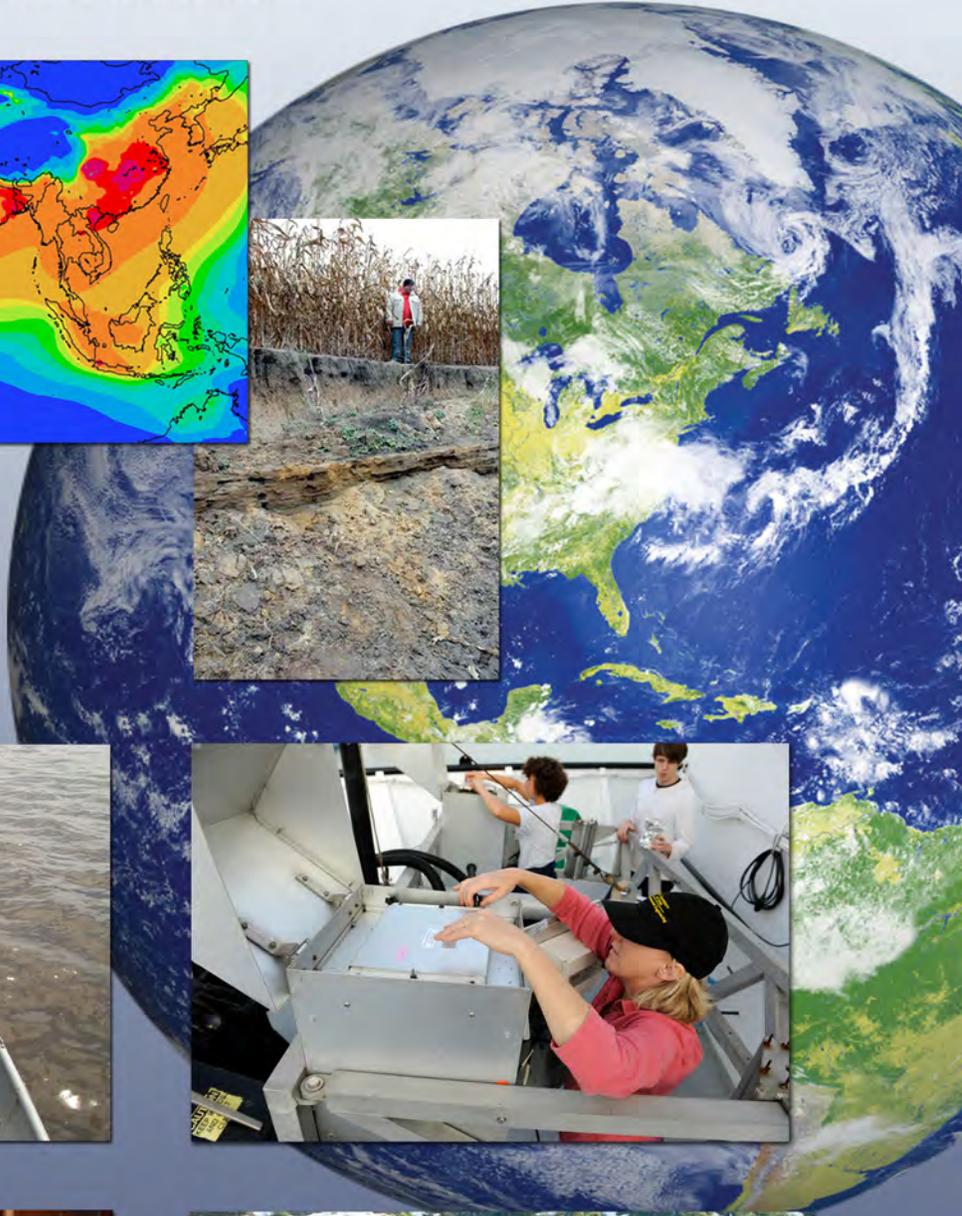
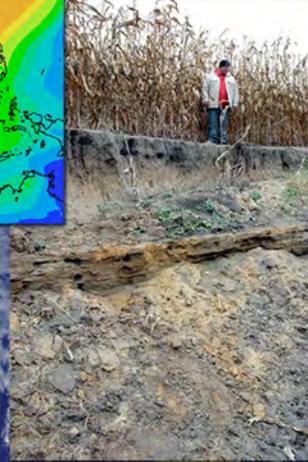
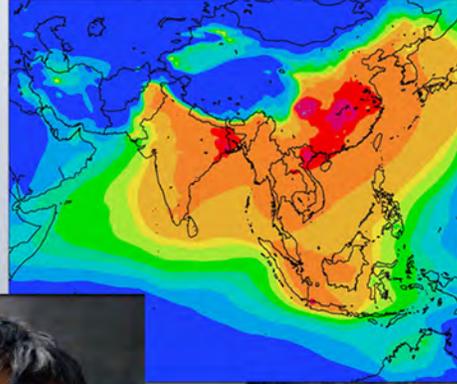


2010 ANNUAL REPORT



The Center for Global and Regional Environmental Research



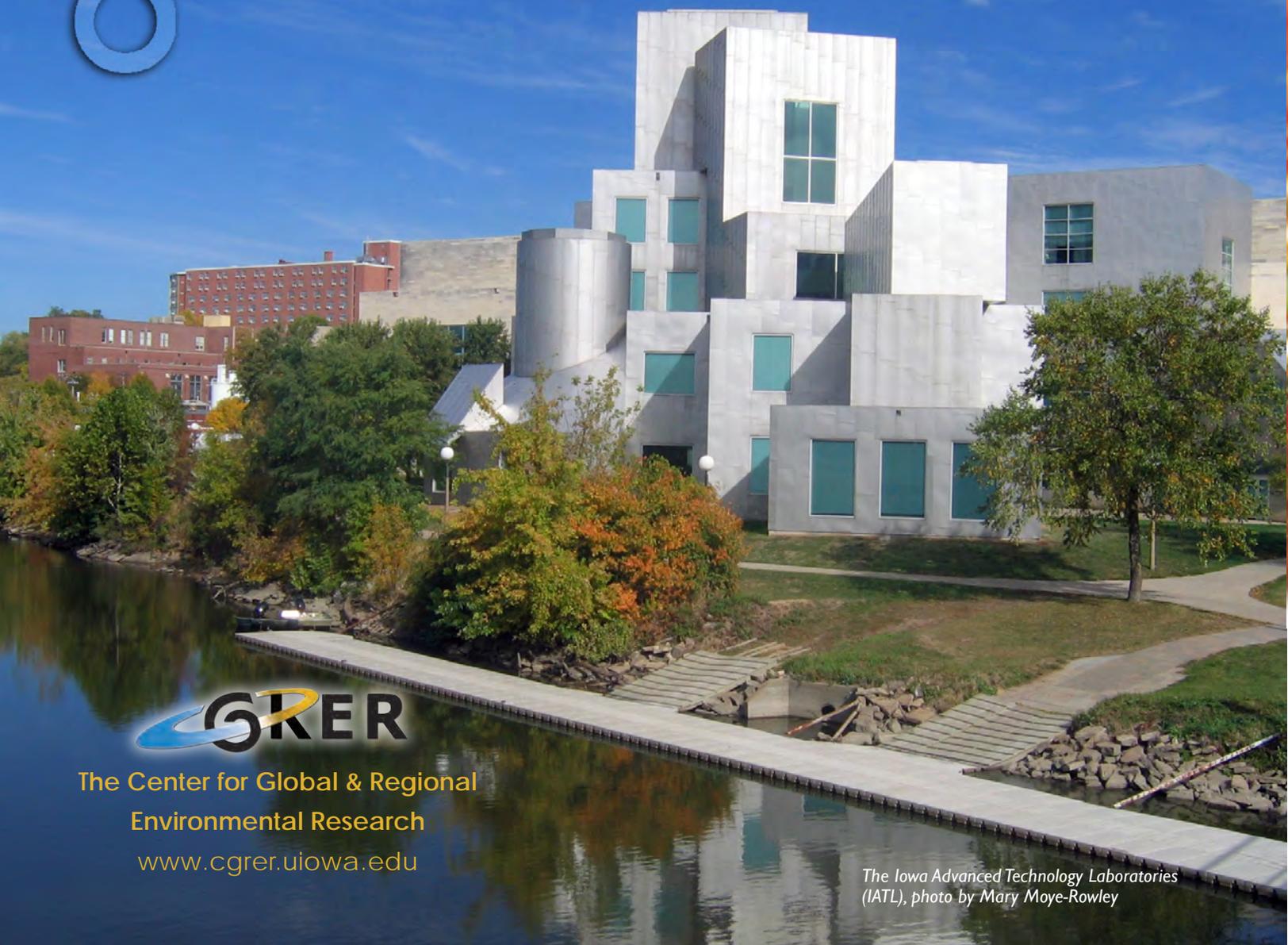
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promote dialogue
among specialists
and agencies

educate students
and the general public

foster and support
relevant **research**
projects



The Center for Global & Regional
Environmental Research
www.cgrer.uiowa.edu

*The Iowa Advanced Technology Laboratories
(IATL), photo by Mary Moyer-Rowley*



The Center for Global & Regional Environmental Research

The Center for Global and Regional Environmental Research (CGRER) was established in 1990 with the intent of promoting interdisciplinary efforts that focus on global environmental change. Housed on the University of Iowa (UI) campus in the Iowa Advanced Technology Laboratories (IATL), CGRER is supported by revenues generated from public utilities, as mandated by the State of Iowa's Energy Efficiency Act. Funds are used to support research and provide services to faculty members and students across the state who are interested in environmental change. CGRER currently is composed of 82 members from 27 departments at seven institutions.

While environmental change is constant and natural, CGRER focuses on the human-induced acceleration of such change caused by modern technologies, lifestyles, and population growth. Concerns about global change encompass multiple issues including its effects on natural ecosystems, environments, and resources, and on human health, culture, and social systems. Because global change promises to touch virtually every aspect of life and require the reinterpretation of many

fields of science and engineering, the humanities, medicine, and law, an understanding of global change requires collaborative efforts among the many disciplines involved. CGRER's mission is to foster such collaborative interdisciplinary actions in three ways: by promoting dialogue among specialists and agencies, by educating students and the general public, and by fostering and supporting relevant research projects.

Understanding
global change requires
collaborative
efforts

This annual report summarizes CGRER's activities in each of these three areas. Because CGRER's output is commensurate with that of its many members, a summary of which would require a small book, this annual report includes only a sampling of significant projects and efforts. Yet this sampling provides a vision of CGRER's multiple efforts to achieve its ultimate goal: assisting Iowa's agencies, industries, and citizens in assessing and preparing for global change and its effects.

www.cgrer.uiowa.edu

Executive Summary: A Landmark Year

The year 2010 marked the 20th anniversary of the formal establishment of CGRER, which grew out of a grassroots effort by faculty from diverse departments at the University of Iowa. All were interested in exploring more deeply questions relating to how our environment is being altered in response to changes in climate, the effects of increasing amounts and varieties of chemicals released into the environment, and how land cover and usage are being shaped by meeting the needs of an ever-growing population. We wanted to study these environmental changes as well as explore how they are impacting human life.

Over the past two decades CGRER has grown to include 82 members at seven educational



and research institutions. I am struck by how far we have come in better understanding the complexities associated with environmental changes and by how valuable our interdisciplinary approach has been. In 1990 there was keen interest in questions such as *Is the world warming? Have humans become the major cause of this warming? What are the possible impacts associated with warming?* Research by the students and faculty at CGRER has helped answer these questions, and in general the science-to-date provides pretty clear answers to the first two questions (yes and yes). We have made progress on the impacts

question as well, but there remains much more work to be done. We need to better estimate the nature of these impacts and further explore the questions of who will be affected and when and where such impacts are likely to happen.

I am also struck by the fact that at various levels we have not advanced very far. The concern over our changing environment—and our sense of urgency in addressing these changes—has not increased much during the past two decades. Diverse views remain. Public concern relating to climate change increased during the 1990s, but has now decreased.





Today many public opinion polls suggest that the percentage of Americans who believe that global warming is happening is actually decreasing.

Climate change is a complex issue of great importance, and as a society we need to think seriously about ways to mitigate these changes. We also need to focus more of our efforts on being prepared to adapt to changes as they occur. But climate change is one of those issues where science and politics meet, and it remains difficult for us to decide on policy directions.

CGRER's role is not to develop policies, but to provide the research needed to inform the policy discussions. In this report you will



see some of the ways in which CGRER research is influencing policy discussions at the state, national, and international levels. In addition, CGRER is committed to helping inform public discussions about these issues. Thus CGRER is expanding its efforts in education and outreach, as you will also learn in this year's report.

I am proud of the important work that CGRER students, staff, and faculty are doing and the impact that their efforts are having on improving our understanding of environmental change. We welcome additional suggestions on how CGRER can better serve the state and its citizens in addressing these important issues and in identifying cleaner energy and more sustainable pathways.

Gregory R. Carmichael,
CGRER Co-Director with
Jerald L. Schnoor



CGRER Executive Committee

David Bennett
Geography, UI

Dennis Dahms
Physical Geography, UNI

Vicki Grassian
Chemistry, UI

Paul Greenough
History & Behavior
Science, UI

Diana Horton
Biological Sciences, UI

Sarah Larsen
Chemistry, UI

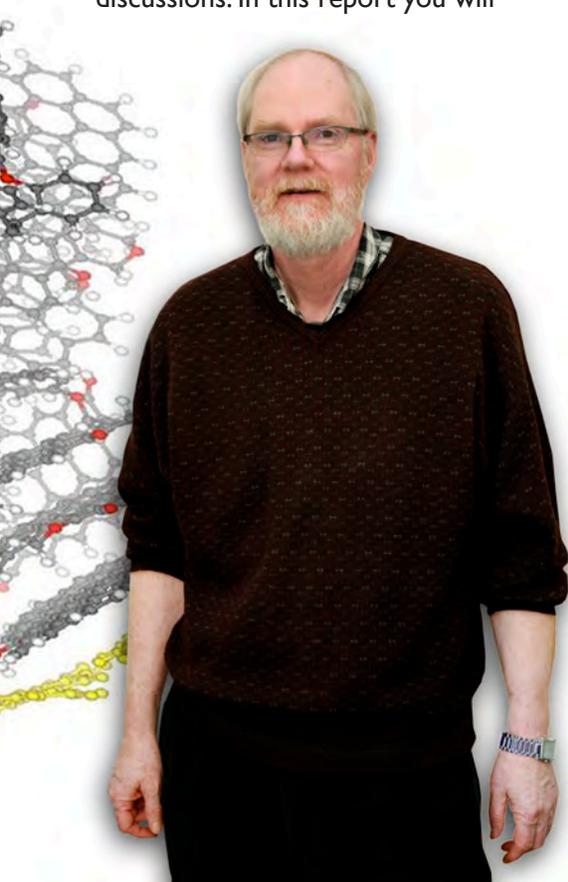
Lou Licht
Ecolo-Tree, Inc.

Michelle Scherer
Civil & Environmental
Engineering, UI

Peter Thorne
Occupational &
Environmental Health, UI

You-Kuan Zhang
Geoscience, UI

Clockwise from upper left: Craig Just, with UI Sustainability Living-Learning Community members; an example of *Parnassius clodius* from Diane Debinski's climate change project; Witold Krajewski and students at poster session; young scientists; field research in Iowa; Gregory R. Carmichael; model structure of a hexane soot taken from Akhter et al. (1985) with four BaP molecules added in yellow; Zach Rodenburg and Rachel Yucuis on Lake Michigan; Ricardo Mantilla speaks at a flood seminar in Ames; soil erosion



Message from the CGRER Advisory Board



With so much competing and conflicting information in today's headlines, it is ever more imperative that CGRER continue its role as a trusted, evidence-based resource.



By many accounts, this past year has not been an easy one. The economy continued to limp along, pitting markets against the environment, and once again, Congress failed to pass meaningful energy policy. However, this past year also gave reason for hope. The 2010 United Nations Climate Change Conference in Cancun was heralded a success, though much more needs to be done; California voters stood behind their climate change bill; and CGRER's outreach continued to bear fruit.

While Iowa was not immune to political discord, our state legislators' actions verified the importance of slowing climate change and reminded the nation that collaboration is required to solve this century's most pressing issue. In 2010, Iowa enacted a nuclear plant feasibility study bill and a bill requiring planners to consider "smart planning principles." Both of these policy options were recommended by the Iowa Climate Change Advisory Council, chaired by CGRER's Jerry Schnoor.

CGRER's influence is also observed in *Climate Change Impacts on Iowa 2010*, a report to which many CGRER members contributed. The policy considerations in this report—as well as CGRER's experts themselves—should be consulted as local and state leaders work through difficult decisions. As Iowa is expected to become warmer and wetter with increased flooding at non-traditional times, CGRER's interdisciplinary approach to understanding a changing environment provides invaluable expertise and guidance.

We already know that we need to slow the effects of a warming climate and cut greenhouse gas emissions, but legislators face more difficult questions. For example, which ecosystem services should we support to ensure they continue supporting us? Smart public policy should be based on the science behind efficiently slowing climate change and the best practices for adapting to it. CGRER is a tremendous asset to Iowa and the nation. We cannot ignore the mitigation techniques discovered by its members.



Advisory Board Members

Robert Dvorsky
Senator, Iowa State Legislature

Jon Kallen
Manager, Environmental Policy and Strategy,
MidAmerican Energy

Jim Klosterbuer
Senior Environmental Consultant, Alliant Energy

Mark Kresowik
National Corporate Accountability Representative,
National Coal Campaign, Sierra Club

Hiram "Chip" Levy
Senior Research Scientist,
Geophysical Fluid Dynamics Laboratory, NOAA

David Osterberg
Occupational and Environmental Health,
University of Iowa

William Stigliani
Professor, Center for Energy & Environmental Education,
University of Northern Iowa

Sharon Tahtinen
Special Assistant, Energy Policy,
Iowa Department of Natural Resources

Krista Tanner
Iowa Utilities Board

In addition to educating our government leaders, CGRER has continued and expanded its outstanding public education and outreach efforts. As part of these efforts, CGRER has begun partnering with Iowa radio stations to air a new radio segment called Iowa Environmental Focus. Each week, audio segments narrated by Jerry Schnoor are distributed to Iowa radio stations with timely and relevant information about Iowa's weather trends, air and water quality, sustainable energy, and more. With so much competing and conflicting information in today's headlines, it is ever more imperative that CGRER continue its role as a trusted, evidence-based resource for Iowans.

In 2011, the challenges and debates of 2010 will no doubt continue to unfold, but as they do, CGRER will certainly continue to be a reason for hope.



Krista Tanner,
Iowa Utilities
Board

Pictured: the Matanuska Glacier in Alaska. UI Geoscience graduate student Susan Kilgore received a CGRER field grant to investigate the evolution of the drainage system of this temperate glacier. Photo by S. Kilgore.



OUTREACH

CGRER members shared their expertise with the larger world through a wide variety of outreach efforts during the year. Radio programs, community seminars, and a major report on climate change impacts in Iowa were among the initiatives that brought CGRER's work into the public sphere.



Jerry Schnoor, Jim Malewitz, Brynne Schweigel



Environmental Radio Project

Iowans looking for news about the state's environment can now just turn on their radios, thanks to a new information campaign launched by CGRER. Iowa Environmental Focus features a weekly radio clip highlighting some aspect of Iowa's environment. Narrated by Jerry Schnoor, the one-to-two minute segments cover topics such as weather trends, air and water quality, and sustainable energy, and have featured research done by CGRER members Greg Carmichael, Cory Forbes, Brian Hornbuckle, Laura Jackson, Craig Just, Lou Licht, David Osterberg, Gene Parkin, Gene Takle, and Peter Thorne. The clips are distributed to 85 radio stations around the state, 25 of which play the segment weekly while the rest use the content on a less frequent basis. At any time, the clips can be heard by visiting the project's website, www.iowaenvironmentalfocus.org, which also features a blog covering environmental news in the state.



Greg Carmichael



Laura Jackson



Peter Thorne

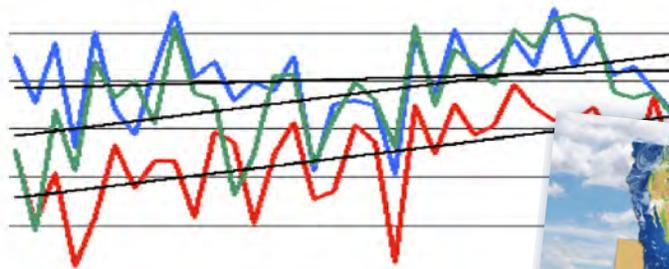


Brian Hornbuckle

Climate Change Impacts Report

During the past year several CGRER members contributed to a major new report: *Climate Change Impacts on Iowa 2010*. The publication was submitted to the Iowa General Assembly and governor in early January of 2011, as mandated by state legislation. Report authors Laura Jackson, Jerry Schnoor, Gene Takle, Peter Thorne, and Advisory board member David Osterberg were joined by four other professors from Iowa's regents institutions. Connie Mutel served as editor.

The report describes how Iowans are already living with accelerating climate changes such as warmer winters, longer growing seasons, increased atmospheric humidity and soil moisture, larger streamflows, and



more intense precipitation events. People are now adapting to these changes in a variety of ways, including altering farming practices. While some results of climate change may be beneficial (such as rising row crop yields due in part to lower drought stress), others will require ongoing adaptations and produce rising problems (for example, more human allergies and asthma, challenges to Iowa's prominent insurance industry, and spreading agricultural pathogens and pests).

The publication's release drew press coverage around the state. Along with a 2008 report on mitigating Iowa's greenhouse gas emissions, written by a committee headed by Jerry Schnoor, the new report



provides Iowa government leaders with concrete recommendations for both controlling and adapting to ongoing climate change in Iowa. Both reports are available at www.iowadnr.gov/iccac/.

U.N. Day

Jerry Schnoor was appointed by Iowa Governor Chet Culver to serve as United Nations Day Chair for 2010. Schnoor gave addresses at two main events: the U.N. Youth Symposium at the State Capitol in Des Moines on October 19, and the U.N. Day Celebration for Linn County on October 24 in Cedar Rapids.





Outreach & Community Education Efforts

Joe Bolkcom, director of outreach and community education, worked on a variety of initiatives and projects designed to share CGRER's research knowledge with the larger world. He played a central role in organizing the Anatomy of Iowa Floods seminar series (right) and in September launched the Iowa Environmental Focus weekly radio clips and blog (page 6). Joe served on the committee that helped prepare the *Climate Change Impacts on Iowa 2010* report (page 7) and helped facilitate statewide networking relating to advancing small solar and wind power systems. Along with Gene Parkin and Lou Licht, Joe was part of discussions with the Iowa

Department of Natural Resources (DNR) on revising wastewater treatment rules to allow for lower-cost, alternative treatment methods for smaller communities. In June, Joe helped spread the word about Iowa's leadership in renewal energy on the Green Bike Tour (below) and throughout the year he met with local and state government officials to discuss a variety of environmental issues, including Iowa climate change adaptation and the Iowa Flood Center.



Joe Bolkcom

Green Bike Tour

CGRER had a major presence on a Green Bike Tour of the European nation of Slovenia on June 5-13. The event helped promote renewable energy and was organized and led by David Osterberg, CGRER advisory board member. The five-member group also included Joe Bolkcom, CGRER outreach and community education director.



Professor Mladen Franko from the University of Nova Gorica, Joe Bolkcom, David Osterberg, John Moreland and Ed Woolsey.



Iowa Flood Seminars

A major CGRER outreach effort during the year was a series of presentations and community discussions on one of Iowa's most significant environmental problems. More than 700 people attended sessions on *Anatomy of Iowa Floods: Preparing for the Future*. The two-hour sessions were held in Des Moines, Burlington, Cedar Rapids, Waverly, Mason City, Ames, Red Oak, Cherokee, Elkader, and at Honey Creek Resort State Park. Topics included climate change trends



Flood Seminar in Ames, Iowa



CGRER Communications

Jim Malewitz served as CGRER's half-time communications intern during the year and worked on a variety of digital and print media projects as he pursues his M.A. in non-profit journalism.

During 2010, Jim:

- helped launch Iowa Environmental Focus (page 6), a weekly radio program on the environment. Jim writes scripts and helps record, edit, promote, and distribute the audio clips.



- wrote posts for the Iowa Environmental Focus blog and website (www.iowaenvironmentalfocus.org) including an in-depth report on a controversial proposal to build a tar sands oil refinery near the South Dakota-Iowa border.

- increased CGRER's presence on social media by posting environmental updates on Facebook and Twitter.



- wrote articles for the CGRER website and for *Little Village Magazine* and the *Ames Tribune*.

- created and edited a blog that followed Joe Bolkcom on his Green Bike Tour through Slovenia last summer (page 8).

Jim also serves as an intern for IowaWatch.org, a non-profit, non-partisan online news service that educates students and collaborates with Iowa news outlets to produce investigative and explanatory journalism.

Two quarter-time interns are also part of the CGRER staff. Brynne Schweigel joined CGRER in September and is a fourth-year student in journalism/mass communication and political science. She has assisted with the Iowa Environmental Focus radio program, including recording and editing clips and making contacts with media outlets. Morgan Yarker has been a CGRER intern since 2008.

A graduate student in science education, Morgan updated educational materials on the website and helped with the planning for a weather forecasting model to be added to the website next year.



Susan Judkins-Josten and Iowa State Senator Amanda Ragan at flood seminar.

in Iowa precipitation and run-off; floodplain management strategies; rural-urban watershed coalition building; water quality; the work of the Iowa Flood Center; and a review of public policy issues. Each seminar featured a question and answer period, and copies of Connie Mutel's *A Watershed Year: Anatomy of the Iowa Floods of 2008* were made available to attendees.



Left to right: Jim Malewitz, Brynne Schweigel and Morgan Yarker





A Sampling of Awards, Achievements & Appointments of CGRER Members

William Field was appointed to a National Academy of Science Committee which is examining the potential scientific, technical, environmental, human health and safety, and regulatory impacts of uranium mining in Virginia. He also prepared a report on “Climate Change and Indoor Air Quality” for the Office of Radiation and Indoor Air at the U.S. Environmental Protection Agency.

Vicki Grassian was named F.Wendell Miller Professor at the UI.



Bill Gutowski was appointed a Lead Author for Working Group I of the next Intergovernmental Panel on Climate Change (IPCC) assessment report. Working Group I focuses primarily on the physical behavior of climate change, including its causes.



Olga Laskina, graduate student in Vicki Grassian’s lab, works with an instrument that measures the physicochemical properties of aerosols. Photo by Jackie Jensen.

Keri Hornbuckle was named Associate Dean for Academic Programs, UI College of Engineering. She also served as guest co-editor of an *Environmental Science & Technology* Special Focus Issue on PCB Sources, Exposures and Toxicities, April 15, 2010.



Witold Krajewski was the recipient of the 2010 Iowa Board of Regents Award for Faculty Excellence.

John Loperfido, who completed his PhD in 2009 under Jerry Schnoor, was selected to receive the Graduate Dean’s Distinguished Dissertation Award for 2010 for his thesis “High-frequency sensing of Clear Creek water quality: mechanisms of dissolved oxygen and turbidity dynamics, and nutrient transport.”



Keri Hornbuckle, Zach Rodenburg and Rachel Yucuis working on Lake Michigan. Photo by Tim Schoon.

Clear Creek





Andres Martinez, on the right, working in Indiana Harbor.
Photo by Keri Hornbuckle.

Andres Martinez, a graduate student working with Keri Hornbuckle, received the Best Student Paper award of 2010 from the Division of Environmental Chemistry of the American Chemical Society. The award was for “Fate of PCB congeners in an industrial harbor of Lake Michigan,” which appeared in *Environmental Science & Technology*.

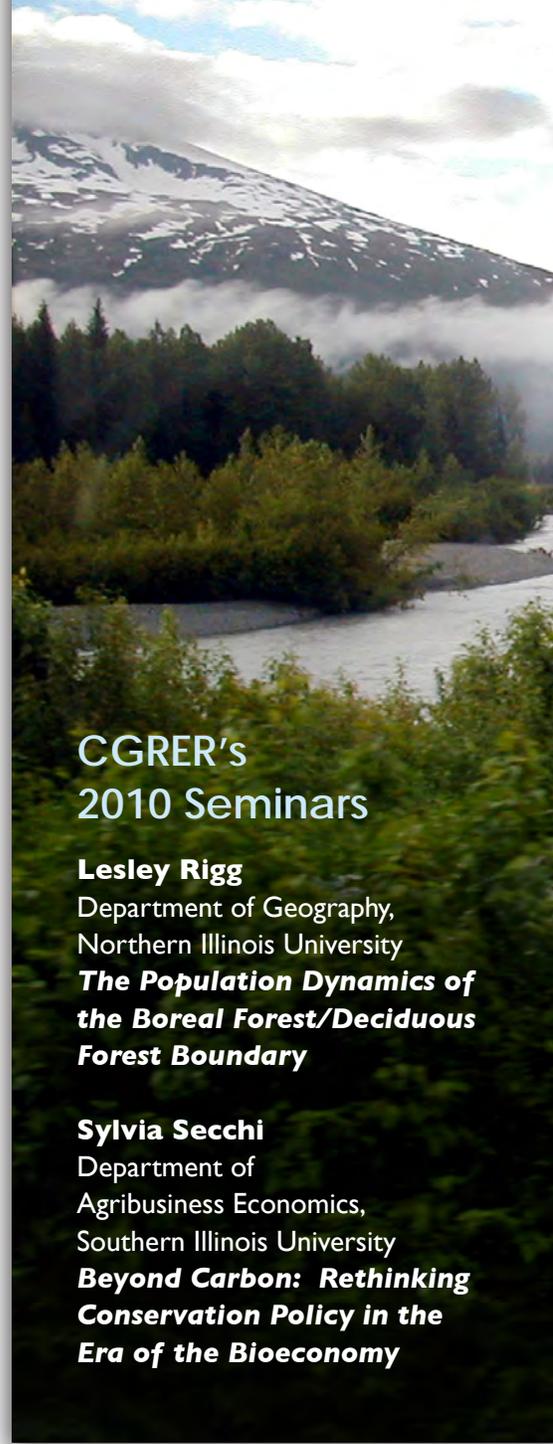
Thanos Papanicolaou was named the Donald E. Bently Faculty Fellow of Engineering at the UI.

David Peate was appointed as an associate editor of *Geochemistry, Geophysics, Geosystems*, a journal of the American Geophysical Union.

Michelle Scherer received the 2010 Malcolm Pirnie/AEESP Frontier in Research Award from the Association of Environmental Engineering and Science Professors. The award honors individuals who have advanced the environmental engineering and science field in new and innovative research areas. Michelle was also appointed the Robert and Virginia Wheeler Faculty Fellow of Engineering at the UI.

Jerry Schnoor was the recipient of the prestigious Athalie Richardson Irvine Clarke Prize, which is given by the National Water Research Institute to honor individuals who have made outstanding contributions to the field of water research. The award recognizes the significant work Schnoor has done in research areas that include acid rain, climate change, and water quality.

Peter Thorne received the 2010 John Doull Award from the Central States Chapter of the Society of Toxicology. The award is presented each year to honor the contributions of an outstanding member of the discipline of toxicology and the chapter.



CGRER's 2010 Seminars

Lesley Rigg

Department of Geography,
Northern Illinois University

***The Population Dynamics of
the Boreal Forest/Deciduous
Forest Boundary***

Sylvia Secchi

Department of
Agribusiness Economics,
Southern Illinois University

***Beyond Carbon: Rethinking
Conservation Policy in the
Era of the Bioeconomy***



Dan Allman, graduate student working with Michelle Scherer and Vicki Grassian, prepares a Mossbauer spectrometer to measure the form of iron in an air dust sample. Photo by Michelle Scherer.

From improving elementary school science programs to developing new interdisciplinary approaches to promoting water sustainability, CGRER members strengthened and broadened their commitment to education during 2010.



Focus on Water

The University of Iowa is giving increasing emphasis to the important and complex issues relating to water, thanks in part to the efforts of several CGRER members. [Jerry Schnoor](#) serves as chair of the UI Water Sustainability Initiative, an interdisciplinary effort designed to increase faculty research, education, and outreach efforts on issues that include global water availability, quality and reuse, as well as the health impacts of unsustainable practices and their relationship to a changing climate. Other CGRER members who serve on the initiative's steering committee are [David Bennett](#), [Peter Thorne](#), and [Larry Weber](#).

The Water Sustainability Initiative expands the University's existing strength in interdisciplinary research on water. In 2010 three professors joined the UI faculty as a "cluster-hire" in water sustainability: [Aaron Strong](#) in Urban and Regional Planning and the Public Policy Center, [Tori Forbes](#) in Chemistry, and [David Cwiernty](#) in Civil and Environmental Engineering. Applicants are being recruited for an additional seven positions. The Water Sustainability Initiative also sponsored a lecture series during the year on topics relating to water research and issues.

Improving Science Education

- ▼ [Cory Forbes](#) received a \$263,026 grant from the Roy J. Carver Charitable Trust to help educators teach science in ways that best promote student learning. The two-year project involves 60 elementary teachers in Davenport, which is one of Iowa's largest high-needs school districts. The grant includes both research into current methods of teaching and professional development for teachers using an inquiry-based approach to science education, which encourages students to participate in such fundamental scientific practices as asking and answering questions, collecting and making sense of data, and using evidence to construct, evaluate and negotiate explanations about the natural world. The grant will also help teachers adapt their current curricular resources to the National Science Education



Standards and the recently-adopted Iowa Core Curriculum.

The project will include teaching assessments and video recordings, which will help in analyzing the ways in which teachers have incorporated inquiry-based teaching into their lessons. The goal is to build a strong foundation in science for students' future success, as science and technology play ever-larger roles in people's lives around the world.

Teaching Sustainability

Craig Just has been working on two projects that will help educate a new generation of students about sustainability. In the fall, he helped establish a Sustainability Living-Learning Community in the UI Mayflower Residence Hall. About 40 students live in a setting where they can learn about the concepts of sustainability and how to create change in a democratic society. The living-learning community serves as a pilot program for a larger effort funded by a U.S. Department of Education grant of \$873,318 for *Campus Living-Learning Communities for the Sustainable Citizen* (2011-2013).



Craig Just with Sustainability Living-Learning Community members. Photo by Jim Heemstra.

In the next two years the program will expand to include additional students living in any UI residence hall as well as workshops and training on other campuses, so that institutions can learn from the UI model. The goal is to create first-year residential experiences at large public universities across the U.S. based on the principles of sustainability and citizenship. The project involves researchers at the UI, Columbia University, and the Education Division of the National Geographic Society.

Just also received a \$67,000 Iowa Workforce Development grant for *Connecting Higher Education to Iowa's Green Economy* (2010-2011). The grant will be used to identify gaps between post-secondary student perceptions of the so-called "green economy" and the reality of Iowa's economy as described by employers. Once the gaps are identified, curricula will be developed to better enable the state's workforce to take part in a thriving and sustainable Iowa economy.



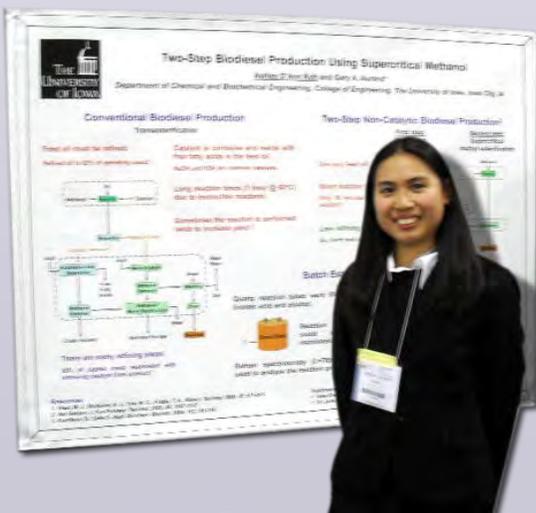
Conference Travel Grants for Graduate Students

The following grants were awarded to students whose advisors are CGRER members and who were traveling to professional conferences to make oral or poster presentations. A total of \$27,169 was awarded in 2010.



Sudipta Kumar Mishra's presentation at the International Soil and Water Assessment Tool Conference in Seoul, South Korea.

Ashley D'Ann Koh with her poster at the American Chemical Society National Meeting in San Francisco. Photo by Sherrie Elzey.



Samuel Boland
Civil & Environmental Engineering, UI
[American Geophysical Union Fall Meeting](#)

Lisa Bramer
Statistics, ISU
[American Society of Agronomy](#)

Luciana Kindl da Cunha
Civil & Environmental Engineering, UI
[10th International Symposium on Stochastic Hydraulics & 5th International Conference on Water Resources and Environment Research](#)

Piotr Domaszczynski
Civil & Environmental Engineering, UI
[American Geophysical Union Fall Meeting](#)

Renato Prata de Moraes Frasson
Civil & Environmental Engineering, UI
[Annual International Meeting of the American Society of Agricultural and Biological Engineers](#)

Kelly Gierlus
Chemistry, UI
[American Chemical Society National Meeting](#)

Christopher Kimsey
Anthropology, UI
[Society for American Archaeology](#)

Ashley D'Ann Koh
Chemical & Biochemical Engineering, UI
[American Chemical Society National Meeting](#)

Joshua Livermore
Civil & Environmental Engineering, UI
[Battelle Remediation of Chlorinated & Recalcitrant Compounds](#)

Rachel Marek
Civil & Environmental Engineering, UI
[Society of Environmental Toxicology and Chemistry North American 31st Annual Meeting and Superfund Research Program Annual Meeting](#)

Visiting Scientists

Sudipta Kumar Mishra
Civil & Environmental Engineering, UI
[International Soil and Water
Assessment Tool Conference](#)

Timothy Pasakarnis
Civil & Environmental Engineering, UI
[American Chemical Society National Meeting](#)

Daniel Proctor
Anthropology, UI
[American Association of Physical Anthropologists](#)

Daniel Rajewski
Geological & Atmospheric Sciences, ISU
[29th Conference on Agricultural and Forest Meteorology](#)

Kat Rocheford
Geoscience, UI
[Geological Society of America North Central/
South-Central Combined Section Meeting](#)

Gavan Randika Sampath Rubasinghege
Chemistry, UI
[American Chemical Society National Meeting](#)

Timothy Schulz
Civil & Environmental Engineering, UI
[Society of Environmental Toxicology and Chemistry
North American 31st Annual Meeting and
Superfund Research Program Annual Meeting](#)

Tommy Ekamitra Sutarto
Civil & Environmental Engineering, UI
[Upper Midwest Stream
Restoration Symposium](#)

Meredith Wismer
Anthropology, UI
[Society for American Archaeology
Annual Meeting](#)

In July, Alfred Wiedensohler and Stephan Nordmann of the Physics Department at the Leibniz-Institute for Tropospheric Research in Leipzig, Germany, visited to establish cooperative research in the modeling of European black carbon to assess its role in air pollution and climate change.

In November-December, Saroj Sahu from the Indian Institute of Tropical Meteorology in Pune, India, visited as part of a collaborative research project on air quality forecasting for the 2010 Commonwealth Games in India.

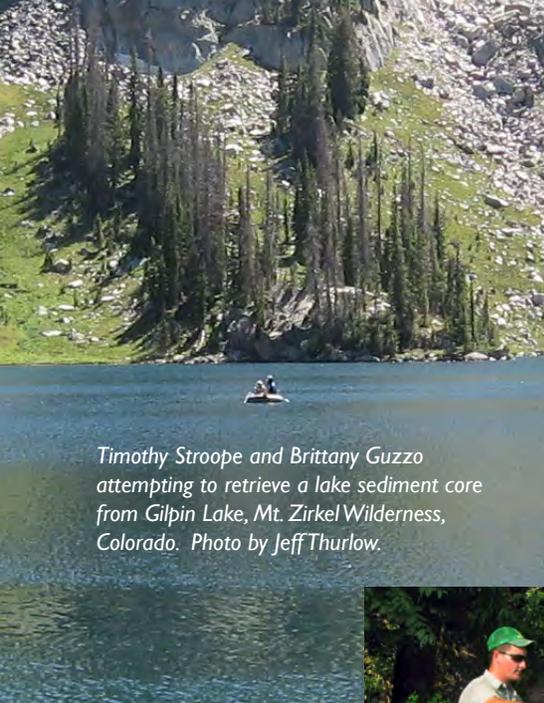


Test tubes of serum mixing by inversion during an extraction procedure.
Photo by Rachel Marek.



Kat Rocheford with her poster at the Geological Society of America North Central/South-Central Combined Section Meeting in Branson, Missouri. Photo by Xiuju Liu.





Timothy Stroope and Brittany Guzzo attempting to retrieve a lake sediment core from Gilpin Lake, Mt. Zirkel Wilderness, Colorado. Photo by Jeff Thurlow.

Field Research Travel Grants for Graduate Students

In 2010, \$14,860 was awarded to graduate students advised by CGRER members who were traveling to sites to complete field research for their thesis or dissertation.

Jeremy Brill
Civil & Environmental Engineering, UI
Analysis of High Frequency Nitrate Data to Explore New Phenomena in Dynamic Nutrient Cycling
UI LACMRERS near Fairport, Iowa

Timothy Stroope
Geoscience, UI
Analysis of Sedimentation Rates in Lakes within Blowdown Patches Created by the Routt-Divide Blowdown of 1997, Mt. Zirkel Wilderness
Routt-Divide in Colorado



Farmer and son harvest burley tobacco in northeast Tennessee. Photo by Susie Donaldson.

Susanna Donaldson
Anthropology, UI
Organizing Seasonal Labor: Farmers, Migrants, and Burley Tobacco
Greenville, Tennessee

Clare Tolmie
Anthropology, UI
Environmental Factors in the Adoption of New Organic Technology in the Early Upper Paleolithic of Western Europe
France

Simone Williams
Geography, UI
Evaluating Water Quality to Protect Human and Ecosystem Health
Jamaica

Alexander Woods
Anthropology, UI
The Effects of Lithic Raw Material Quality on Aurignacian Blade Production at Abri Cellier
France

Alexander Woods collecting flint samples in the Perigord, France. Photo by Tamara Woods.



Jeremy Brill displays native mussel found in the Mississippi River. Photo by Nathan Young.

Douglas Grane
Geography, UI
Research on Evaluation Practice for Water Management Programs
Kenya

Brandi Janssen
Anthropology, UI
Producing Local Food and Local Knowledge: The Experience of Iowa Farmers
Various Sites in Iowa

Susan Kilgore
Geoscience, UI
The Use of Multi-Channel Ground Penetrating Radar to Investigate the Evolution of Englacial Drainage System in Temperate Glaciers over the Course of an Ablation Season
Two glaciers in Alaska



Washing vegetables at a Community Supported Agriculture farm in Iowa. Photo by Brandi Janssen.

A Sampling of Educational Efforts by CGRER Members

The National Science Foundation (NSF) awarded a \$2.6 million dollar grant to the UI to initiate an interdisciplinary graduate program in Geoinformatics for Environmental and Energy Modeling and Prediction. CGRER members involved in the five-year grant are [Kate Cowles](#) (PI), [David Bennett](#) (coPI), [Marc Armstrong](#), [Marc Linderman](#), [George Malanson](#), [Gerard Rushton](#), [Keri Hornbuckle](#), [Thanos Papanicolaou](#), [Jerry Schnoor](#), and [Dale Zimmerman](#).

[Barbara Eckstein](#) offered a new course, Locally Grown, which is approved for credit for the undergraduate sustainability certificate. Focusing on local questions of global significance, the course takes up the issues of community building, farming, and sustainability in Iowa, using nonfiction, fiction, poetry, and film, as well as insights gained from guest speakers.

In May, [Barbara Eckstein](#) participated in Iowa Rivercall, ► a project designed to teach third and fourth graders about the Iowa River. Students from the Iowa City Community School District learned about the river, riverine floral and fauna, and the native and settler history of the area. The Johnson County Conservation Service and the Iowa DNR helped with the event, and IIHR-Hydrosience & Engineering provided funding.

[David Peate](#) developed lab activities for middle school students attending an Iowa Science, Technology, Engineering and Mathematics (STEM) symposium that focused on water quality issues. Students collected water samples and analyzed them for a range of heavy metals using the newly-installed ICP-MS instrument in his lab (pictured below).



Naturalist Brad Friedhof displays a river otter's pelt. Photo by Julia Wasson.



Iowa Rivercall



Above: Kali Feiereisel, an Iowa Rivercall volunteer from the University of Iowa, helps fourth graders identify aquatic animals found at the edge of the Iowa River. Below: Jake Benedict demonstrates how to identify aquatic animals while students and teacher Mary Goodfellow look on. Photos by Julia Wasson.



During 2010, CGRER members worked on a wide range of research projects that deepen our understanding of environmental change and help provide solutions to local, regional, and global problems. **Monitoring air pollution in Chicago, studying flood mitigation in Iowa, and monitoring black carbon in the atmosphere** were among CGRER initiatives during the past year.



Monitoring Air Toxics in Chicago

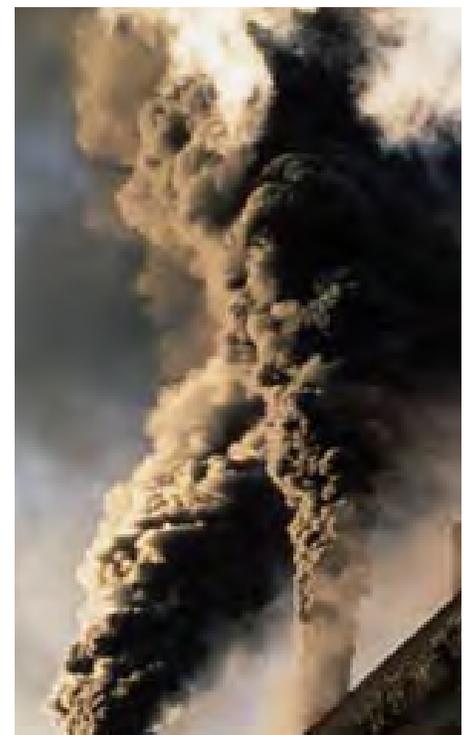
- ▼ **Keri Hornbuckle** was awarded a four-year, \$1.2 million grant from the Environmental Protection Agency (EPA) to investigate the importance of the Chicago region as a source of persistent organic pollutants (POPs) to Lake Michigan. During the course of the project, approximately 650 air samples will be collected and analyzed for a suite of over 250 organic pollutants.

Air toxics have only recently been recognized as a major source of pollutants in the Great Lakes. Before the 1990s, regulatory efforts to control toxins in the water and fish focused on direct discharges from industrial producers or users and there was little interest in controlling airborne sources. Recent research has made it clear that air toxics have a significant impact on the lakes, but atmospheric sources of most POPs in the lakes are almost completely undefined.

Hornbuckle and her co-principal investigator, Ronald A. Hites of Indiana University, hope to help reduce pollutants in Lake Michigan by identifying if the Chicago sources involve a few large emission sites, many sites, or are amorphous (spread out over the entire area). The goal is to help guide the EPA in determining how best to reduce airborne emissions originating from the Chicago area.

Black Carbon and Climate Warming

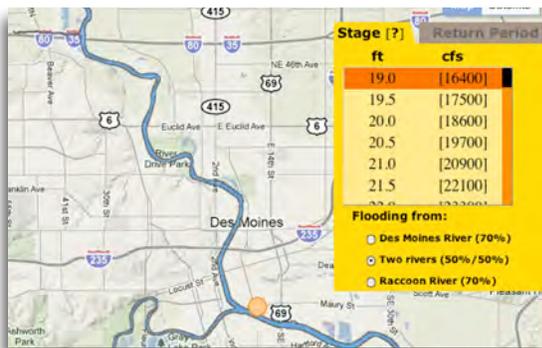
Greg Carmichael's work on black carbon was featured in the July 25 issue of the journal *Nature Geoscience*. Using air samples taken at various altitudes above South Korea, Carmichael and his colleagues found that increasing the ratio of black carbon to sulfate in the atmosphere increases climate warming. Black carbons arise from sources such as diesel engine exhaust and cooking fires, while sulfates occur in the atmosphere largely as a result of various industrial processes. They found that black carbon plumes derived from fossil fuels were 100 percent more efficient at trapping heat than were plumes arising from biomass burning.





Learning From Floods

The Iowa Flood Center, which was established in 2009 in response to the massive floods of 2008, is playing an increasing role in protecting the state against future disasters. Through the efforts of **Witold Krajewski**, Flood Center director, and **Larry Weber**, director of the UI's IHR-Hydroscience & Engineering, the Flood Center received two major grants during the year through the Community Development Block Grant program within the U.S. Department of Housing and Urban Development (HUD).



The Flood Center received \$10 million for its Iowa Floodplain Mapping Project, which over a four-year period will create floodplain maps of the 85 Iowa counties declared federal disaster areas during the 2008 flood. The maps, when approved by FEMA, will help government authorities and private citizens identify vulnerable areas so that flood protection measures can be better targeted.

The second grant funds \$10 million divided between three initiatives. Nearly \$9 million will go to pilot projects in urban and rural areas designed to minimize erosion, manage runoff, and mitigate future flood damage. Wise management of watersheds plays a critical role both in preventing flood damage and in preserving water quality. The grant

also funds the establishment of two to three Watershed Management Authorities in Iowa on a pilot basis. This portion of the grant will be coordinated through the Iowa DNR and will involve local governments that share a common watershed. The management authorities will be given the task of assessing flood risks and water quality and monitoring federal activities and funding involving the watershed. The HUD grant also funds an educational campaign designed to inform the public about floodplains, flood risks, and how to manage areas vulnerable to flooding. The Flood Center will work on this effort with the Iowa State University Agricultural Extension Service, the Iowa Floodplain and Stormwater Management Association, and the Iowa Water Resources Coordinating Council.

Along with \$1.3 million in funding from the state of Iowa during 2010, these grants solidify the Iowa Flood Center's important role in mitigating future floods and in providing national leadership in flood research.



Gulf Oil Spill Research

In June two of **Jerry Schnoor's** students, **Elliott Beenk** (at left) and **Aaron Gwinnup**, traveled to Louisiana to study the effects of last summer's oil spill on marshlands. The group spent five days gathering samples of oil, contaminated marsh grasses, and uncontaminated grasses. The samples were shipped back to the UI, where studies are being done on how damaged marshlands might be restored using native plants from Louisiana.



A Sampling of CGRER Member Publications

Vilanova, I., A.R. Prieto, S., Stutz and **E.A. Bettis III**. 2010. Holocene vegetation changes along the southeastern coast of the Argentinean Pampa grassland in relation to sea-level fluctuations and climate variability: Palynological analysis of alluvial sequences from Arroyo Claromecó. *Palaeogeography, Palaeoclimatology, Palaeoecology*, doi:10.1016/j.palaeo.2010.09.026.

Muhs, D.R., J. Budahn, G. Skipp, J.M. Prospero, D. Patterson and **E.A. Bettis III**. 2010. Geochemical evidence for African dust additions to soils on the Canary Islands, Spain. *Terra Nova*, doi: 10.1111/j.1365-3121.2010.00949.x.

CGRER Aids to Researchers

CGRER continued to offer state-of-the-art computing resources to members and their students. The goal for 2010 again focused on obtaining large data storage capacity. This was accomplished by purchasing multiple storage units with various levels of redundancy, including a 20TB mirrored system for valuable data and model results. The staff also worked on developing a high-resolution weather and energy forecasting page for the state of Iowa, which will be launched in 2011 on the CGRER website. In addition, CGRER is one of four departments on the UI campus that supports and distributes geographical information system (GIS) software through a campus-wide site license with ESRI.

Adhikary, B., **G. R. Carmichael**, S. Kulkarni, et al. 2010. A regional scale modeling analysis of aerosol and trace gas distributions over the eastern Pacific during the INTEX-B field campaign. *Atmospheric Chemistry and Physics*, doi:10.5194/acp-10-2091-2010.

Lu, Z., D. G. Streets, Q. Zhang, S. Wang, **G. R. Carmichael**, et al. 2010. Sulfur dioxide emissions in China and sulfur trends in East Asia since 2000. *Atmospheric Chemistry and Physics*, doi:10.5194/acpd-10-8657-2010.

Ramana, M.V., V. Ramanathan, Y. Feng, S. C. Yoon, S.W. Kim, **G. R. Carmichael** and J. J. Schauer 2010. Warming influenced by the ratio of black carbon to sulphate and the black-carbon source. *Nature Geoscience*, doi:10.1038/ngeo918.

Debinski, D.M., H. Wickham, K. Kindscher, et al. 2010. Montane meadow change during drought varies with background hydrologic regime and plant functional group. *Ecology*, doi: 10.1890/09-0567.1.

Dorale, J.A., B.P. Onac, J.J. Fornós, J. Ginés, A. Angel Ginés, P. Tuccimei, and **D.W. Peate**. 2010. Sea level high stand 81,000 years ago in Mallorca. *Science*, doi: 10.1126/science.1181725.

Dorale, J.A., L.A. Wozniak, **E.A. Bettis III**, et al. 2010. Isotopic evidence for Younger Dryas aridity in the North American mid-continent. *Geology*, doi: 10.1130/G30781.1.

Forbes, C.T. & E.A. Davis. 2010. Curriculum design for inquiry: Preservice elementary teachers' mobilization and adaptation of science curriculum materials. *Journal of Research in Science Teaching*, doi: 10.1002/tea.20379.

Gassó, S.; **V.H. Grassian**, R.L. Miller. 2010. Interactions between mineral dust, climate and ocean ecosystems. *Elements*, doi: 10.2113/gselements.6.4.247.

Bian, S.W., J. Baltrusaitis, P. Galhotra, **V.H. Grassian**. 2010. A template-free, thermal decomposition method to synthesize mesoporous MgO with a nanocrystalline framework and its application in carbon dioxide adsorption. *Journal of Materials Chemistry*, doi: 10.1039/C0JM01261K.

Gutowski, W.J., R.W. Arritt, S. Kawazoe, D.M. Flory, **E.S. Takle**, et al. 2010. Regional, extreme monthly precipitation simulated by NARCCAP RCMs. *Journal of Hydrometeorology*, doi: 10.1175/2010JHM1297.1.

Hu, D., H. Lehmler, A. Martinez, K. Wang and **K. C. Hornbuckle**. 2010. Atmospheric PCB congeners across Chicago. *Atmospheric Environment*, doi: 10.1016/j.atmosenv.2010.01.006.

Bryan, S.E., I. Ukstins Peate, **D.W. Peate**, et al. 2010. The largest volcanic eruptions on Earth. *Earth-Science Reviews*, doi: 10.1016/j.earscirev.2010.07.001.

Russell, A.E., **J.W. Raich**, R. Bedoya, et al. 2010. Impacts of individual tree species on carbon dynamics in a moist tropical forest environment. *Ecological Applications*, doi:10.1890/09-0635.1.

Maher, R.M., H. Asbjornsen, R.K. Kolka, C.A. Cambardella, **J.W. Raich**. 2010. Changes in soil respiration across a chronosequence of tallgrass prairie reconstructions. *Agriculture, Ecosystems & Environment*, doi: 10.1016/j.agee.2010.09.009.

Gorski, C.A., J.T. Nurmi, P.G. Tratnyek, T.B. Hofstetter, **M.M. Scherer**. 2010. Redox behavior of magnetite: Implications for contaminant reduction. *Environmental Science & Technology*, doi: 10.1021/es9016848.

Rosso, K. M., S.V. Yanina, C.A. Gorski, P. Larese-Casanova, **M.M. Scherer**. 2010. Connecting observations of hematite (α-Fe₂O₃) growth catalyzed by Fe(II). *Environmental Science & Technology*, doi: 10.1021/es901882a.

A Sampling of Grants Awarded to CGRER Members

Jeffrey Dorale and **B.P. Onac** at the University of South Florida received a \$24,234 NSF planning grant, *Sea Level Changes into MIS 5: from Observations to Predictions* (2010-2011), for a workshop to be held in Mallorca in 2012 on the topic of sea level change.

Vicki Grassian (PI) received a \$540,000 (2010-2013) NSF grant for *Surface Photochemistry and Redox Chemistry of Adsorbates on Oxide Surfaces at the Adsorbed Water Interface: Fundamental Studies of Atmospheric Significance*.

Bill Gutowski (PI) and colleagues at four institutions received an \$802,000 NSF grant for *Arctic Extreme Temperature and Precipitation: Detection and Projection of their Climatic Change and Physical Causes* (2010-2013). ISU's portion was \$371,000.

Keri Hornbuckle (PI), **Greg Carmichael**, and **Peter Thorne** (co-PIs) received a \$1,385,580 grant from the National Institute of Environmental Health Sciences of the National Institutes of Health for *Atmospheric Sources of PCB Congeners* (2010-2015). The grant is part of the Iowa Superfund Research Program.

Paul Kleiber (PI), **Vicki Grassian** and **Mark Young** (co-PIs) received an NSF grant for \$548,370 (2010-2013) for *Spectral Characterization of Atmospheric Dust from the IR to the UV: A Combined Laboratory and Modeling Study of Composition, Size, and Shape Effects on Dust Optical Properties*.

Thanos Papanicolaou (PI), **Charles Stanier**, and **Greg Carmichael** (co-PIs) were awarded a \$641,737 NASA Experimental Program to Stimulate Competitive Research (EPSCoR) grant for *Agricultural Soil Erosion and Carbon Cycle Observations in Iowa: Gaps Threaten Climate Mitigating Policies* (2010-2013).

Michelle Scherer (PI) and **Vicki Grassian** and **Martin St. Clair** of Coe College (co-PIs) received a grant *Linking Molecular Scale Surface Speciation to Interfacial Fe Redox Chemistry* (2010-2013) from the NSF-Environmental Chemical Science for \$579,729.

Peter Thorne (PI) and **Keri Hornbuckle** (co-investigator) received \$2,2248,481 in funding from the National Institute of Environmental Health Sciences of the National Institutes of Health for *Airborne Exposures of Semi-volatile Organic Pollutants: The AESOP Study* (2010-2015). The grant is part of the Iowa Superfund Research Program.

Peter Thorne (PI) received \$770,440 in funding (2010-2015) from the National Institute of Environmental Health Sciences of the National Institutes of Health for an Inhalation Toxicology Facility Core that supports the Iowa Superfund Research Program.

Mark Young (PI), **Vicki Grassian**, and **Paul Kleiber** (co-PIs) received an NSF award of \$440,595 for *MRI: Development of a Single Particle Mass Spectrometer for Field and Laboratory Studies of the Environmental Impact of Atmospheric Aerosols and Engineered Nanoparticles* (2010-2013).

Seed Grants

In 2010, CGRER awarded a total of \$149,997 in seed grants to five projects.

Nandita Basu
Civil & Environmental Engineering, UI
Remote Sensing Based Distributed Hydrologic Modeling in Midwestern Landscapes for Predicting 'Tile-to-Tide' Responses
\$29,997

Ann F. Budd
Geoscience, UI
Sustaining the Biodiversity of Coral Reefs: Evolutionary Insight from Coral Skeletons
\$30,000

Diane Debinski
Ecology, Evolution, and Organismal Biology, ISU
Climate Change Effects on Trophic Interactions in Montane Meadow Systems
\$30,000

Brian Hornbuckle
Agronomy, ISU
Feedbacks between Agriculture and Climate Revealed Through the Coupling of an Agricultural Land Surface Model to a Regional Climate Model
\$30,000

Michelle Scherer
Civil & Environmental Engineering, UI
Arsenic in Iowa Groundwater: Identifying Important Geochemical Processes
\$30,000



INTERNATIONAL EFFORTS

While much of CGRER's work is done in Iowa, its members also travel the world in their efforts to understand environmental change and find solutions to global problems.

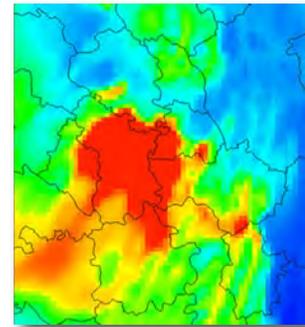


India Winterim Program

- Thanks to the efforts of **Raj Rajagopal**, the educational and personal ties between Iowa and India grow deeper each year. For the past five years Rajagopal has coordinated a set of study abroad courses held for three weeks in India over winter break. The program allows students to learn from Indian social entrepreneurs, non-profit organizations, and academic institutions working to address a wide range of environmental and social problems.

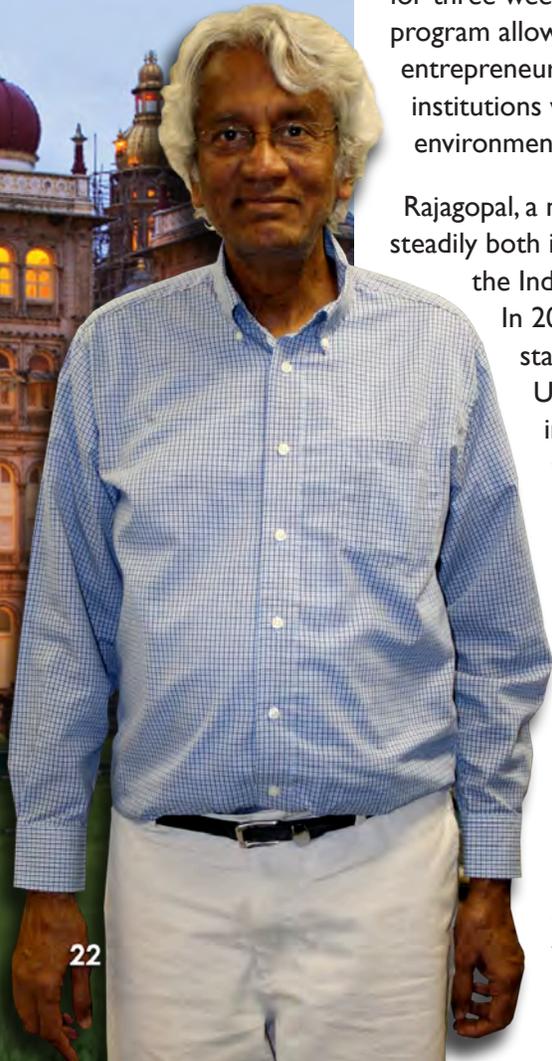
Rajagopal, a native of India, has seen the program grow steadily both in the number of students who enroll and the Indian host organizations that participate.

In 2010-11, more than 120 students and staff participated in 11 courses led by 14 UI faculty members. Over 55 additional individuals in India joined as participants in these courses. The courses allow students to learn about innovative programs relating to issues such as low-cost solar energy, sustainable water use, application of geospatial technologies, educational strategies, and environmental planning and public health. The courses are based in cities that include Trivandrum, Chennai, Delhi/Gurgaon, Dindigul, Hyderabad, Pondicherry, and Udaipur. Participation in the program is open to community members from around the world as well as students from the UI and other institutions.



Air Quality Forecasting for Commonwealth Games

CGRER researchers worked with the Indian Institute of Tropical Meteorology in Pune to provide official air quality forecasts for the 2010 Commonwealth Games in Delhi. The CGRER team, led by **Greg Carmichael** and researchers **Pallavi Marrapu** and **Scott Spak**, worked with the Indian government to design an automated system that predicted urban air pollution levels 24 hours in advance. The system has uses beyond the Commonwealth Games, as it is a valuable tool for understanding how huge cities affect air quality and climate.



At right: Nathan Rourke, Sara Rourke, Benjamin Kusi of Self Help International, Craig Just, Kali Feiereisel, and Thomas Bang overlooking the valley of the Ejura-Sekyedumase District between Ejura and Kobriti village in Ghana. Below: Thomas Bang visits with young villager.



Water Project in Ghana

In June, **Craig Just** led a team of four students to Kobriti, Ghana, to help the UI's chapter of Engineers Without Borders establish a five-year service project there. The group spent five weeks learning about the community and its needs, laying the groundwork for future engineering projects. They discovered that issues relating to water quantity and storage top the list of local needs, and on future trips members of the chapter will work with villagers to develop practical solutions to these problems.



UI graduate student **Shelby Putt** (top left), an assistant from the village of Ngandong, **Rob Scott**, **Yahdi Zaim** and **Russ Ciochon** clean and record fossils removed from the day's excavations. Photo by Frank Huffman. Photo below: **Yadhi Zaim** (upper right), **Rob Scott** (far left) and local Indonesian assistants work in one of several large block excavations at the Ngandong site. Photo by Art Bettis.



Tracing Human Evolution

Art Bettis and **Russell Ciochon** returned for their sixth joint visit to the island of Java this summer to continue their investigations at Ngandong, one of the world's largest caches of *Homo erectus*. The early humans may have lived in Java as recently as 50,000 to 100,000 years ago. The Ngandong site is unique in that its *H. erectus* fossils are considerably younger than those found elsewhere and also have a significantly larger brain size.



Working in a small village bordering the Solo River, Bettis, Ciochon and UI graduate students **Shelby Putt** and **Maija Sipola** were part of a nine-member interdisciplinary team from four institutions. To unravel the mystery of when, where, and how these early humans lived, the team studied how the fossils and the ancient river sediments that entombed them accumulated. The geological features of the site provide important clues to the changing climate and environmental conditions in which *H. erectus* lived. By studying the interaction between climatic variables, changing vegetation conditions, and volcanic and tectonic events, the research also addresses questions relating to the evolution of large tropical rivers.

While CGRER has contributed to the Java research in the past, the 2010 team was supported by a \$35,000 grant from the LSB Leakey Foundation.

Budget & Funding

In fiscal year 2010 (July 1, 2009-June 30, 2010), 76% of CGRER's \$653,310 of revenue was spent on research, education, and outreach directed toward global change issues (Figure 1). The remaining 24 percent of the budget was dedicated to administration.

This funding, received in total from an assessment on Iowa's gas and electric utilities through the State Department of Commerce, was magnified many times in the millions of dollars of external grants and contracts awarded to CGRER members (Figure 2). In calendar year 2010 CGRER members, working through their respective departments, were performing research that brought in a total of about \$49.5 million in external funds. Of this amount, \$24.2 million was new funding that was initiated in 2010, while the remaining \$25.3 million came from ongoing projects.

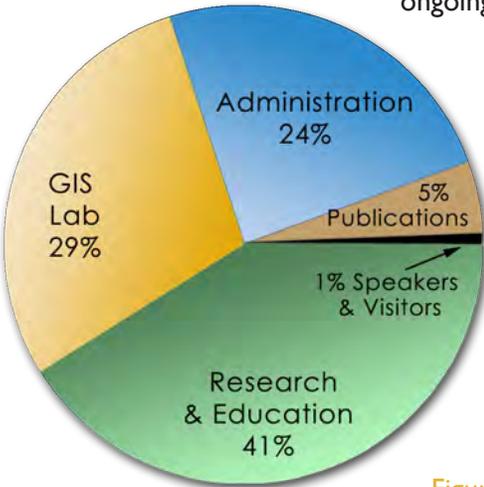
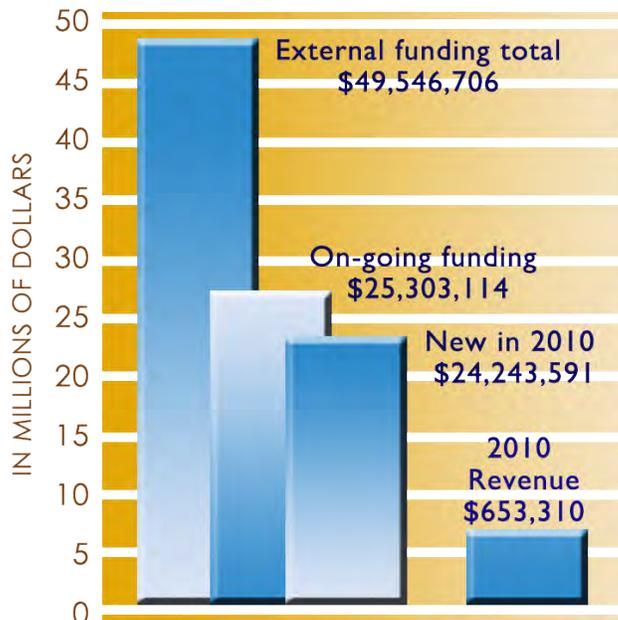


Figure 1
CGRER's Expenses

Figure 2
CGRER's Revenue



Administration

CGRER is directed by University of Iowa professors Gregory Carmichael (Dept. of Chemical and Biochemical Engineering) and Jerald Schnoor (Dept. of Civil and Environmental Engineering). Center activities are guided by an elected Executive Committee that consists of ten members (listed on page 3) plus the two co-directors. The Executive Committee meets monthly to plan initiatives and chart CGRER's course. An Advisory Board of nine members from outside the academic community (listed on page 5) meets annually to lend oversight to CGRER's activities.

Since 1992, CGRER has employed two full-time staff members. Administrative assistant Jane Frank oversees office operations. Jeremie Moen manages CGRER's computer facilities with the aid of services contracted from the Iowa Computer Aided Engineering Network. In addition, Joe Bolkom serves as half-time Director of Outreach and Community Education. CGRER reports directly to the UI's Vice President for Research.



University of Iowa

Anthropology

Margaret E. Beck
Michael S. Chibnik
Russell L. Ciochon
James G. Enloe
Matthew E. Hill, Jr.

Biological Sciences

Stephen D. Hendrix
Diana G. Horton

**Chemical and
Biochemical
Engineering**

Gregory R. Carmichael
Charles O. Stanier

Chemistry

Tori Z. Forbes
Vicki H. Grassian
Sarah C. Larsen
Mark Young

**Civil &
Environmental
Engineering**

Nandita Basu
A. Allen Bradley
William E. Eichinger
Keri C. Hornbuckle
Craig L. Just
Witold F. Krajewski
Lou Licht
Timothy E. Mattes
Marian V. Muste
Wilfrid A. Nixon
A. Jacob Odgaard
A.N. Thanos Papanicolaou
Gene F. Parkin
Michelle Scherer
Jerald L. Schnoor
Richard L. Valentine
Larry Weber

Economics

Thomas F. Pogue
John L. Solow

**Electron Spin
Resonance Facility**

Garry R. Buettner

English

Laura Rigal

Geography

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David Bennett
Naresh Kumar
Marc Linderman
George P. Malanson
Michael L. McNulty, Emeritus
R. Rajagopal
Gerard Rushton

Geoscience

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E. Arthur Bettis
Robert S. Carmichael
Jeffrey Dorale
Lon D. Drake, Emeritus
David W. Peate
Mark K. Reagan
Holmes A. Semken, Jr.,
Emeritus
Frank H. Weirich
You-Kuan Zhang

**History and Community
& Behavioral Health**

Paul R. Greenough

Law

Jonathan Carlson
Burns H. Weston

**Mechanical &
Industrial Engineering**

Geb Thomas

**Molecular Physiology
& Biophysics**

G. Edgar Folk, Emeritus

**Occupational
& Environmental Health**

William R. Field
Joel N. Kline
Peter S. Thorne

Physics & Astronomy

Donald A. Gurnett
Paul D. Kleiber
Steven R. Spangler

Science Education

Cory T. Forbes

**Statistics & Actuarial
Science**

Dale L. Zimmerman

**Urban & Regional
Planning**

Aaron Strong

Iowa State University

Agronomy

Raymond W. Arritt
Richard M. Cruse
Brian K. Hornbuckle

**Ecology, Evolution, and
Organismal Biology**

Diane M. Debinski
John Nason
James W. Raich

**Geological &
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William J. Gutowski
Eugene S. Takle

**Natural Resource
Ecology and
Management**

Jan Thompson

University
of Northern Iowa

Biology

Laura Jackson

Physical Geography

Dennis E. Dahms
Ramanathan Sugumaran

Cornell College

Geology

Rhawn Denniston

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San Diego, CA

Konstantine P. Georgakakos

Rice University

**Civil & Environmental
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College of Engineering

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