

# Dissertations Initiative for the Advancement of Climate Change Research (DISCCRS)



## DISCCRS II Symposium Report

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<<http://aslo.org/phd/discrs2sympreport.pdf>>



*"It was the most formative and important meeting I have attended"*  
*DISCCRS II Symposium participant*

**Support**  
**U.S. National Science Foundation NSF**

### **Sponsoring Societies**

**AAG** Association of American Geographers; **AGU** American Geophysical Union;  
**AERE** Association of Environmental and Resource Economics; **AMS** American Meteorological Society;  
**ASLO** American Society of Limnology and Oceanography; **ESA** Ecological Society of America;  
**ESS-ISA** Environmental Studies Section of the International Studies Association;  
**USSEE** U.S. Society for Ecological Economics

## **Rationale**

There is no longer any doubt that humans are having an impact on the complex physical, chemical, biological, and geological processes that collectively determine Earth's climate. Scholars and the public have become increasingly aware that insights from human ecology, economics, geography, political science, psychology, sociology, and other disciplines involving the human dimension of the Earth system are needed to meet the challenges imposed by a changing climate. **DISCCRS** (pronounced “discourse”), the *Dissertations Initiative for the Advancement of Climate Change Research*, jump-starts this integration by helping recent Ph.D. graduates build an international, interdisciplinary network of scholars dedicated to meeting the challenges ahead.

The centerpiece of DISCCRS is a series of annual symposia, the first of which was held in 2003 in Guanica, Puerto Rico. Each symposium draws together a select group of recent Ph.D. graduates from the full spectrum of natural and social sciences for a week of discussion, training, collaboration, and networking. The most recent announcement is posted at <http://www.aslo.org/phd/discrcrposter.pdf>. Anyone conducting climate-change research is invited to join the Ph.D. dissertation registry, and those who have completed a Ph.D. within two years of the application deadline are eligible to apply for the symposium. A public website, <http://aslo.org/phd.html>, is used to register Ph.D. dissertation abstracts and make resources available to a broad global audience. A weekly electronic newsletter transmits announcements and time-sensitive information.

## **DISCCRS II Symposium**

The second DISCCRS Symposium (DISCCRS II) was convened March 26 – April 2, 2006 at the Asilomar Conference Center in Pacific Grove, CA. The symposium was open to graduates who completed their Ph.D. degree between October 1, 2002 – September 30, 2005. Applicants were competitively selected by an interdisciplinary committee of established research scientists. Seventy-eight Ph.D. graduates applied and 38 were invited to participate as DISCCRS II Symposium scholars. Five could not attend due to conflicts with other responsibilities. See Table I for a profile of applicants and invitees.

### *Symposium Scholars*

The thirty-three symposium scholars represented nine countries: United States (19), China (2), Columbia (1), France (2), Germany (4), India (2), Slovenia (1), Spain (1) and the United Kingdom (1). A broad range of academic fields were represented, including biogeochemistry, economics, ecology, geography, modeling, political science, and psychology. A quick scan of Table II, which includes each scholar's Ph.D. dissertation title, indicates the breadth of expertise represented. Approaches ranged from basic to highly applied research. These scholars used a large array of environments as study areas (tropics, deserts, polar regions, Eastern European forests, South American farms, Indonesian households, to name a few) and have investigated and modeled human as well as atmospheric, terrestrial and aquatic systems. Dissertation topics ranged from an economic assessment of carbon sequestration potential in transition countries of Europe to the potential for carbon sequestration via iron fertilization in the Southern Ocean. Studies of land-use change included investigations of butterflies, lizards, phytoplankton,

copepods, wetland species, forests, Antarctic birds, agrarian economies, and urban human populations. Several participants used different paleoclimatological approaches to compare current and past climates.

The symposium began with brief introductions in which each of the scholars described their background and interests, both personal and professional. Over the first two days, scholars presented their doctoral and current research in plenary form. As part of an exercise in communicating across disciplines, scholars were instructed to provide an “alternate” title for their Ph.D. dissertation research, and prepare an 8-minute oral presentation that would be understandable across disciplines. Posters prepared by the scholars were on display throughout the week. In-depth discussions took place during evening poster sessions and also during informal discussions throughout the week. The retreat-style location with on-site meals, housing and conference rooms provided an ideal setting for sustained informal interactions.

### ***Keynote Presentations by Symposium Mentors***

Two mid-career and two fully established researchers were invited to the symposium as mentors. In addition to serving as role models and sharing insights on developing successful interdisciplinary careers, each made a keynote presentation. These talks, which are summarized below, provided a context for discussions that continued through the week.

**Jorge L. Sarmiento** Princeton University: Professor of Atmospheric and Oceanic Sciences (Biogeochemistry), Associated Faculty, Princeton Environmental Institute, Director, Cooperative Institute for Climate Science:

***Global Carbon Sources & Sinks and What it Will Take to Stabilize CO<sub>2</sub> at 550 ppm over the next 50 years.*** Sarmiento outlined various carbon sources and sinks and described work using atmospheric observations to constrain model predictions for air/sea and land/air carbon fluxes. Analysis demonstrates that the putative tropical carbon dioxide sink from terrestrial fertilization may not exist. This, combined with prior research showing no evidence of temperate fertilization, indicates the IPCC TAR land models have greatly overestimated the size of the land sink. Sarmiento went on to describe what could be done to stabilize atmospheric carbon dioxide at 550 ppm over the next 50 years using the “stabilization wedges” described by Pacala, S. and R. Sokolow. 2004. Stabilization wedges: Solving the climate problem for the next 50 years with current technologies. *Science* 305:968-972. Sarmiento pointed out that there is no ‘magic bullet’. Stabilizing atmospheric carbon over the appropriate time frame, even at a level as high as 550 ppm, will require a mix of strategies including: increased energy efficiency; carbon capture and storage; fuel shifting to displace coal; wind and solar for electricity generation; renewable or nuclear energy; and biological sequestration in forests and soils.

**Edward L. Miles** University of Washington: Bloedel Professor of Marine Studies and Public Affairs; Adjunct Professor of Fisheries; Senior Fellow & Co-Director CSES/JISAO:

***So Where Are We (the World) on this Climate Change Problem?*** Miles discussed why countries have such difficulty responding effectively to environmental problems – such as global warming – that have long time scales, focusing in particular on how the large costs, major lifestyle changes, significant distributive inequities, and difficulties of identifying the long-term impacts of policy choices create large obstacles to effective policy action. He concluded that, given the immediacy of the threats and the time horizon for developing alternatives to carbon-based fuels, we should develop a strategy of “Buying Time” to push out the horizon of

irreversible impacts. Like Sarmiento, Miles described a plan that would utilize a number of strategies including a carbon-based tax, use of carbon sinks and carbon sequestration, alternative energy, and strategies to protect international competitiveness. Miles also highlighted the need to prepare comprehensively for adaptation to changing climate.

**Lisa Dilling** University of Colorado: CIRES Visiting Fellow at the Center for Science and Technology Policy Research:

***Carbon Governance and Creating Useable Knowledge.*** Dilling stressed that we must move to the deliberate management of carbon in order to mitigate human impacts on the global carbon cycle. After outlining the need for “useable science,” she described a successful model based on the State of the Carbon Cycle Report (SOCCR). The goal of the report was to perform a highly credible scientific synthesis that would be relevant and understandable to non-scientific stakeholders – see <<http://www.ucar.edu/soccr>>. She ended by highlighting the need for effective communication. See Moser and Dilling 2006. *Creating a Climate for Change: Communicating climate change and facilitating social change* – see <<http://www.isse.ucar.edu/communication/>>.

**Leigh Raymond** Purdue University: Assistant Professor of Political Science, Associate Director of the Purdue Climate Change Research Center:

***Market-based Environmental Policies.*** Raymond highlighted the conflicts between ideas and interests in politics, such as “How do ethical values and norms help explain political behavior?” “Why do people cooperate on environmental problems?”; “Why do initial allocations look like they do?” He concluded that property norms, incentives and agencies all matter. See Raymond, 2006. Cutting the “Gordian knot” in climate-change policy. *Energy Policy* 34: 655-658.

### ***Interdisciplinary Research Collaborations***

An interdisciplinary team headed by **Pamela Matson** (Stanford University) was invited to provide a case study of a successful interdisciplinary project involving both the natural and social sciences. In a panel titled **Intensive agriculture, environmental change and sustainability in the Yaqui Valley region of Sonora, Mexico**, Matson and collaborators **Walter Falcon**, **Amy Luers**, and **David Lobell** described rewards, challenges, and techniques of successful international, collaborative interdisciplinary research projects. See <<http://yaquivalley.stanford.edu/>>.

**Ronald Mitchell** used his recent work on environmental treaties as an example of an effective interdisciplinary research project. Mitchell identified one obstacle to addressing climate change internationally as the lack of systematic and comparative analyses of the performance of existing treaties on other environmental issues from which lessons could be drawn. He described development of an interdisciplinary dataset of environmental, legal, political, social, and economic indicators related to hundreds of treaties and corresponding methodological tools that will foster such analyses by a wide range of scholars. See <<http://iea.uoregon.edu/>>.

**Patrick L. Brezonik**, professor of Civil Engineering (University of Minnesota) and visiting program director for Environmental Engineering at the U.S. National Science Foundation (NSF), presented an overview of NSF and led a panel discussion with the four mentors and Matson’s team on elements of successful interdisciplinary proposals. The take-home message from this panel is to choose your collaborators carefully, define the responsibilities of each clearly, be

sensitive to different personalities and cultures, develop a realistic time line, work hard, and be persistent while also enjoying the time with colleagues, friends and family.

### ***Building a Successful Interdisciplinary Career***

**Leigh Raymond** shared his experience developing an interdisciplinary career through a presentation entitled **Am I the only social scientist in the room? Reflections on Interdisciplinarity**. Raymond provided a “view from the trenches” on the rewards of, and successful strategies for, developing an interdisciplinary research career. While noting there are some challenges for interdisciplinarians, such as lack of recognition in own discipline, risks of tokenism, risks of shallowness (only so many hours in a day!) and extra burdens of service, there are many rewards as well. These include unique funding sources, greater chances of “real world” impact, the pleasures of wider knowledge and working with great people, and discovering new conceptual frames and epistemologies for teaching and research. His advice to those beginning interdisciplinary careers included:

- Stay theoretically grounded in your discipline;
- Be narrow and deep; add value to your discipline through your interdisciplinary collaborations;
- See big picture; read and study broadly;
- Find niche/identity through journals, conferences, and memberships;
- Build trust and social capital with collaborators;
- Reach out, but remember your limits;
- Learn to say “No” – control your own research agenda;
- Look for a good “fit” when job hunting; look for a receptive department, strong links across departments;
- Express curiosity and humility.

This same advice was echoed by the other mentors, who also shared their insights on building successful interdisciplinary careers. Perhaps most memorable was **Ed Miles’ Recipe for Success**: *To protect junior faculty and graduate students, choice of a research topic must offer the potential for significant disciplinary advances as well as interdisciplinary ‘added value.’* All agreed that, while there are some unique challenges to interdisciplinary work – including funding challenges, outmoded institutional structures, and obstacles to maintaining sufficient breadth as well as depth – the intellectual rewards of such work, and the personal satisfaction of addressing a major global issue, far outweigh the difficulties.

### ***Communicating across Disciplinary Boundaries and beyond the Ivory Tower***

Communication was identified as a major barrier to interdisciplinary work, and to successful forays beyond the ivory tower. Communication barriers include things as simple as excessive use of unnecessarily confusing jargon and the different meanings that the same word may have in different disciplines, as well as the far deeper difficulties that arise simply from the depth of expertise and length of time needed to understand the intricacies of any of the disciplines that contribute to understanding the causes and consequences of climate change.

Some of the discipline-specific jargon was so ingrained that participants didn’t even recognize it as such until pointed out by others. For example, “counterfactual” (defined in the Merriam-Webster dictionary as “contrary to fact”) was used to refer to a process for assessing the effects of environmental treaties or policies by comparing the behaviors and environmental outcomes

actually observed in the world to an estimate (often called a "thought experiment") of how those behaviors and environmental outcomes would have differed if the treaty or policy being evaluated had never been adopted. Natural and social scientists use "inverse modeling" to mean different things. Physical models are normally used to predict outcomes. An "inverse model" uses observed data to estimate uncertain parameters. Political scientists sometimes use the term "inverse modeling" for the "tolerable windows approach", an analysis that uses normatively defined goals of climate policy to identify global climate policies that are compatible with the goals (see the special issue of *Climatic Change* 56(1-2), 2003). Another term used in many different contexts "vulnerability". Two publications focusing on this topic are available at: <<http://www.cicero.uio.no/media/2682.pdf>> and <<http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1013&context=ucias>>.

Ashley Simons of SeaWeb was invited to the symposium to provide training in communication skills. She also led a panel with Jane Kay of the *San Francisco Chronicle* and Monty Schmitt of the Natural Resources Defense Council on communicating with the press, policy makers, and other non-academic audiences. Participants used both formal and informal sessions to explore and practice communication skills. Words proved to be inadequate and, indeed, superfluous on at least one evening, when the scholars instigated a game of Charades to convey some of the jargon used during the symposium.

### ***Teambuilding***

Because interdisciplinary work involves a high degree of teamwork, the scientific content of the Symposium was enriched with professional training in facilitation techniques, interpersonal communication and teambuilding skills by expert trainer Chris Olex. Techniques were practiced throughout the week.

### ***Small-Group Discussions***

During the week, participants were encouraged to self-select into discussion groups based on mutual interest. Scientific topics included: various issues related to carbon cycling, impact of climate on human health, optimizing global strategies for monitoring ecological, economic and social systems, ecosystem conservation and restoration, mitigation and adaptation, and scale issues. Additional panels and small-group discussions took place on topics spanning the nuts and bolts of interdisciplinary collaboration, publishing interdisciplinary articles, proposal development, time management, balancing personal and professional responsibilities, family issues, career development along different trajectories, conducting policy-relevant research, teaching interdisciplinary courses, and practice sessions on communicating with a non-specialist audience. These sessions were used to practice communication and teambuilding skills learned earlier in the week, and to share experiences and find solutions.

Two websites dealing with early-career resources were highlighted during the discussion groups. These should be of broad interest to students as well as graduates:

- Links to various websites dealing with time management and other early-career issues collated by Robert B. Jackson for the Ecological Society of America's Physiological Ecology Section website: <<http://www.biology.duke.edu/jackson/ecophys/courses.htm>>

- Early-career resources developed through prior DIALOG and DISCCRS symposia for recent Ph.D. graduates: <<http://marcus.whitman.edu/~weilercs/resources/>>

### ***Exercise on Collaborative Interdisciplinary Proposals***

The week's events culminated with proposal teams of 5 to 6 participants each developing interdisciplinary proposals on a research topic that spanned the natural and social sciences and utilized the expertise of all team members. Presentations and discussions earlier in the week provided a solid foundation for this exercise, which proved both challenging and rewarding for all. In 8 to 10 hours spread over three days, each of six teams assembled an impressive proposal dealing with topics as far ranging as impacts of climate change on human health, coastal impacts of climate change and mitigation strategies, and transboundary pollution issues. Each team presented their proposal in plenary sessions on the last day. These were then critiqued by the mentors and the scholars to illustrate and practice constructive feedback.

### ***DISCCRS II Symposium Evaluation***

An evaluation session at the end of the week highlighted the strengths and weaknesses of this year's symposium, providing valuable input for improving content in future years. The scholars' individual ratings of the week averaged 1.5 on a scale of 1 to 5 with 1 = Excellent and 5 = Poor. In total there were 17 E's and 16 VG's. While the week's agenda was quite full, the group agreed that all components should be retained, with perhaps a little time squeezed out of some activities to make room for more free time.

The importance of the informal interactions are more difficult to summarize and quantify. Symposium strengths were highlighted by participant comments, such as:

**Proposal working groups:** *I am surprised at how hard we all worked to make this successful! The participation and ideas of all involved really were key to the symposium, and not easy!*

**Value of the experience as a whole:** *About 5-10 years of trial and error compressed into one week. • It was the most formative and important meeting I have attended. • Not only did I learn a lot about interdisciplinary work and climate change, I also learned a lot about myself, my strengths and weaknesses, and how I work with others. • The high caliber work being done by the other participants has really motivated me....*

**Recommend to others:** *I am very impressed and recommend this training to anyone embarking on an interdisciplinary career. I leave feeling rejuvenated and inspired. Thank you.*

### **DISCCRS III**

**September 8-15, 2007**

**Kohala Center for Pacific Environments**

**Hawai'i Island**

<<http://aslo.org/phd/discrsposter.pdf>>

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**Table I.** Characteristics of graduates who have registered Ph.D. dissertations with DISCCRS, those who applied for the DISCCRS II Symposium, and the invited Symposium Scholars.

**223 Ph.D. Dissertation abstracts submitted to the DISCCRS Registry**

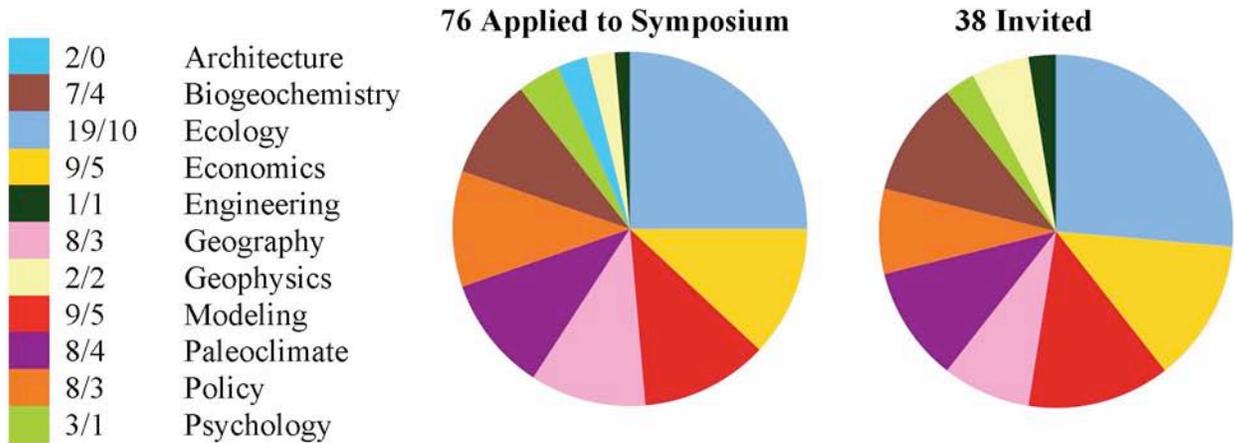
88 American citizens	47% male	53% female
135 Other citizenships	56% male	44% female
129 Ph.D. completed in USA	53% male	47% female

**76 Applied for DISCCRS II Symposium, 38 invited, 33 attended**

**Ratios - Applied/Invited**

47/30	U.S. Ph.D.
29/8	Ph.D. Abroad
36/15	Male
40/23	Female
2/2	U.S. Underrepresented Minority

**Disciplinary Specialties - Applicants & Invitees**



**33 DISCCRS II Symposium Scholars attending:**

**Citizenship:**

19 (58%)	American
8 (22%)	W. European (4 Germany, 2 France, 1 Spain, 1 United Kingdom)
4 (12%)	Asian (2 India, 2 China)
1 (3%)	South of U.S. (1 Colombia)
1 (3%)	E. European (1 Slovakia)

**PhD Received:**

25	United States
7	Western Europe
1	Eastern Europe

**Current Residence:**

25	United States
5	Western Europe
2	Canada
1	South of U.S.

**Table II.** DISCCRS II Symposium Scholars and Ph.D. Dissertation Citations

- Bierwagen, Britta G.** 2003. Ecological and microevolutionary effects of urban land-use change on butterfly dispersal. Univ. of California at Santa Barbara (USA), 381 pp.
- Bizikova, Livia** 2004. Economic assessment of carbon sequestration potential in agriculture and forestry in transition countries of Europe. Univ. of Economics at Bratislava (Slovak Republic), 101 pp.
- Boyd, Emily GK.** 2003. Forests post Kyoto: Global priorities and local realities. Univ. of East Anglia at Norwich (United Kingdom), 200 pp.
- Buckley, Lauren B.** 2005. Lizard distributions on islands: Community ecology and biogeography. Stanford Univ. (USA), 110 pp.
- Cherry, Julia A.** 2004. Effects of herbivory, competition, and disturbance on a wetland plant community with emphasis on the dominant aquatic macrophyte, *Nymphaea odorata* Aiton. Univ. of Alabama at Tuscaloosa (USA), 176 pp.
- Dong, Shenfu** 2004. Interannual variations in the upper ocean heat content and heat transport convergence in the Western North Atlantic. Univ. of Washington (USA), 152 pp.
- Fietz, Susanne** 2005. Recent and fossil phytoplankton pigments in Lake Baikal as markers for community structure and environmental changes. Humboldt Univ. Berlin (Germany), 131 pp.
- Fuessel, Hans-Martin** 2004. Impacts analysis for inverse integrated assessments of climate change. Potsdam Univ. (Germany), 178 pp.
- Guhl, Andres** 2004. Coffee and landscape change in the Colombian countryside 1970-2002. Univ. of Florida (USA), 343 pp.
- Jacques, Peter J.** 2003. A Green peace? Connections between environmental policy and military foreign policy. Northern Arizona Univ. (USA), 212 pp.
- Jenerette, G. Darrel** 2004. Landscape complexity and ecosystem processes in an urbanized arid region. Arizona State Univ. (USA), 150 pp.
- Jenouvrier, Stephanie** 2004. Influence of environmental variability on demographic strategies of top predator populations. Univ. of Paris VI (France), 400 pp.
- Johnson, Catherine L.** 2003. Dormancy in an eastern boundary current copepod. Univ. of California at San Diego (USA), 149 pp.
- Keil, Alwin** 2004. The socio-economic impact of ENSO-related drought on farm households in Central Sulawesi, Indonesia. Georg-August-Univ. Goettingen (Germany), 226 pp.
- Knowlton, Kim M.** 2005. Mortality in Metropolitan New York under a changing climate. Columbia Univ. (USA), 240 pp.
- Kueppers, Lara M.** 2003. Forest carbon cycling along an elevation gradient: The influence of species and climate. Univ. of California at Berkeley (USA), 230 pp.
- Leiserowitz, Anthony A.** 2003. Global warming in the American mind: The roles of affect, imagery, and worldviews in risk perception, policy preferences and behavior. Univ. of Oregon (USA), 210 pp.
- Lewis, Joanna I.** 2005. From technology transfer to local manufacturing: China's emergence in the global wind power industry. Univ. of California, Berkeley (USA), 356 pp.
- Meskhidze, Nicholas** 2003. Iron mobilization in mineral dust and the possible effect of Asian pollution on C-uptake in North Pacific Ocean. Georgia Inst. of Technology (USA), 173 pp.
- Mladenov, Natalie** 2004. Evaluating the effects of hydrologic change in the Okavango Delta of Botswana: Analyses of aquatic organic matter transport and ecosystem economics. Univ. of Colorado (USA), 109 pp.
- Mouriño, Beatriz** 2002. Mesoscale features (seamounts, oceanic fronts and cyclonic rings) in the NE subtropical Atlantic: Their role in the carbon budget of the euphotic layer. Universidade de Vigo (Spain), 133 pp.
- Naik, Vaishali** 2003. Interactions of the terrestrial biosphere with climate and atmospheric chemistry. Univ. of Illinois at Urbana-Champaign (USA), 128 pp.
- Petron, Gabrielle B.** 2003. Inverse modeling of carbon monoxide surface sources. Univ. Pierre & Marie Curie (France), 252 pp.
- Potito, Aaron P.** 2005. A combined paleolimnological and dendroclimatological study on climate change and impacts in the eastern Sierra Nevada, California. Univ. of California at Los Angeles (USA), 209 pp.
- Poulter, Benjamin** 2005. Interactions between landscape disturbance and gradual environmental change: Plant community migration in response to fire and sea-level rise. Duke Univ. (USA), 216 pp.
- Pressley, Shelley N.** 2004. Isoprene flux measurements above a northern hardwood forest. Washington State Univ. (USA), 164 pp.
- Roy, Shouraseni Sen** 2005. An analysis of the spatio-temporal patterns of precipitation in India. Arizona St Univ. (USA), 150 pp.
- Schlenker, Wolfram** 2003. The optimal pricing of natural resources. Univ. of California at Berkeley (USA), 148 pp.
- Schwarz, Jodi A.** 2002. Cellular and molecular aspects of cnidarian-algal symbioses. Oregon State Univ. (USA), 121 pp.
- Shinker, Jacqueline J.** 2003. Mechanistic controls of North American climate variability. Univ. of Oregon (USA), 152 pp.
- Steiner, Allison L.** 2003. The influence of atmospheric chemistry and climate on atmosphere-biosphere interactions. Georgia Inst. of Technology (USA), 133 pp.
- Thompson, William G.** 2004. A 250,000-year record of sea level and climate from open-system coral ages. Columbia Univ. (USA), 133 pp.
- Wang, Jun** 2005. Air quality and radiative impacts of long-range transported aerosols over the southeastern United States. Univ. of Alabama in Huntsville (USA), 161 pp.