Materials*

University of British Columbia, Vancouver, BC, March 2009; *Assessing Geoscience Departments; What should we teach? Lessons from geoscience research; Helping Faculty be Better Teachers*.

Planning for the Future of Geo-Cybereducation Workshop, Washington DC, January 2010, *Technical and Social Collaborations to Support Cyberlearning: Lessons from SERC*

Whitaker Center for STEM Education Meeting, Florida Gulf Coast University, Naples, FL, February 2009, *Publishing On-Line*.

Promising Practices in Undergraduate Science, Technology, Engineering, and Mathematics (STEM) Education; National Academy of Sciences, Washington DC, October 2008; *Changing Undergraduate STEM Education: Addressing Disciplinary and Institutional Culture*

Assessing Quantitative Reasoning Workshop, Carleton College, October 2010, October, 2008, *Creating Enduring Resources*.

Stanford University, Palo Alto, CA, October, 2007; *What Makes a Good Activity? Lessons from research and experience; How do you know what your students are learning? Applying Science to Teaching*.

St Olaf College, Center for Innovation in the Liberal Arts, Northfield, MN, September, 2006; *Teaching with Visualizations*.

Tectonic Significance of Vertical Boundaries in the Cordillera: Geological Society of America Field Forum, McCall ID, August 2006, *The Hazard Creek Complex*.

American Institute of Physics Academic-Industrial Workshop, Baltimore, MD, November, 2005, *Using the Web to Make A Compelling Public Case for Science*.

Iowa State University, Center for Excellence in Learning and Teaching, Ames, IA, September 2006: *Digital Libraries: What can they do for you?; Teaching with Data; Funding Your Dreams; Teaching with Visualizations*.

University of Illinois: Chicago, IL May, 2005, *Improving Student Quantitative Skills – A Cooperative Venture for Math and Science Educators; Bringing Research on Learning to the Geosciences*. Presented at the symposium: Excellence in Teaching Mathematics and Science: Research and Practice.

DLESE Annual Meeting, Boulder, CO, August, 2003 *Resources and Reflections: Using Data in Undergraduate Classrooms*.

Mayo Foundation Chapter of Sigma Xi, Rochester, MN, February 2002, *Living with Karst, Maintaining a Clean Water Supply for Olmsted County*.

NASA Earth Science Institute for Museums, Minnesota Science Museum, Minneapolis, MN, November 2001, *Learning about the Earth System: An Integrated Effort; Possibilities*

- for Collaboration between the Digital Library for Earth System Education (DLESE) and the Informal Science Education Community.*
- American Institute of Physics Academic-Industrial Workshop, Rochester, NY, October 2001, *Digital Libraries: A New Way of Doing Business in Science Education*
- Joint Conference on Digital Libraries, June 2001, *Pathways to Progress: A Basis for Collaboration.*
- Washington State University, Pullman, WA April 2001, *Bringing the Earth into the Classroom—How Can Technology Help?* NAGT Distinguished Lecture
- Eastern Washington University, Cheney, WA, April 2001, *Bringing the Earth into the Classroom—How Can Technology Help?* NAGT Distinguished Lecture
- Eastern Washington University, Cheney, WA, April 2001, *The Lower Crust in Western Idaho, A Very Different Place* for Sigma Xi Chapter,
- Council on Undergraduate Research, Annual Meeting, College of Wooster, Wooster, OH August, 2000, *Working Together to Meet Our Individual Goals—Collaborative Undergraduate Research in the Keck Geology Consortium.*
- American Geophysical Union, San Francisco, December, 1999, *Working Together in Our Own Best Interest: Collaboration in the Keck Geology Consortium.*
- California State University Long Beach, February, 1999, *Keck Geology Consortium Collaborative Undergraduate Research: Assessing the Impacts on Students and Faculty*
- Geological Society of America, October, 1999, *Living with Karst: Maintaining a Clean Water Supply in Olmsted County, MN*, Invited presentation for Pardee Symposium.
- National Science Foundation, Division of Undergraduate Education, Washington, DC, May, 1998, *A Special Time for Geoscience Education: The Convergence of the Earth System, Science for All Students, and the National Science Education Standards.*
- Mayo Clinic, Rochester, MN, February, 1998, *Undergraduates Doing Science-Geology of the Clarks Fork River, Yellowstone Area, Wyoming* for Rochester Chapter Sigma Xi, with Megan Anderson, Student, Carleton College.
- American Geophysical Union, San Francisco, CA, December, 1997, *Integrating Research and Education-The Impact of Keck Geology Consortium Undergraduate Research Projects on the Classroom: EOS*, v. 78, no 46., p. F12.
- Meeting of the Heads and Chairs of Earth and Space Science Departments, American Geophysical Union, Washington DC, October 1997 *Project Kaleidoscope, a Resource for Departments.*
- Sigma Xi, Annual Meeting, Washington, DC, November, 1997, *Integrating Research and Education through Undergraduate Research—Examples from the Keck Geology Consortium.*
- Sigma Xi Annual Meeting, November, 1996, *Regions-Form and Function.*
- California Institute of Technology, Pasadena, April, 1995, *Research Groups for Undergraduate Earth Science Students—Examples from the Keck Geology Consortium and Elsewhere* for Leon T. Silver 70th Birthday Symposium and Celebration.
- California State University, Fullerton, April, 1995, *Research Groups for Undergraduate Earth Science Students—Examples from the Keck Geology Consortium and Elsewhere.*
- Arizona State University, Tempe, March, 1994, *Magmas at 30 km.*
- Iowa State University, Ames, January 1994, *Tectonics in Western Idaho—A View from the Lower Crust.*
- University of North Dakota, Grand Forks, ND, January 1994, *Tectonics in Western Idaho—A View from the Lower Crust.*

- Mayo Clinic, Rochester, MN, November 1993, *The Lower Crust—A Very Different Place Only 7 Miles From Home* for Rochester Chapter Sigma Xi.
- Geological Society of America, 1991. *Compressional Deformation During and After Plutonism Along the Oceanic-Arc-Continent Boundary in Western Idaho*. Abstracts with Programs, 23(2): 75. Invited for Pluton Tectonics Symposium.
- University of Minnesota, Minneapolis, January, 1991, *The Boundary Between Accreted Oceanic Arc Terranes and the Continental Margin in Western Idaho*.
- University of Minnesota, Minneapolis, January, 1991, *Magmatic Epidote—A Useful Igneous Geobarometer?*
- University of Wisconsin, Eau Claire, December, 1989, *The Boundary Between Accreted Oceanic Arc Terranes and the Continental Margin in Western Idaho*.

Abstracts

- Cervato, Cinzia, Cathryn A. Manduca, David W. Mogk, Carol J. Ormand, Thomas F. Shipley, and Trisha A. Smrecak (2011). Rates, Dates, and Geologic Time: A Journal Club Report On Teaching About Temporal Aspects of Geoscience Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 183.
- Fox, Sean, Ellen A. Iverson, Cathryn A. Manduca, Karin B. Kirk, John R. McDaris, Carol J. Ormand, Monica Z. Bruckner (2011), Supporting Faculty Learning About Teaching: The On the Cutting Edge Website, Abstract ED23A-0612 Poster presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Gold, Anne U., Tamara S. Ledley, Karin B. Kirk, Marian Grogan, Mark S. McCaffrey, Susan M. Buhr, Cathryn A. Manduca, Sean Fox, Frank Niepold, Cynthia Howell, Susan E. Lynds (2011), Addressing climate and energy misconceptions – teaching tools offered by the Climate Literacy and Energy Awareness Network, Abstract ED11B-0782 Poster presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Iverson, Ellen A., Sabra Lee, Carol J. Ormand, P.G. Feiss, Heather Macdonald, Cathryn A. Manduca, Randall M. Richardson (2011), Building Strong Geoscience Departments: Case Studies and Findings from Six Years of Programming, Abstract ED23A-0616 Poster presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Kirk, Karin B., Kathryn Wiese, Cathryn A. Manduca, and Tamara Shapiro Ledley (2011). Supporting Undergraduate Research in Climate and Energy with Professional Development for Faculty, Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 255.
- Larsen, Krista, Peter H. Bohacek, Karin B. Kirk, Cathryn A. Manduca, Tamara Shapiro Ledley, and Lee Schmitt (2011). K-12 Science: A New SERC Portal to Classroom Activities and Pedagogic Guidance, Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 536.
- Ledley, Tamara Shapiro, Mark S. McCaffrey, Anne U. Gold, Susan Buhr, Cathryn Manduca, Sean P. Fox, Karin B. Kirk, Marian Grogan, Frank Niepold, Susan E. Lynds, and Cynthia Howell (2011), Climate Literacy and Energy Awareness Network (CLEAN) - Supporting the Scientists and Citizens of Tomorrow, Abstract ED24A-03 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Ledley, Tamara Shapiro, Mark S. McCaffrey, Anne U. Gold, Susan Buhr, Cathryn Manduca, Sean P. Fox, Marian Grogan, Karin B. Kirk, Frank Niepold, and Cynthia Howell (2011). The Climate Literacy and Energy Awareness Network (CLEAN) Facilitating Climate and Energy Literacy, Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 571.
- Macdonald, Heather, Cathryn A. Manduca, David W. Mogk, Barbara J. Tewksbury, Ellen A.

- Iverson, Karin B. Kirk, Rachel J. Beane, David McConnel, Katryn Wiese, Michael E. Wysession (2011), *On the Cutting Edge: Face-to-Face and Virtual Professional Development for Current and Future Geoscience Faculty*. Abstract ED23A-0615 Poster presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Macdonald, Heather, Cathryn A. Manduca, Carol J. Ormand, Robyn W. Dunbar, Rachel J. Beane, Monica Bruckner, Time J. Bralower, P.G. Feiss, Barbara J. Tewksbury, Katryn Wiese (2011), *Preparing Future Geoscience Professionals: Needs, Strategies, Programs, and Online Resources (Invited)*, Abstract ED14A-01 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Manduca, Cathryn A., David Blockstein, Timothy J. Bralower, Diane Doser, Anne E. Egger, P. Geoffrey Feiss, David C. Gosselin, Pamela Matson, David McConnell, and Carol J. Ormand (2011). *Geoscience Learning in Undergraduate Education*, Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 350.
- Manduca, Cathryn A., Timothy J. Bralower, Diane Clemens-Knott, Diane Doser, P. Geoffrey Feiss, Heather MacDonald, Carol J. Ormand, Dallas D. Rhodes, Randall M. Richardson, and Mary E. Savina (2011). *Bringing Together Design and Evaluation to Understand Student Learning*, Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 298.
- Manduca, Cathryn A., Emily A. Cobabe-Ammann, Nicholas A. Gross, Charles Connor (2011), *Education, Outreach and Policy: Opportunities for Sections and Focus Groups*, Abstract TH22E Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Manduca, Cathryn A., Ellen A. Iverson, Roman Czujko, Heather Macdonald, David W. Mogk, Barbara J. Tewksbury, John McLaughlin, Camelia Sanford, Lija Greenseid, Michael Luxenberg (2011), *Impact of the On the Cutting Edge Professional Development Program on U.S. Geoscience Faculty*, Abstract ED42A-04 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Manduca, Cathryn A., David W. Mogk, Kim A. Kastens, Basil Tikoff, Thomas F. Shipley, Carol J. Ormand, David A. McConnel (2011), *Geoscience Education Research: The Role of Collaborations with Education Researchers and Cognitive Scientists (Invited)*, Abstract ED23E02 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- McDaris, John R., Heather Macdonald, Robert H. Blodgett, Cathryn A. Manduca, Mark Maier (2011), *Website Resources and Support for Two-Year College Geoscience Educators*. Abstract ED11E-08 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- McConnell, David, Ellen Iverson, David Budd, Darrell Henry, Katrien J. van der Hoeven Kraft, John R. McDaris, Heather MacDonald, Cathryn Manduca, LeeAnn Srogi, and Karen Viskupic (2011). *A Preliminary Snapshot of Geoscience Teaching at US Colleges and Universities*, Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 136.
- Mogk, David W., Cathryn A. Manduca, Kim A. Kastens (2011), *Geoscience Education Research: A Brief History, Context and Opportunities*, Abstract ED23E-01 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Murphy, Rachel, Carol J. Ormand, Laurel Goodwin, Thomas F. Shipley, Cathryn Manduca, and Basil Tikoff (2011). *Improving Students' Visuo-Penetrative Thinking Skills Through Brief, Weekly Practice*. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 184.
- Ormand, Carol J., Cathryn A. Manduca, Heather Macdonald, Tim J. Bralower, Diane Clemens Knott, Diane I. Doser, P.G. Feiss, Dallas D. Rhodes, Randall M. Richardson,

- Mary E. Savina (2011), Building Strong Geoscience Departments Through the Visiting Workshop Program, Abstract ED42A-06 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Ormand, Carol J., Thomas F. Shipley, Cathryn A. Manduca, Basil Tikoff (2011), Improving Geoscience Students' Spatial Thinking Skills: Applying Cognitive Science Research in the Classroom, Abstract ED13C-0825 Poster presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Shipley, Thomas F., Cathryn A. Manduca, Carol J. Ormand, Basil Tikoff (2011), Spatiotemporal Thinking in the Geosciences, Abstract ED23E-06 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Teasdale, Rachel, David Budd, Cinzia Cervato, Ellen Iverson, Katrien J. van der Hoeven Kraft, Cathryn Manduca, David A. McConnell, John R. McDaris, Daniel P. Murray, and William Slattery (2011). Enhancing Student-Centered Teaching Practices: Approaches Developed On the New Cutting Edge Geosciences RTOP Website, Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 255.
- Wiese, Kathryn, Karin B. Kirk, Cathryn A. Manduca, Lucinda J. Shellito, Ester Sztein, Monica Z. Bruckner (2011), Improving Climate Science Education by Supporting Faculty: Climate Programs from *On the Cutting Edge (Invited)*, Abstract ED14B-05 Presentation at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Atit, K.R., C.A. Manduca, C.J. Ormand, I. Resnick, T.F. Shipley, and B. Tikoff (2010). *Reasoning About Sequences of Spatial Events: How Do Geologists Know What Happened First?* Geological Society of America Abstracts with Programs, Vol. 42, No. 5, p. 587.
- Bruckner, M.Z., E.P. Laine, D.W. Mogk, S. O'Connell, and K.B. Kirk (2010), *Teaching Service Learning in the Geosciences: An On the Cutting Edge Workshop Report*, Abstract ED51A-0501 Poster presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
- Fox, S., Iverson, E., Manduca, C. A (2010). *Connecting the Dots from "Hand Outs" to Research-based Pedagogy: the SERC Pedagogic Service*. Presented at the NSDL 2010 Annual Meeting, Washington, D.C., 1-3 Nov.
- Gold, A.U., T.S. Ledley, M.S. McCaffrey, S.M. Buhr, C.A. Manduca, F. Niepold, S.P. Fox, C. Howell, and S. Lynds (2010). *Climate Literacy and Energy Awareness Network (CLEAN): A Rigorous Peer-Review Process for Building a New Collection of High-Quality Digital Teaching Materials on Climate and Energy Science*. Geological Society of America Abstracts with Programs, Vol. 42, No. 5, p. 495.
- Gold, A.U., T.S. Ledley, M.S. McCaffrey, S.M. Buhr, C.A. Manduca, F. Niepold, S. Fox, C.D. Howell, and S.E. Lynds (2010), *Lessons Learned from a Rigorous Peer-Review Process for Building the Climate Literacy and Energy Awareness (CLEAN) Collection of High-Quality Digital Teaching Materials*, Abstract ED33A-0695 Poster presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
- Kirk, K.B., C.A. Manduca, J.D. Myers, and F. Loxom (2010). *A Portal to Undergraduate Materials For Teaching About Energy From On the Cutting Edge*. Geological Society of America Abstracts with Programs, Vol. 42, No. 5, p. 495.
- Kirk, K.B., C.A. Manduca, and W.H. Hirt (2010). *Venturing Into Online Teaching? Resources From On The Cutting Edge Can Ease the Transition*. Geological Society of America Abstracts with Programs, Vol. 42, No. 5, p. 530.
- Ledley, T.S., M.S. McCaffrey, S. Buhr, C.A. Manduca, S. Fox, F. Niepold, and A.U. Gold (2010), *The Climate Literacy and Energy Awareness Network (CLEAN) Pathway:*

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