NARCCAP

North American Regional Climate Change Assessment Program

NCAR

The Second Users' Workshop

September 10 - 11, 2009
National Center for Atmospheric Research
Boulder, Colorado

NARCCAP USERS' MEETING

September 10 - 11, 2009

Foothills Laboratory, EOL Atrium

NCAR

AGENDA

THURSDAY

8:15 a.m.	Shuttles depart from Golden Buff to Foothills Lab
08:30 – 09:00	Pick up registration materials, badges, and t-shirts
09:00 – 09:30	Welcome and overview of NARCCAP – Linda Mearns
09:30 – 10:30	Introductions by attendees (3-5 minutes each) – attendees give brief summaries of their research interests and plans for using NARCCAP data
10:30 – 10:45	*Break*
10:45 – 12:30	Introductions by attendees continue
12:30 – 13:30	*Lunch*
13:30 – 14:30	Data overview and tutorial – Seth McGinnis
14:30 – 16:45	About the RCMs – Representatives from each RCM group will talk for 20 minutes about the important features of their RCM and what users ought to know about it.
14:30 – 14:50	HRM3 – Richard Jones or TBD
14:50 – 15:10	CRCM – Sebasitien Biner
15:10 – 15:30	MM5I – Bill Gutowski
15:30 – 15:45	*Break*
15:45 – 16:05	WRFP – Ruby Leung
16:05 – 16:25	ECPC – Ana Nunes
16:25 – 16:45	RCM3 – Lisa Sloan
16:45 – 17:30	Panel discussion with regional climate modelers
17:30 – 18:00	Meeting adjourns – transportation to Mesa Lab
18:00 – 18:30	*Poster session and drinks at Mesa Lab*
18:30 – 20:15	*Dinner and poster session (cont'd)*
20:15	Shuttles return to Golden Buff and Marriott Residence Inn

FRIDAY

8:30 a.m.	Shuttles depart from Golden Buff to Foothills Lab
09:00 – 09:30	Overview of results of NCEP-driven RCM simulations – Bill Gutowski
09:30 – 10:00	Evaluation of additional RCM results and some AOGCM-driven results – Melissa Bukovsky
10:00 – 10:30	Climate change results – Linda Mearns
10:30 – 10:45	*Break – collect suggestions for small group discussion topics*
10:45 – 11:15	Quantifying uncertainty – Steve Sain
11:15 – 12:30	Participant talks (15 minutes each)
11:15 – 11:30	Comparison of NARCCAP GFDL timeslice and CRCM results with GHCN and GOES satellite observations – Randy Alliss
11:30 – 11:45	Preliminary intercomparison results for NARCCAP, other RCMs, and statistical down scaling over southern Quebec – Philippe Gachon
11:45 – 12:00	Regional climate decision aids based on NARCCAP data – Glenn Higgins
12:00 – 12:15	NCEP-driven NARCCAP results vs. observations for British Columbia – Trevor Murdock
12:15 – 12:30	Regional Climate Model reproduction of atmospheric teleconnections over North America – Philippe Roy
12:30 – 13:30	*Lunch*
13:30 – 14:30	Small group discussions
14:30 – 14:55	Report-outs from small groups
14:55 – 15:00	Final wrap-up
15:00	Meeting adjourns

P I
BIOGRAPHIES

- ☐ Linda Mearns
- ☐ Sebastien Biner
- ☐ Melissa Bukovsky
- ☐ Daniel Caya
  Philip Duffy
- ☐ William Gutowski
  Isaac Held
  Richard Jones
- ☐ Ruby Leung
- ☐ Larry McDaniel
- ☐ Seth McGinnis
  Don Middleton
- ☐ Ana Nunes
  John Roads
- ☐ Stephan Sain
- ☐ Lisa Cirbus Sloan
  Eugene Tackle

☐ Attending PIs

LINDA O MEARNS

Linda O. Mearns is Director of the Weather and Climate Impacts Assessment Science Program (WCIASP) within the Institute for Mathematics Applied to Geosciences and Senior Scientist at the National Center for Atmospheric Research, Boulder, Colorado. She served as Director of the Institute for the Study of Society and Environment (ISSE) for three years ending in April 2008. She holds a Ph.D. in Geography/Climatology from UCLA. She has performed research and published mainly in the areas of climate change scenario formation, quantifying uncertainties, and climate change impacts on agro-ecosystems. She has particularly worked extensively with regional climate models. She has most recently published papers on the effect of uncertainty in climate change scenarios on agricultural and economic impacts of climate change, and quantifying uncertainty of regional climate change. She has been an author in the IPCC Climate Change 1995, 2001, and 2007 Assessments regarding climate variability, impacts of climate change on agriculture, regional projections of climate change, climate scenarios, and uncertainty in future projections of climate change. For the 2007 Report(s) she was Lead Author for the chapter on Regional Projections of Climate Change in Working Group 1 and for the chapter on New Assessment Methods in Working Group 2. She has also been an author on two Synthesis Products of the US Climate Change Science Program. She leads the multi-agency supported North American Regional Climate Change Assessment Program (NARCCAP), which is providing multiple high-resolution climate change scenarios for the North American impacts community. She is a member of the National Research Council Climate Research Committee (CRC) and Human Dimensions of Global Change (HDGC) Committee, and the NAS Panel on Adaptation as part of the America's Climate Choices Program. She was made a Fellow of the American Meteorological Society in January 2006.

SÉBASTIEN BINER

Sébastian Biner is a climate simulation specialist for the Ouranos Consortium in Montréal, Canada. As such, he contributes to the production, analysis and improvement of the regional climate simulations used by Ouranos users and partners. Scientifically, he is particularly interested in studies related to the internal variability, added value and uncertainties of Regional Climate Models. He is also strongly involved in maintaining and improving the operational infrastructure at Ouranos and in the distribution of climate simulation data. Sébastian is co-supervising graduate students and supervising interns. He has a M.Sc in atmospheric sciences and a B.Sc in physics from the Université du Québec á Montréal. Sébastian is a father of two and a ski and cycling enthusiast.

MELISSA BUKOVSKY

Melissa Bukovsky is a Postdoctoral Fellow at the National Center for Atmospheric Research working with the NARCCAP project. She recently finished her Ph.D. at the University of Oklahoma where she ran the WRF as a regional climate model to assess the impacts of climate change on precipitation over the United States. Aside from a direct interest in regional climate modeling and model diagnostics, Melissa is also interested in the impacts of climate change on water resources, various ecosystems, and urban populations.

Melissa is working to establish the credibility of the NARCCAP simulations and assess the uncertainty involved in projecting climate change using the simulations.

DANIEL CAYA

Daniel Caya holds a degree in Atmospheric Science from UQAM, and began his career as a consultant in meteorology and atmospheric science with a private firm. After earning his PhD in Environmental Science from UQAM, he headed the Canadian Regional Climate Modelling Network from 1997 to 2001. In 2001, Ouranos appointed him to plan, develop and manage the Canadian climate modelling program. Since then he has been directing the Climate Simulation group, in charge of developing and producing regional climate projections for Canadian scientists. Mr. Caya is also an associate professor at the regional climate study and modelling centre (ESCER) at UQÀM, at INRS-ETE and at ISMER (UQAR). He remains very involved in training highly skilled staff to maintain Canadian expertise in regional climate simulation.

PHILIP B. DUFFY

Dr. Duffy joined Climate Central in 2008 as the Scientific Director of the Palo Alto Office and Senior Research Scientist. Previously he had worked at the Lawrence Livermore National Laboratory, where he was a physicist for 22 years. He is the founder and director of the University of California Institute for Research on Climate Change and its Societal Impacts, and an Adjunct Associate Professor at UC Merced. Dr. Duffy has a A.B. degree from Harvard in Astrophysics, and a Ph.D. from Stanford in Applied Physics. Dr. Duffy is a member of the Nobel-honored Intergovernmental Panel on Climate Change (IPCC). He has published over 50 peer-reviewed papers on many aspects of climate science. His recent work has focused on increasing the spatial resolution of climate projections, to make them more suitable for assessing potential societal impacts of climate change.

WILLIAM J. GUTOWSKI, JR.

William J. Gutowski, Jr. is Professor of Atmospheric Science in the Department of Geological and Atmospheric Sciences at Iowa State University. His research concentrates on the role of atmospheric dynamics in climate, with a focus on the dynamics of the hydrologic cycle and regional climate. Dr. Gutowski's research program entails a variety of modeling and data analysis approaches to capture the necessary spatial and temporal scales of these dynamics and involves working through the Regional Climate Modeling Laboratory at Iowa State University. His work also includes regional modeling of Arctic, African, and East Asian climates, in which he collaborates with scientists from these regions.

Dr. Gutowski currently serves as an Editor for the Journal of Hydrometeorology. He was a Lead Author for two U.S. Climate Change Science Program reports (CCSP 3-1, Climate Models: An Assessment of Strengths and Limitations; CCSP 3-3, Weather and Climate Extremes in a Changing Climate) and a contributing author to the IPCC Third and Fourth Assessment Reports. In addition, he was a member of the U.S. National Academy/Transportation Research Board panel to study the impacts of climate change on transportation. Dr. Gutowski received a Ph.D. degree in meteorology from the Massachusetts Institute of Technology and a Bachelor of Science degree in astronomy and physics from Yale University.

ISAAC HELD

Dr. Isaac Held is a Senior Research Scientist at NOAA's Geophysical Fluid Dynamics Laboratory, where he conducts research on climate dynamics and climate modeling, and is head of the Weather and Atmospheric Dynamics Group. He is also a lecturer with rank of Professor at Princeton University, in its Atmospheric and Oceanic Sciences Program, and is an Associate Faculty member in Princeton's Applied and Computational Mathematics Program and in the Princeton Environmental Institute. Dr. Held is a Fellow of the American Meteorological Society (1991) and the American Geophysical Union (1995), and a member of the National Academy of Sciences (2003). He recently received the AMS Carl Gustav Rossby Gold Medal (2008). He was a lead author of Ch.11 of the WG1 AR4 report on regional projections. He is particularly interested in the connections between planetary scale aspects of climatic responses and regional issues. He has coordinated the contribution of GFDL to NARCCAP, working with Bruce Wyman both to provide time-resolution output from GFDL's AR4 model (CM2.1) for downscaling and to provide data over North America from a time slice simulation with a ~50km version of AM2.1, the atmospheric component of the GFDL model.

RICHARD JONES

Richard Jones is manager of regional predictions at the Meteorological Office Hadley Centre. His main responsibilities are to provide state of the art regional climate modelling systems and to provide and analyse regional climate change scenarios and advice on these as required under contracts for various UK government departments and international bodies. He developed regional climate modelling in the Hadley Centre involving development of a consistent GCM/RCM modelling system; domain-size experiments; climate simulations driven by numerical weather prediction analyses; multi-decade regional climate change experiments; development of GCMs to provide high quality boundary conditions for RCMs; ensemble regional climate change experiments. He is a lead or major contributing author to many publications in regional climate modelling and was a lead author of the IPCC Assessment Reports Three and Four. He led the development of the regional climate modelling system PRECIS, has worked with many European institutes and is currently working with institutes across all continents in the fields of climate prediction and climate scenario development and application. In the NARCCAP project he is responsible for providing boundary conditions from Hadley Centre global climate model projections for downscaling by NARCCAP RCMs, for downscaling the GCMs used in NARCCAP with PRECIS and assisting with interpretation of the model projections.

RUBY LEUNG

Ruby Leung is a Laboratory Fellow at the Pacific Northwest National Laboratory (PNNL) and an Affiliate Scientist at the National Center for Atmospheric Research. She received her MS and Ph.D. in Atmospheric Science from the Texas A&M University in 1988 and 1991. Her primary research focus is in regional climate modeling. In the early 1990's, Dr. Leung developed a regional climate model with special features that account for the subgrid scale effects of topography, lake and vegetation. Her model enables the coupling of climate and hydrologic processes in regions with complex orography. Dr. Leung has led several multi-disciplinary projects to examine the impacts of climate variability and change and the effects of aerosols on the regional hydrological cycle. In 2001, Dr. Leung organized the Workshop on "Regional Climate Research: Needs and Opportunities" co-sponsored by the National Science Foundation and Department of Energy to examine various approaches to modeling regional climate. More recently, she is working with collaborators at NCAR to develop regional climate modeling capability with the Weather Research and Forecasting (WRF) model. She organized the Workshop on "Research Needs and Directions of Regional Climate Modeling Using WRF and CCSM" in 2005. The workshop identified the needs to develop capability for high resolution modeling, regional earth system modeling and up scaling. Dr. Leung's role in NARCCAP is to perform dynamical downscaling using the WRF model, and to participate in evaluation and intercompari8son of dynamical downscaled climate change scenarios for North America.

LARRY MCDANIEL

Larry McDaniel is a software engineer in ISP who has worked on climate, climate change and climate impact on agriculture for the past twenty years here at NCAR. He prepares data sets (observed and model output) for use in agricultural models, heat wave studies as well as other projects. Along with Seth McGinnis, he is doing the quality checking of the model data to be published on the Earth System Grid.
Larry plans to use the NARCCAP data for the above purposes as well as for health and heat waves.

SETH MCGINNIS

Seth McGinnis has worked as an Associate Scientist in ISSE at NCAR since 2003, shortly after he received his Ph.D. in geophysics from CU-Boulder. He has a strong background in computer programming and works on a variety of projects related to making atmospheric science data accessible and usable to end-users of all types. His role in NARCCAP, along with Larry McDaniel, is to quality check (QC) the model data as it is submitted for archiving and publication, checking for errors and ensuring that it meets the formatting and metadata requirements of the project.

DON MIDDLETON

Don E. Middleton leads the Visualization and Enabling Technologies Section in NCAR's Computational and Information Systems Laboratory. He is responsible for developing and managing an emerging technologies program that encompasses data and knowledge management, analysis and visualization, collaborative visual computing environments, Grid computing, digital preservation, and education and outreach activities. Don's professional interests center on the frontiers of managing, preserving, and analyzing large, complex earth system datasets and communication using advanced visual technologies. Don is currently serving in a PI or co-PI capacity on a number of projects, including: the Earth System Grid, the Earth System Curator, the Virtual Solar Terrestrial Observatory, the North American Regional Climate Change Assessment Program, the Cooperative Arctic Data and Information Service, and NCAR's Cyberinfrastructure Strategic Initiative. Don recently completed a term on a National Research Council committee for NEES/NEESGrid and Earthquake Engineering and was a contributing author for the new publication, The Visualization Handbook.

ANA NUNES

Dr. Ana Nunes is a weather/climate modeler at the Experimental Climate Prediction Center (ECPC) at the Scripps Institution of Oceanography. Formerly, she worked with the Modeling Development Division of the Center of Weather Prediction and Climate Studies at the National Institute for Space Research in Brazil, which is considered one of the most prestigious scientific institutions in South America. One of the subjects of her research is improving our understanding of atmospheric dynamics, and dynamical downscaling in particular, via the assimilation of precipitation, as well as the applications of precipitation assimilation to water cycle modeling.
Dr. Nunes is a member of the NARCCAP team, and in charge of the ECPC-Regional Spectral Model (RSM) participation in this program.

JOHN ROADS*

Dr. John Roads is a Senior Scripps Research Meteorologist, Sr. Lecturer and Director of the Experimental Climate Prediction Center (ECPC) at the Scripps Institution of Oceanography, University of California, San Diego. He is also the co-chair of the Global Energy and Water-cycle Experiment (GEWEX) Coordinated Energy and water-cycle Project (CEOP). Dr. Roads was a previous chair of the National Centers For Environmental Research (NCEP) Regional Reanalysis Scientific Advisory Committee, several international Regional Spectral Model workshops, and the National Research Council GEWEX committee. He has also been a Principal Investigator on many NOAA, NASA, USFS; and other US agency grants. He is a Fellow of the AMS and has published more than 140 refereed articles. Dr. Roads is the ECPC principal investigator in charge of contributing the Regional Spectral Model (RSM) simulations to NARCCAP.

*Regrettably, Dr. John Roads died in June, 2008

STEPHAN SAIN

Stephan R. Sain is the head of the Geophysical Statistics Project in the Institute for Mathematics Applied to Geosciences at the National Center for Atmospheric Research. He received undergraduate degrees in mathematical sciences and statistics as well as a masters and PhD in statistics from Rice University in Houston, TX. His research area involves nonparametric function estimation, spatial statistics, statistical computing, environmental statistics, and applications in the geosciences. As a NARCCAP co-Pi, he is reasonable for the development of statistical methodology to assess and quantify uncertainty in addition to other statistical issues that arise in the design of the NARCCAP experiments and the analysis of the model output.

LISA CIRBUS SLOAN

Lisa Cirbus Sloan is a Professor of Earth and Planetary Sciences and the Director of the Climate Change and Impacts Laboratory the University of California Santa Cruz (UCSC). She is also the Vice Provost and Dean of Graduate Studies at UCSC. Sloan received her B.S. from Allegheny College and her Ph.D. from Pennsylvania State University, and did postdoctoral work at the University of Michigan. Sloan joined the faculty at UCSC in 1995. Sloan has been the National Secretary of the American Geophysical Union's Ocean Sciences Section, a scientific Fellow of the David and Lucile Packard Foundation, Editor-in-Chief of the international journal Global and Planetary Change, editor of the international journal Paleoceanography, and has co-chaired the National Center for Atmospheric Research's Paleoclimate Working Group. She has served and continues to serve on and many national scientific advisory boards that deal with past and future climate change as well as scientific computing challenges. Sloan's research is concentrated in two broad areas: (1) understanding the mechanisms of climate changes in the geologic past and (2) studying and modeling future climate change at regional scales and investigating the possible impacts of future climate change on human and natural
systems. She has authored or coauthored more than 60 peer-reviewed articles and book chapters, and is a frequent public speaker in California on issues of climate change. For more information, see http://www.es.ucsc.edu/~lcsloan/

EUGENE S. TACKLE

Eugene S. Tackle is professor of Atmospheric Sciences and Agricultural Meteorology at Iowa State University.
Eugene's current climate-related research includes both basic research on climate change and impacts of climate change. Basic research centers on how the features of the earth surface influence turbulent flow and exchange processes that influence surface momentum, energy, and moisture fluxes. Research on climate-change impacts includes assessing the interactive roles of climate and land-manager choices on land-use/land-cover change in agricultural area, development and evaluation of downscaling tools for near-surface flow and impacts of climate change on wind power, evaluating effects of climate changes on Midwest agroecosystems using a climate-crop coupled model, and assessment of variability and trends in Iowa climate data on pavement performance by use of a mechanistic-empirical pavement design model. The land-use/land-cover project uses SWAT (Soil and Water Assessment Tool) to simulate stream flow in large complex watersheds in agricultural areas under current and future scenario climates. Changes in surface wind speed and wind power over the 20th and 21st Centuries are explored through use of statistical downscaling and regional climate models. By coupling crop models with regional climate models we explore the impact of crop selection on carbon uptake and evapotranspiration over the Midwest during the growing season. Roadways in Iowa have been designed under assumptions of average climate conditions that do not reflect actual climate variability or future climate change. Working with civil engineers we are using a standard pavement design model to explore expected changes in various roadway failure modes under actual variability and projected trends in climate over the next 60 years.
Eugene's role in NARCCAP is as part of the ISU team organizing and analyzing the reanalysis-driven runs and contributing to the scenario-driven runs. A central focus is promoting appropriate and effective use of regional climate model information in impacts studies.

USERS BIOGRAPHIES AND INTERESTS

Randall J. Alliss
Valentine Anantharaj
Joseph Barsugli
Loubna Benyahya
Jared Bowden
Levi Brekke
Neil Comer
Patrice Constanza
Neil Davis
Philippe Gachon
Evan Girvetz
Chuck Hakkarinen
Healy Hamilton
Glenn Higgins
Kathleen D. Holman
John Horel
Norman Johns
Renu Joseph
Linda Joyce
Daniel Kirk-Davidoff
Jay Hestbeck
Katie Lavigne
Brian Lazar
Tim Mayer
Trevor Murdock
Lareau Neil
Jim Prairie
Imtiaz Rangwala
Betsy Reardon
Kevin Robbins
Philippe Roy
Nadine Salzmann
Willis Shem
Lydia Stefanova
Steve Vavrus
Chris Weaver
Shuang-Ye Wu

Randall J. Alliss
Northrop Grumman - TASC

Biographical sketch: My background is in Atmospheric Science. I hold a PhD from North Carolina State University. I am the manager of the atmospheric effects section at Northrop Grumman in Chantilly, Va. Our company is looking at the impacts of climate change on its business.

Research Interests: Our research includes the development of regional climate simulations over the mid-atlantic states in order to develop climate decision aids for policy making.

Valentine Anantharaj
Mississippi State University

Biographical sketch: Valentine Anantharaj is an atmospheric scientist at the GeoResources Institute in Mississippi State University (MSU). In his current role as a research project manager, he manages several research activities funded by NASA Applied Sciences Program and the NOAA Office of Atmospheric Research. His current research interests are centered on global change and land-atmospheric interactions. His professional interests are also focused on transitioning research results into operations. He is also a skilled software engineer who played a key role in one of the first major data sharing projects on the internet, the Master Environmental Library, sponsored by the Defense Modeling and Simulations Office. Mr. Anantharaj has been recognized with many organizational awards, including the 2008 Research Award from the Office of the Vice President for Research at MSU. During 2003-2005, he was one of the recipients of the NASA EIGS Graduate Fellowship award.

Research Interests: The forest and wetlands ecosystems along the coasts of the Northern Gulf of Mexico are faced with increased stress from a changing climate. The forest management specialists are in need of relevant regional future climate projects at spatial scales that are meaningful for their decision making. The available IPCC AR4 climate assessments are at spatial scales that are too coarse for the decision making needs of the Gulf Coast. Most of natural and ecological resource management needs to be at ecologically and hydrologically relevant regional scales. Hence, we plan to dynamically downscale selected IPCC AR4 simulations for regional climate projections. We will incorporate the new climate projections into LANDIS, a Decision Support Tool (DST) for forest ecosystems management, in order to facilitate decision-making under past, present, and future regional climate scenarios at relevant spatial scales.

Joseph Barsugli
CIRES, Univ. of Colorado and Western Water Assessment

Biographical sketch: Joe Barsugli is a Research Scientist at the Cooperative Institute for Research in the Environmental Sciences (CIRES) at the University of Colorado, Boulder. He received his Ph.D. in Atmospheric Sciences from the University of Washington in Seattle on the theory of atmosphere-ocean interactions. His research has ranged from the role of sea-ice during the last Ice Age, to the effects of El Nino on individual storms, to the impacts of Tropcial Ocean “hot spots” in climate change. Joe works with the Western Water Assessment on the use of weather forecasts and climate change projections to inform water resources planning in the West. He is one of the lead authors of “Climate Change in Colorado: A Synthesis to support Water Resources Management and Adaptation.”

Research Interests: Incorporating NARCCAP projections into climate change assessments. Using NARCCAP in climate impacts studies. Synthesizing NARCCAP model data with other sources of climate change information.

Loubna Benyahya

ESCER Center, UQÀM

Biographical sketch: Loubna Benyahya graduated (Ph. D) from the Institut National de la Recherche Scientifique (INRS-ETE) of Québec in 2007. Her research was carried out in the Chair on Statistical Hydrology. Loubna Benyahya's thesis developed and tested new statistical approaches for water temperature modeling. From 2007 to 2009, Dr Benyahya has worked as Postdoctoral Researcher in Civil and Water Resources Engineering at Dalhousie University. One of the major aspects of her work was the principal investigator of water temperature modeling and frequency analysis of low flow projects in collaboration with Department of Fisheries and Oceans Canada. Currently, Loubna Benyahya is a Postdoctoral Researcher at UQÀM's ESCER Center under the direction of Professors René Laprise and Philippe Gachon. Her work focuses on the evaluation of the dynamical downscaling method (RCM) to further reconstruct observed extremes for the Quebec region, as well as to give plausible future scenarios.

Research Interests: Climate modelling and analysis, including extremes, and downscaling methods
Statistical modeling of hydrometeorological variables; Analysis of hydrometeorological extremes

Jared Bowden

EPA / NRC Postdoc

Biographical sketch: Jared Bowden is currently a National Research Council Postdoc working to help create dynamical downscaling capabilities within the Environmental Protection Agency. Born in Rocky Mount, NC he received his B.S. in Meteorology and Marine Science in 2002 from North Carolina State University. As an undergraduate, he was active in the student and central chapter of the American Meteorology Society and participated in the research experience for undergraduate program.
His M.S. and Ph.D. work at North Carolina State University centered on the Greater Horn of Africa region. The M.S. research focused on empirical analysis of intraseasonal variability of rainfall and SST. For his PhD., Jared began to pursue regional climate modeling over the Greater Horn of Africa. The approach evaluated GCMs and a dynamically downscaled GCM to evaluate potential climate change. Jared has several publications and expects to have several more publications from his dissertation.

Research Interests: Being a young scientist I have many interests in climate science in general.
I have an interest in regional climate modeling and climate change with particular focus on the model uncertainty for impact, vulnerability and adaption assessments. Particular interest is the large scale uncertainty (from GCMs) and the ramifications on regional climate including the dynamical mechanisms associated with the variability and change.
Interests also include lateral boundary problems associated with regional climate modeling, four dimensional data assimilation for regional climate modeling applications, potential land-use changes effect on local climate, the indirect radiative effect on local climate, and stochastic modeling.

Levi Brekke

Bureau of Reclamation

Biographical sketch: Hydraulic Engineer
Water Resources Planning & Operations Support (86-68210)
Technical Services Center
Bureau of Reclamation, Denver, CO
Levi Brekke has been working with Reclamation since 2003 and currently works at the Technical Service Center in Denver. His work focuses on reservoir systems analysis, technical team coordination, and conducting research on climate information applications. Levi's education includes a B.S.E. in Civil Engineering (The University of Iowa), M.S. in Environmental Science and Engineering (Stanford University), and Ph.D. in Water Resources Engineering (University of California Berkeley). Levi's work experience also includes consulting in the areas of wastewater and water treatment engineering.

Research Interests: Climate projections downscaling, climate change impacts and risk assessment for water resources, seasonal climate forecast applications

Neil Comer

Environment Canada- AIRD

Biographical sketch: Currently climatologist and manager of the Canadian Climate Change Scenarios Network of the Adaptation and Impacts Research Division (AIRD) of Environment Canada.
Academic history:
Ph.D. Climate Modelling, McGill University
M.Sc. Climate Modelling, McGill University
B.Sc. Geography / Atmospheric Science, York University

Research Interests: Managing and coordinating the Canadian Climate Change Scenarios Network (CCCSN.CA), Contribute to the national development of the Canadian Atmospheric Hazards Network (HAZARDS.CA), Provide advice, interpretation, and instruction on the use of climate change model results for adaptation studies.

Patrice Constanza

McGill/GEC3/DRI

Biographical sketch: Postgraduated from the university of Norwich (UK) in the MSC for climate change, graduated from the university of Reading (UK) in the BSc for Meteorology, and graduated from the university of Montpellier (France) in the DUT in computer sciences (similar to BSc)

Research Interests: Development and improvement of the Data Access & Integration (DAI) webservices
to provide a greater choice of data, to improve the user friendly aspect of the webservices and to improve the help provided to scientists for the analysis of the data

Neil Davis

Institute for the Environment University of North Carolina - Chapel Hill

Biographical sketch: Received B.S. from Valparaiso University in Meteorology, and M.S. from North Carolina State University in Atmospheric Science with focus on Regional Climate modeling. Past 2 years spend working for the Institute for the Environment mainly providing meteorological inputs for Air Quality simulations.

Research Interests: The joining of air quality research with climate simulations. With a particular focus on regional climate modeling.

Philippe Gachon

Environment Canada

Biographical sketch: Philippe Gachon is a Research Scientist within the Adaptation and Impacts Research Division of Environment Canada (EC). In the last six years, he has been leading various projects on statistical downscaling methods, climate extremes analysis and climate scenario development. Dr. Gachon was the co-investigator of the Canadian Climate Impacts Scenarios (CCIS) project, and more recently he is a co-investigator of the EC Canadian Climate Change Scenarios Network (CCCSN). He is co-Principal investigator of NSERC Special Research Opportunity program funded project entitled “Probabilistic assessment of regional changes in climate variability and extremes” whose main objectives are to develop and apply new statistical downscaling methods, to compare those methods with dynamical downscaling models (i.e. Regional Climate Models), and to develop high resolution scenarios of extremes across Canada, with a quantification of various sources of uncertainties.

Research Interests: Climate scenarios development at high resolution, Statistical downscaling methods, Extremes and trends analysis: temperature (heat spells), precipitation (occurrence, intensity and duration of heavy precipitation events), winds and hydrologic variables (low/high flow), Assessment of Regional Climate Models: reconstructed observed extremes and projected extreme climate events over Canada Large/Mesoscale atmospheric dynamics and their interactions with regional climate variability and changes

Evan Girvetz

University of Washington

Biographical sketch: Evan Girvetz is a postdoctoral research associate in the College of Forest Resources at the University of Washington. He is a lead developer of the ClimateWizard climate change analysis tool (http://ClimateWizard.org, http://faculty.washington.edu/girvetz/ClimateWizard). Evan has produced climate change analyses for a variety of conservation planning efforts, including the Southwest Climate Change Initiative (SWCCI), a multi-stakeholder adaptation planning effort lead by The Nature Conservancy (http://faculty.washington.edu/girvetz/ClimateWizard/SWCCI/). He has extensive experience presenting on climate-change analysis, and facilitating the use of ClimateWizard analysis products with a wide range of groups. Evan was an invited expert to the WWF climate camp (2008), and is also a member of a The Nature Conservancy's climate change adaption working group.

Research Interests: Climate change impacts and adaptation assessment; Landscape Ecology; Geographic Information Systems; Decision support tool development; Statistical Analysis

Chuck Hakkarinen

Biographical sketch: Chuck Hakkarinen retired in 2002 from the Electric Power Research Institute in Palo Alto, California after a 30-year career in the Environment Division. During his career, Chuck managed more than 100 research projects in the geophysical environmental sciences, including local and regional air pollution modeling, atmospheric chemistry, acid rain, global and regional climate modeling. Chuck has served on the NSF Allocation Panel for its Climate Simulation Laboratory since its inception, and currently serves as Panel Chair. He is a member of the AMS Committee on Climate Services, and provides pro bono services as webmaster for the local chapter of the California Society of Health System Pharmacists and the American Cancer Society's Northern California Pain Initiative.
Chuck splits his time between home in Belmont, California and vacation condo in Silverthorne, Colorado, where he serves on the Condo Association Board of Directors and is also the treasurer and webmaster.

Research Interests: Application of web-based geo-referenced data servers (hardware and software) to the visual display, intercomparison, and evaluation of global and regional climate data and modeling results.

Healy Hamilton

California Academy of Sciences

Biographical sketch: Healy Hamilton is the Director of the Center for Biodiversity Research (CBR) at the California Academy of Sciences, the world's greenest museum. CBR focuses on conservation applications of musuem biodiversity data, with an emphasis on mapping patterns of biodiversity and modeling species geographic response to climate change for conservation planning. Current projects include advanced science visualizations of climate impacts on biodiversity for educational exhibits. Hamilton is a former Fulbright fellow with a masters degree in Environmental Studies from Yale and a PhD in Evolutionary Biology from UC Berkeley. When she is not sitting in front of her computer she is searching for fin clippings of seahorses for genetic analysis.

Research Interests: Our lab is specifically addressing approaches to reducing uncertainty in forecasting climate impacts to biodiversity. We have embraced ensemble modeling approaches, and have generated a GIS dataset of over 14,000 future climate surfaces for input into species distribution modeling algorithms, derived from statistical downscaling of CMIP3 GCMs to 10km2 spatial resolution for the terrestrial globe. We are also developing an uncertainty index for environmental data derived from analyses of weather station density, topographic heterogeneity, and temporal climactic variability. These efforts help to quantify the degree of model agreement as well as the degree of uncertainty in predicting the biogeography of climate change.

Jay Hestbeck

U. S. Geological Survey

Biographical sketch: I am the Central Region Biology Science Coordinator. This position is in the Regional Science Office which is located in the Denver Federal Center. I have held positions as the Center Director of the Northern Prairie Wildlife Research Center, Chief of Research at Patuxent Wildlife Research Center, and Leader of the Massachusetts Cooperative Research Unit. I have a Ph.D. from University of California - Davis. I'm working with the DOI bureaus to help coordinate land management activities for climate change adaptation.

Research Interests: Present interests include biological parameter estimates from regional down-scaled GCM data and use of biological data to project landscape changes for plants, fish, and wildlife.

Glenn Higgins
Northrop Grumman

Biographical sketch: Mr. Higgins is manager of the Atmospheric Sciences and Engineering Department within Northrop Grumman Information Systems. He is currently principal investigator of Northrop Grumman's Climate Modeling and Decision Aids activities. His department is also responsible for climate related programs for NASA Goddard, the DoD, and other government organizations.

Research Interests: Interests include regional climate modeling and decision aids for climate models. Other interests include remote sensing, numerical weather prediction, high performance computing, and high performance networking.

Kathleen D. Holman
University of Wisconsin, Madison

Biographical sketch: I am currently enrolled as a third year graduate student at the University of Wisconsin - Madison. I have a Bachelor' Degree in Mathematics. During my final year of undergrad, I completed a short-term position as a project assistant investigating the effects of evaporation on the energy budget of Sparkling Lake, located in northern Wisconsin. The topic of my Master's thesis research focuses on the seasonality of extreme precipitation events in GCM output and downscaled data.

Research Interests: Currently, I am interested in looking at extreme precipitation events in GCMs. Namely, I am interested in understanding the timing of extreme precipitation events and the physical mechanism responsible for producing them. My Master's thesis research is focusing on the Madison, WI (midwest) area and the seasonal cycle of precipitation that peaks during the summer months.

John Horel
University of Utah

Biographical sketch: Dr. Horel has been a Professor in the Department of Meteorology since 1996 and a member of the academic faculty in that department since 1986. He had a research faculty appointment at Scripps Institution of Oceanography from 1982 until 1986 and received his Ph.D. from the University of Washington in 1982.

Research Interests: Dr. Horel's current research activities include further development of MesoWest, which provides access to surface weather observations for operational, research, and educational applications. The MesoWest observations also provide a foundation from which to conduct research to improve data assimilation techniques over complex terrain. He participates in a National Weather Service effort to develop a mesoscale Analysis of Record and its prototype the Real Time Mesoscale Analysis. He is also involved in research related to the Great Salt Lake and the impacts of the Lake on local wind circulations. Research related to assessing the impacts of global warming on snowfall in the Wasatch Mountains of northern Utah is also in progress.

Norman Johns
National Wildlife Federation

Biographical sketch: From Florida originally, now residing in Austin, Tx.
Academic background: B.S. Chemical Engineering, Univ. Florida;
M.S. Civil Engineering, Univ. Texas;
M.Pa. LBJ School Public Affairs, Univ. Texas;
PhD, Geography and Environment,Univ. Texas

Research Interests: Water, wildlife, and ecosystem impacts of climate change. Analyses of environmental effects exercised via the interface between human use and aquatic ecosystem needs. Interface of climate models with river management models via landuse-climate-runoff analyses.

Renu Joseph

Department of Energy

Biographical sketch: Renu Joseph is a program manager for the Climate Change and Prediction program at the Department of Energy, on detail from the University of Maryland. Renu holds Master's degrees in Physics from University of Massachusetts, Amherst. She did her Ph.D. from State University of New York, Stony Brook, followed by a postdoctoral stint at University of Illinois Urbana Champaign.

Research Interests: Her research interests span climate diagnostics, climate variability and change, hydroclimate studies and carbon cycle-climate interaction.

Linda Joyce

USDA Forest Service, Rocky Mountain Reearch Station

Biographical sketch: Linda Joyce is a research scientist with the USFS, Rocky Mountain Research Station in Fort Collins, Colorado. Her area of expertise is quantitative ecology and her recent research has focused on quantifying the impacts of climate change on ecosystems, wildlife habitat, and the socio-economic implications of climate change on the forestry sector. She is also working with other western scientists on developing adaptation options for natural resource managers and planners to climate change. As the Climate Change Specialist for the Assessment process in the Forest Service, she coordinates analysis of potential effects of global climate change on the condition of renewable resources on the forests and rangelands of the United States. She has contributed to International Panel on Climate Change reports. She was an author in the recently released U.S. Climate Change Science Program Synthesis and Assessment Report 4.4 'Adaptation Options for Climate-Sensitive Eco systems and Resources.'

Research Interests: My research includes the development of integrated models to analyze the national and regional supply and demand of renewable resources from forest and rangelands and the development of climate scenarios for use in such analyses. My research includes methods to quantify the potential effects of climate change on forests and the forestry sector at national/regional scales and to explore options for adaptation and mitigation management. I am working to develop information, methods, and analyses to provide state wildlife agencies with information on the magnitude of projected climate change effects on terrestrial wildlife habitat and tenable options for ameliorating the impacts. I am a co-principal investigator of the WestWide Climate Initiative--a partnership of FS research and National Forests to implement climate-change science with the goal of developing a set of decision-support tools and reference materials that will incorporate climate-change considerations into decision making.

Daniel Kirk-Davidoff

University of Maryland

Biographical sketch: I received my PhD from MIT in 1997, working with Richard Lindzen on a simplified climate model based on an assumption of Potential Vorticity homogenization. As a post-doctoral fellow with Jim Anderson at Harvard, I worked on understanding the transport of water into the stratosphere under global warming, and its role in ozone depletion, at stratospheric feedbacks on polar climate, and on sampling strategies for climate monitoring satellites. I joined the department of Atmospheric and Oceanic Science of the University of Maryland in 2003.

Research Interests: I'm interested in how and why climate has changed in the past, and in how to devise better ways to test the models we use to predict climate change in the future. My students and I use computer climate models to understand how the climate system responds to changes at the earth's surface, whether due to geological processes like mountain building, or fast human processes like the construction of wind turbines. We work to develop tests of the climate models we use to predict future climate by comparing climate model predictions of time-lagged correlations among climate variables with the same statistics in observations. In addition we're involved in an effort to develop an optimal satellite climate monitoring system, investigating the dependence of sampling errors on the orbital characterisitcs of the system.

Neil Lareau
University of Utah

Biographical sketch: Neil Lareau was born in Granby, CT. He attended Carnegie Mellon University graduating in 2002 with a Bachelor of Fine Arts. Shortly thereafter, Neil decided to shift focus and pursue a career in atmospheric sciences. To start down this path, he completed an internship at the Mount Washington Observatory during the winter of 2003/2004. Subsequently, Neil became a full time weather observer and forecaster for the Observatory through the spring of 2007. Now at the University of Utah Department of Atmospheric Science as a graduate student, Neil is in his second year and is researching regional climate impacts in the inter-mountain west.

Research Interests: I'm interested in exploring synoptic variability associated with winter snow and spring melt/runoff over the inter-mountain west in future climate scenarios. Specifically, I hope to use statistical down-scaling approaches developed from ERA-interim reanalysis and applied to the NARCCAP model output to identify trends in the frequency, timing, intensity and duration of synoptic events such as trough passages and persistent ridging. The ultimate goal is to be able to make useful predictions about changes in snowpack in northern Utah.

Katie Lavigne
Louisiana State University

Biographical sketch: I am from New Orleans, LA and graduated with a B.S. in Geography from Louisiana State University in May 2009. I am now a first year Graduate Student at LSU seeking a M.S. in Geography.

Research Interests: I am interested in how climate change is affecting the water balance and coastal change of South Louisiana. I plan to do an impact analysis for South Louisiana using NARCCAP output of climate change and comparing that with landcover change and my water balance analysis to determine any correlations.

Brian Lazar
Stratus Consulting

Biographical sketch: Brian Lazar is a senior scientist at Stratus Consulting. He specializes in the characterization and mechanics of integrated hydrologic systems, using analytical techniques from engineering, physics, and hydrology. Mr. Lazar performs snowpack and hydrologic modeling and analysis, climate change impact assessments, and data research and analysis. His work is concentrated in the areas of surface and groundwater hydrology, snowpack modeling, glaciology, and contaminant fate and transport. The results of his research have been published in peer-reviewed journals such as Geophysical Research Letters and Cold Regions Science and Technology, and presented at the American Geophysical Union, the International Snow Science Workshop, the Western Snow Conference, and the National Ski Area Association Conference. Mr. Lazar hold an MS in environmental/water resource engineering and a BS in environmental science, both from the University of Colorado, Boulder.

Research Interests: Research interests include climate change impacts assesments at the local, regional, and continental scale; focusing primarily on impacts to snowpack and water resources. Other research interests include snowpack and hydrologic modeling and analysis, and data research and analysis.

Tim Mayer
US Fish and Wildlife Service

Biographical sketch: I've been working as a hydrologist with the US Fish and Wildlife Service for the past 15 years. My work involves the protection of Service water rights and water resources in six states including Oregon, Washington, California, Idaho, Nevada, and Hawaii. My time is divided about equally in the areas of water rights, water quantity, and water quality. In the last several years, I have become focused on the impacts of climate change on water resources (quantitiy and quality). I have served on the DOI Climate Change Task Force and am currently a member of the regional climate change team and the western water workgroup for the FWS. I have a B.S. in forest soils and a Ph.D. in Environmental Science and Engineering.

Research Interests: Surface water hydrology, groundwater/surface interactions, climate change, wetlands, water quality

Trevor Murdock

Pacific Climate Impacts Consortium

Biographical sketch: Trevor Murdock is a climate scientist with an undergraduate degree in Physics and Astronomy Co-op from the University of Victoria (1995) and a M.Sc. in Earth and Ocean Sciences from the University of Victoria (1997). Trevor is currently the Program Lead of Regional Climate Impacts at the Pacific Climate Impacts Consortium in Victoria, BC.
For the past 12 years, he has worked on applications of climate research to assist decision-making and planning. Trevor's work has focused on climate scenarios and online mapping tools, downscaling to high resolution, analysis of historical climate data and improvement of seasonal climate predictions.

Research Interests: Use of climate projections by communities and infrastructure for adapation, Impacts of climate change on ecosystems and biodiversity, Impacts of climate change on forest resources, Analysis of results from regional climate models and emperical downscaling, Analysis of uncertainty

Imtiaz Rangwala

UCAR

Biographical sketch: Ph.D. Rutgers University 2009, Postdoctoral Fellow at UCAR 2009-2011

Research Interests: Climate change and its impact on hydrology in the Colorado Basin

Betsy Reardon

University of Texas at Austin

Biographical sketch: Presently, I am PhD candidate in the Department of Ecology, Evolution, and Behavior at the University of Texas at Austin. I completed a Master's of Environmental Management at Duke's Nicholas School of the Environment. My master's research focused on determining spatial extents of vegetation community gradients in the Florida Keys, and elucidating the potential ecological drivers of community differentiation of this region. My undergraduate degree is in Natural Resources and Urban Forestry from The Ohio State University. Despite being primarily a computational ecologist, I have extensive field experience. For example, this includes work at Duke's FACE site, the Key West Botanical Garden, and Dawes Arboretum, and participation in a biological assessment of the Smokey Mountain National Park.

Research Interests: My longterm research goal is to understand the population ecology of mobile species in a dynamic changing landscape, and to use this knowledge to inform land management and conservation decisions. My current research project focuses on understanding how climatic and hydrological factors affect migratory animal habitat selection. I intent to subsequently use climate model outputs to determine how migratory pathways might be impacted by climate change, and identify key conservation lands to possibly mitigate climate change ramifications. In addition to the previously discussed research, I am collaborating on a project that is developing a continental-scale network model of terrestrial animal migration which incorporates the cost of various road type and other man-made barriers.

Kevin Robbins

NOAA Southern Regional Climate Center / LSU

Biographical sketch: Director - NOAA Southern Regional Climate Center
Educational background - engineering (NC State, Clemson), meteorology (Texas A&M), physics (Michigan State)
Past work experience - U.S. Air Force - computer systems repair, weather forecaster; associate professor biological and agricultural engineering (LSU), Associate Professor Geography and Anthropology (Climatology), WMO expert team member - 4 projects

Research Interests: Weather and climate information systems, Statistical and graphical analysis

Philippe Roy

UQAM

Biographical sketch: Undergraduate in Physics at Université of Montréal in 2004.
Master degree in Atmospheric Sciences at Université du Québec à Montréal in 2009, under the supervision of Philippe Gachon and René Laprise. Title : "Assessment of extremes and climate variability over different areas in northeastern North America in summer, as simulated by the Canadian Regional Climate Model driven by reanalyses. »
Began a PhD in 2009 at Université du Québec à Montréal under the supervision of Philippe Gachon and René Laprise. Title : "Assessment of the capacity of the regional climate models to reproduce low and high freqnecy variability and their influences on the occurrence, the intensity and the duration of the regional extremes on North America"

Research Interests: Climate variability, Regional extreme Numerical models, Climate change

Nadine Salzmann

University of Zurich, Switzerland

Biographical sketch: Nadine Salzmann is a scientist and lecturer at the Department of Geography, University of Zurich, Switzerland and the Department of Geosciences, University of Fribourg, Switzerland and currently co-leading an international climate change impacts and adaptation program in the Peruvian Andes. She has been a postdoctoral fellow at the National Center for Atmospheric Research NCAR, Boulder, CO, USA, where she was analyzing output from NARCCAP regarding mountain snow in the Upper Colorado River Basin. She received her PhD at the University of Zurich, with the thesis "The use of results from Regional Climate Models for local-scale permafrost modeling in complex mountain topography – possibilities, limitations and challenges for the future".

Research Interests: My main research interests are on cryospheric process modeling in complex mountain topography. A main focus thereby is the use of results from climate models and the integration of the results into climate change impact assessments and adaptation.

Willis Shem

University of Georgia, Athens

Biographical sketch: I received my PhD. (Earth and Atmospheric Sciences) from the Georgia Institute of Technology (Georgia-Tech) in August 2006. My doctoral thesis was entitled 'Biosphere-Atmosphere Interaction over the Congo Basin and its Influence on the Regional Hydrological Cycle'
My first appointment after graduation was a post-doctoral position at the University of Georgia in Athens (UGA) in the department of Geography (Aug 2006-2008 July). The major product of my initial work at UGA was the publication of a paper entitled "On the impact of urbanization on summertime thunderstorms in Atlanta: Two numerical model case studies" -Atmospheric Research Vol. 92, Issue 2, 172-189.(Shem, W., and Shepherd, J.M. (2009)
From August 2008 t0 May 2009, I held a temporary faculty position of 'Lecturer in Meteorology' at the University of Tennessee in Martin.
In June 2009 I re-joined UGA as a Research Associate in the department of Geography.

Research Interests: My current research is focused on performing further downscaling experiments, via higher resolution RCM simulations based on various climate change scenarios to determine some site specific impacts of these changes on the forests of the Southeast USA.
My other research interests include
1. The impact of landuse changes (e.g urbanization) on the precipitation component of the hydrological cycle
2. Biosphere-Atmosphere interactions in general
3. Hydrological Models (for watershed management and applications)

Lydia Stefanova

COAPS/FSU

Biographical sketch:
B.S. in Physics 1993 Sofia University, Sofia, Bulgaria
M.S. in Meteorology 1996 Florida State University, Tallahassee, Florida
Ph.D. in Meteorology 2001 Florida State University, Tallahassee, Florida

Research Interests: My region of interest is the climate variability, change, and prediction for the Southeast US. My previous work with collections of global climate models demonstrates that seasonal forecasts in this region consistently exhibit significant skill and predictability for winter precipitation, but hardly any skill for other seasons. The global models' skills for near-surface temperature are less consistent across models, and less dramatically dependent on season.
My interest in the NARCCAP project relates to the sources of predictability and skill for the Southeast US on regional scales and the manner in which these differ from global model results. As an extension to this, I am interested in the optimal combination of multi-model forecasts for probabilistic prediction of near surface climate, and the development of scenarios for agricultural and ecological impacts

Steve Vavrus

University of Wisconsin (Center for Climatic Research)

Biographical sketch: I am employed as senior scientist in the University of Wisconsin's Center for Climatic Research, where I have been investigating the behavior of the climate system for the past 20 years. I received my Ph.D. and Master's degrees in meteorology at the University of Wisconsin and my Bachelor's degree in meteorology at Purdue University.

Research Interests: Using climate models, I am investigating the response of global and regional climate to increasing greenhouse gases, particularly how such changes might affect polar regions and extreme weather events. I am also exploring the origin of anthropogenic climate change, the role of clouds in the climate system, and the impact of weather extremes on human health and infrastructure.
I am part of a team that will analyze the NARCCAP simulations of extreme heat, cold, and precipitation events over the Upper Midwest for the present climate and projected future states. We are especially interested in the supplemental influence of humidity on heat stress, the relative changes in extreme heat vs. extreme cold, changes in the return periods and magnitudes of heavy precipitation, and the circulation patterns associated with these types of severe weather. This research should help to address these questions and to provide estimates of how future weather extremes will affect human health.

Chris Weaver

EPA

Biographical sketch: I work in the Global Change Research Program of the National Center for Environmental Assessment, located in the Office of Research and Development within the U.S. Environmental Protection Agency. My background is as a climate scientist, first at Scripps, then at Rutgers, and now with the EPA. Some of my recent research has been on the impacts of land-use/land-cover change on regional climate and the coupling between atmospheric processes and groundwater. For the EPA, I am involved in assessing the potential impacts of global change on U.S. air quality, water quality, human health, and ecosystems and improving the way we use climate information (especially from models) to develop these assessments and more effectively support decision making about adaptation strategies.

Research Interests: Climate system processes, Climate modeling, Climate change risk assessment, Scale issues of climate impacts and adaptation, Characterizing and communicating uncertainty

Shuang-Ye Wu

University of Dayton

Biographical sketch:

Education

2000 Ph.D. in Geography, Cambridge University, UK.
1996 M.Phil in Geography, Cambridge University, UK.
1994 MA in Linguistics, Beijing Foreign Studies University, China
1991 BA in English, Nanjing University, China

Employment

2007 - Assistant Professor, Department of Geology, University of Dayton
2004 - 2007 Visiting Assistant Professor, Department of Geology, University of Dayton
2003 - 2004 Visiting Assistant Professor, Department of Environmental Studies, Gettysburg College
1999 - 2003 Post-doctoral Research Associate, the Environmental Resource Research Institute, Pennsylvania State University.
9-12/2002 Associate Consultant, Stratus Consulting Inc.
1995 - 1999 Tutor and teaching assistant, Department of Geography, Cambridge University
1994 - 1995 Program officer in the Department of International Cooperation of the National Environmental Protection Agency, Beijing, China.

Research Interests: I have been working on assessing potential impacts of climate change on water resources, both in terms of quantity (flooding) and quality.

Aijun Xiu

Institute for the Environment, University of North Carolina at Chapel Hill

Biographical sketch:

Research Associate Professor
Institute for the Environment, University of North Carolina at Chapel Hill
137 E. Franklin Street, Room 657, CB6116
Chapel Hill, NC 27599-6116
Tel: (919) 966-2064; E-mail: aijun@email.unc.edu

A. Professional Preparation

1982 B.S., Atmospheric Science, Hangzhou University, P.R. China.
1985 M.S., Atmospheric Science, Academy of Meteorological Science, P.R. China.
1989 Ph.D., Atmospheric Science, Peking University, P.R. China.
1989-1991 Postdoctoral Research Associate, University at Albany, State University of New York, Albany, New York

B. Appointments

2003 – present Research Associate Professor, Institute for the Environment, UNC-CH
1992 - 2002 Research Scientist, MCNC, Environmental Modeling Center
1998 – Present Adjunct Associate Professor, Dept. of Marine, Earth and Atmospheric Sciences, North Carolina State University
1991 - 1992 Senior Science Specialist, Computer Sciences Corporation

Research Interests: I am interested in the interaction of climate change and air quality, including the direct and indirect effects of air pollutants. Most air quality problems are localized so that their effects on regional climate can be significant. I am also interested in the healthy effects of future climate and air pollution and the NARCCAP data can be applied for the research.

NARCCAP

NARCCAP: Overview and Preliminary Results

Linda O. Mearns and the NARCCAP Team

National Center for Atmospheric Research, Boulder, CO

website: http://www.narccap.ucar.edu

NARCCAP Team: Ray Arritt, Iowa State; Daniel Caya, Sébastien Biner, OURANOS; Phil Duffy, Dave Bader, LLNL (and Climate Central); William Gutowski, Dave Flory, Iowa State; Isaac Held, GFDL; Richard Jones, Wilfran Moufouma-Okia, Hadley Centre; René Laprise, UQAM; Ruby Leung, Yun Qian, PNNL; Seth McGinnis, Larry McDaniel, Don Middleton, Steve Sain, Doug Nychka, NCAR; Ana Nunes, John Roads, Scripps; Lisa Sloan, Mark Snyder, UC Santa Cruz; Gene Takle, Iowa State

INTRODUCTION

The North American Regional Climate Change Assessment Program (NARCCAP) is an international program to produce high resolution climate change scenarios and investigate uncertainties in regional scale projections of future climate by nesting multiple regional climate models (RCMs) within multiple atmosphere-ocean general circulation models (AOGCMs) forced with the A2 SRES scenario and with historical data over a domain covering the conterminous United States and most of Canada and Northern Mexico.

The resulting 60+ TB of data are being archived for distributed storage and made available to global change impacts researchers worldwide via the Earth System Grid (ESG). To ensure that the final product is usable by the impacts community, GIS practitioners, climate analysts, modelers, policy-makers, and other end users, data is stored in CF-compliant NetCDF format, making it fully compatible with many popular analysis programs, including ArcGIS, Matlab, IDL, and R. Tools are also available for converting data to plain text.

GOALS

- Exploration of multiple uncertainties in regional model and global climate model regional projections.
- Development of multiple high resolution regional climate scenarios for use in impacts assessments.
- Further evaluation of regional model performance over North America.
- Exploration of some remaining uncertainties in regional climate modeling (e.g., importance of compatibility of physics in nesting and nested models).
- Creation of greater collaboration between US and Canadian climate modeling groups, as well as with the European modeling community.
- Quantification of uncertainty across all models.

NARCCAP AT A GLANCE

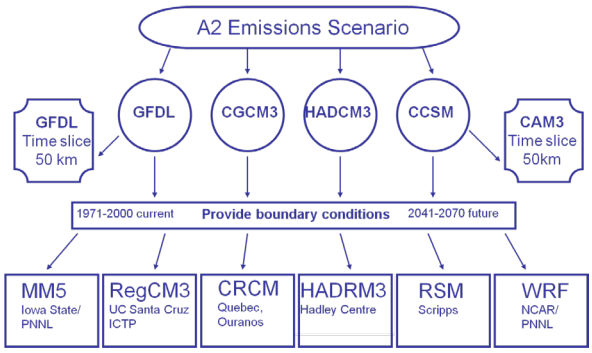
- 4 different AOGCMs driving 6 different RCMs
- 50 km spatial resolution
- 3 hourly temporal resolution
- 52 output variables
- 2 high-resolution AGCM timeslice experiments
- Future scenario: SRES A2

Phase I: RCMs are driven by historical (1979-2004) observed (NCEP2 Reanalysis) data

Phase II: Each RCM is driven by 2 GCMs for current (1971-2000) and future (2041-2070) scenarios. GCM/RCM pairings are chosen for maximum value in statistical analysis.

Timeslices: Atmospheric components of the GFDL & CCSM global models are run at 50 km resolution using observed SST data (offset in the future scenario) instead of a coupled ocean.

NARCCAP PLAN – Phase II

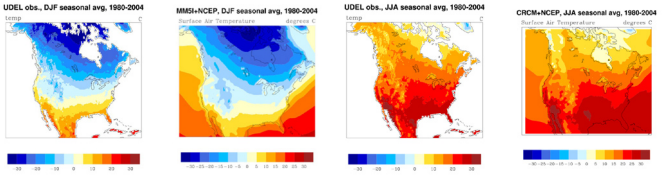


EXPERIMENTAL DESIGN

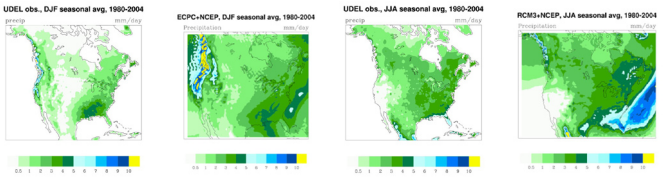
NARCCAP uses a fractional factorial design to manage funding limitations. Each RCM is paired with two GCMs. Timeslice experiments are also performed for two of the GCMs (CCSM & GFDL). Each RCM is paired with one of the two timeslice GCMs. '1st' or '2nd' indicates order of simulation.

RCM \ GCM	Phase I	Phase II			
	NCEP	GFDL	CGCM3	HADCM3	CCSM
CRCM	DONE		1st		2nd
ECPC	DONE	1st		2nd	
HRM3	DONE	2nd		1st	
MM5I	DONE			2nd	1st
RCM3	DONE	1st	2nd		
WRFP	DONE		2nd		1st

SAMPLE PHASE I RESULTS

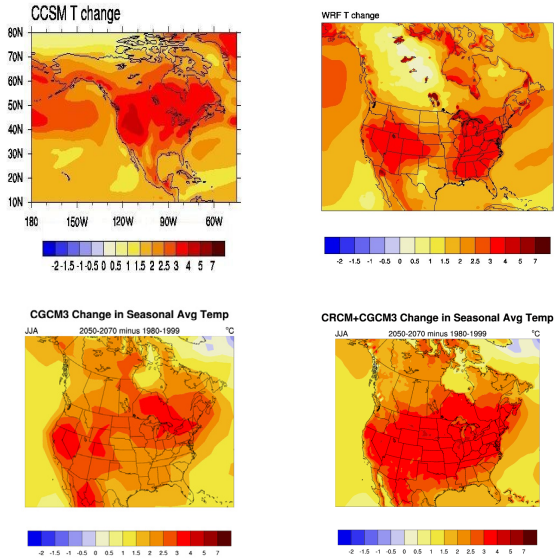


The MM5 winter and CRCM summer temperature patterns match quite closely those of the University of Delaware observations. These are two of the best results of the NCEP-driven runs.



ECPC/RSM successfully reproduces the winter precipitation maxima on the northern west coast, although it overestimates them. The winter precipitation maxima in the south central U.S. are somewhat represented, although not as clearly defined. Most RCMs fail to reproduce this feature; ECPC and CRCM come closest to doing so, most likely because they both use spectral nudging. RCM3 reproduces reasonably well the overall precipitation pattern for summer, although precipitation in the eastern part of the domain is generally overestimated.

SAMPLE PRELIMINARY PHASE II RESULTS



Comparison of Change in Summer Temperature: Global vs Regional Model Results

Patterns of temperature change differ substantially between the global and regional models.

In the case of CCSM and WRF driven by CCSM (top panels), higher temperature changes, particularly in the western part of the domain, are found in the global simulation, and strikingly low changes in temperature are found through most of central Canada in the WRF regional model.

In contrast, the Canadian regional model produces larger, more homogeneous temperature changes on the order of 2° C higher compared to the driving CGCM3 model (bottom panels).