CIMR
CLIMATE INFORMATION
FOR MANAGING RISKS

Local to Regional Adaptation and Mitigation Strategies

May 24-27, 2011
Orlando, Florida
www.conference.ifas.ufl.edu/CIMR

Hosted by

UF | UNIVERSITY of FLORIDA
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Southeast ClimateConsortium

Florida Climate Institute

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FOR MANAGING RISKS

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Dear CIMR Participants,

Welcome to "Climate Information for Managing Risks – Local to regional adaptation and mitigation strategies." We pronounce CIMR "simmer" because things are heating up in the area of climate science and its application.

The first CIMR Symposium was held in June 2008 and emphasized partnerships and solutions for agriculture and natural resources. We were particularly concerned with building partnerships that integrate research, teaching, and outreach. Though there were many positive outcomes from CIMR 2008, we are particularly proud of two: The Florida Climate Institute and the Agricultural Modeling Inter-comparison and Improvement Project (AgMIP), both of which you will learn more about during the Symposium.

The Program Committee organized CIMR 2011 around sectors that are vulnerable to risks posed by climate variability and climate change, namely: agriculture, water resources, costal and urban communities, biodiversity and conservation of natural ecosystems, and public health. Additional themes include: cross-sector climate impacts, developing climate scenarios for planning, and land use and land cover interactions with climate. On day one of CIMR 2011, Chet Koblinsky, Executive Director of the NOAA Climate Program will give our opening keynote address following which we will hear from leading experts on these themes who will give us their perspectives on the challenges and opportunities for local and regional adaptation and climate change mitigation faced by the different sectors and themes. We will also have a poster session and reception during the evening.

On day two, we will have concurrent panel discussions that address specific projects under each of the themes. The intent of these sessions is to promote discussions and to identify needs and opportunities for developing new collaborations.

On day three, we will hear reports from the Program Committee members who participated in organizing the panel discussions and a closing key note address from Steven Shafer, Deputy Administrator of the USDA Agricultural Research Services.

As well as bringing you experts from around the country in the field of climate science and application of climate science to solving urgent problems, the Program Committee has attempted to provide you many opportunities for networking, discussion, and development of new partnerships. We look forward to your active participation in CIMR 2011.

Mark R. McClellan
Dean for Research
Director, Florida Agricultural
Experiment Station

Keith T. Ingram
Chair, Program Committee
Coordinator, Southeast
Climate Consortium

James W. Jones
Director, Florida
Climate Institute

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Program Committee

Alison Adams
Tampa Bay Water

Eric Chassignet
FSU, Center for Ocean-Atmospheric Prediction Studies (COAPS), Florida Climate Institute

Mary Duryea
UF, IFAS, Office of Dean for Research and the Florida Agricultural Experiment Station

Joan Dusky
UF, IFAS, Office of Dean for Extension and Florida Cooperative Extension Office

Wendy Graham
UF Water Institute

Jerry Hatfield
USDA, Agriculture Research Service

John Hayes
UF, IFAS, Wildlife Ecology and Conservation

Radley Horton
Columbia University, NASA Goddard Institute for Space Studies

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Jim Jones
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Emerging Pathogen Institute
UF, College of Medicine

Ray Motha
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Victor Murphy
NOAA, National Weather Service, Southern Region Headquarters

Jim O'Brien
FSU, Center for Ocean-Atmospheric Prediction Studies (COAPS)

Adam Parris
NOAA's Climate Program Office

Louie Tupas
USDA, NIFA, Division of Global Climate Change

Steve Zebiak
Columbia University, IRI Climate and Society

Agenda at a Glance

Tuesday, May 24, 2011

4:00pm-7:00pm	Symposium Registration Open [Caribbean Registration Desk] Poster Presenters setup Posters [Caribbean IV/V]
5:00pm-7:00pm	Early Bird Social [Boca Patio]

Wednesday, May 25, 2011

7:30am-8:30am	Morning Refreshments [Caribbean IV/V]
7:30am-5:30pm	Symposium Registration Open [Caribbean Registration Deskl]
8:30am-10:00am	**Opening Plenary Session** [Caribbean VI/VII]
	Opening Remarks Moderator: **Keith Ingram**, Coordinator, Southeast Climate Consortium, Dept. of Agri. and Biological Eng., IFAS, UF, Gainesville, FL
	Welcome **Jim Jones**, Distinguished Professor, Dept. of Agricultural and Biological Engineering, IFAS, Director, Florida Climate Institute, UF, Gainesville, FL
	Welcome **Mark R. McLellan**, Dean for Research, IFAS, UF, Gainesville, FL
	Introduction of Keynote Speaker **James O'Brien**, Emeritus Robert 0. Lawton Distinguished Professor, Center for Ocean-Atmospheric Prediction Studies, FSU, Tallahassee, FL
	Keynote Address: ***Climate Science and Service from Local to Global Scales*** **Chester Koblinsky**, Executive Director, Climate Program Office, Office of Oceanic and Atmospheric Research, NOAA, Silver Spring, MD
10:00am-10:30am	Break
10:30am-12:00pm	**Plenary Session**
	Moderator: **Eric Chassignet**, Director, Center for Ocean-Atmospheric Prediction Studies, Co-Director, Florida Climate Institute, FSU, Tallahassee, FL
	Scenarios for Planning **Holly Hartmann**, Director, Arid Lands Information Center, University of Arizona, Tucson, AZ
	Water Resources **David Yates**, National Center for Atmospheric Research, Boulder, CO
	Coastal and Urban Communities **Margaret Davidson**, Director, NOAA Coastal Services Center, Charleston, SC
12:00pm-1:15pm	Lunch - provided [Caribbean IV/V]
1:15pm-2:45pm	**Plenary Session**
	Moderator: **Joan Dusky**, Associate Dean and Professor, Office of Dean for Extension and Florida Cooperative Extension Office, IFAS, UF, Gainesville, FL
	Biodiversity and Conservation **Jean Brennan**, Coordinator, Appalachian LLC, US Fish and Wildlife Service, Blacksburg, VA
	Agricultural Risk Management **Cynthia Rosenzweig**, Senior Research Scientist, NASA Goddard Institute for Space Studies, New York, NY
	Cross-sectoral Impacts **Kenneth Mitchell**, Special Assistant to the Director, Air, Pesticides, and Toxics Management Division, U.S. EPA, Atlanta, GA

Wednesday, May 25, 2011 (continued)

2:45pm-3:15pm	Break [Caribbean IV/V]
3:15pm-5:15pm	**Plenary Session**
	Moderator: Glenn Morris, Director, Emerging Pathogen Institute, UF, Gainesville, FL
	Public Health and Climate **George Luber**, Associate Director for Climate Change, Division of Environmental Hazards and Health Effects, NCEH, CDC, Atlanta, GA
	Miami-Dade: A Case Study on Adaptation and Mitigation **Nichole Hefty**, Coordinator, Miami-Dade County Climate Change, Miami-Dade Department of Environmental Resources Management, Miami, FL
	Poster Presentations - a brief introduction
5:30pm-7:00pm	**Poster Session & Reception** [Caribbean IV/V]

Thursday, May 26, 2011

7:00am-8:00am	Morning Refreshments [Caribbean IV/V]		
7:00am-5:00pm	Symposium Registration Open [Caribbean Registration Desk]		
8:30am-10:00am	**Concurrent Panel Sessions**		
	Session 1 **Managing Risks to Agriculture—A World Perspective** [Boca I/II]	Session 2 **Water Resource Management** [Boca III]	Session 3 **Scenarios for Planning** [Boca IV]
	Moderator: **Gerald Arkin**	Moderator: **Alison Adams**	Moderator: **Vasubandhu Misra**
	Dineshkumar Moghariya Farmers' Perceptions of Risk, Impacts and Adaptations to Climate Change: A Perspectives from Western India	**David Yates** Climate Change in Water Utility Planning: Decision Analytic Approaches	**John Promise** Addressing Climate Risks in North Texas' Preferred Future
	Carrie Furman Climate Services for Vulnerable Communities: Listening to African American Farmers	**Pamela Knox** Predicting Georgia's Future Water Use Using Climatological and Sociological Factors	**Wendy-Lin Bartels** Evolution of Social Science Methods for Climate Adaptation Research and Assessment
	Richard McNider Migration of Agriculture to the Southeast as an Adaptation to Regional Climate Change	**Tirusew Asefa** Performance Evaluation of a Water Resources System under Varying Climatic Conditions: Reliability, Resilience, Vulnerability and Beyond	**Frederick Bloetscher** Impact on Local Community Infrastructure from Sea Level Rise
	Shane Perkins Potential Usefulness of Climate Forecasts and AgroClimate for Agriculture in South Carolina	**Stephen McGrew** Making of a Green Utility - Environmental Stewardship	
	Discussion	Discussion	Discussion
10:00am-10:30am	Break		

Thursday, May 26, 2011 (continued)

10:30am-12:00pm	**Concurrent Panel Sessions**		
	Session 1 **Managing Risks to Agriculture – Tools for Understanding** [Boca I/II]	Session 2 **Water Resource Management: Tools and Analysis** [Boca III]	Session 3 **Cross-sector Impacts** [Boca IV]
	Moderator: **Gerald Arkin**	Moderator: **Alison Adams**	Moderator: **Caitlin Simpson**
	DW Shin Climate Model Evaluation Tools - Crop Models	**Vaishali Sharda** Development of Community Water Deficit Index (CWDI) for Small to Mid-size Communities of the Southeastern United States	**Radley Horton** Cross-sector Climate Impacts and Adaptation Strategies in the New York City Infrastructure-shed
	Kenneth Boote Risk and Uncertainty in Crop Model Predictions of Regional Yields under Climate Change and Variability	**Michael Maddox** Agricultural Decision System for the Chesapeake Bay Forecasting System	**Denis Nadolnyak** Climate Impacts on Agricultural Loan Performance: Evidence from the Southeastern US
	Mark Boudreau The Importance of Scale in Managing Agricultural Risk through Climate Information	**Mark Brooks** Development of a Turfgrass Irrigation Management System for North Carolina	**Tamara Houston** Sectoral Engagement Activities at NOAA's National Climatic Data Center
	Teddy Allen The International Environmental Data Rescue Organization: history, present, and future	**Shimelis Setegn** Climate change trend and its impact on the hydrological processes in the Caribbean islands of Puerto Rico, Jamaica and Dominican Republic	**Suresh Sharma** Incorporating Seasonal to Inter-annual (SI) Climate Variability in Point Source Discharge Permitting for Effective TMDL Development and Implementation
	Discussion	Discussion	Discussion
12:00pm-1:30pm	Lunch - provided [Caribbean IV/V]		
1:30pm-3:00pm	**Concurrent Panel Sessions**		
	Session 1 **Managing Risks to Agriculture – Indirect Effects** [Boca I/II]	Session 2 **Coastal and Urban Communities: Sea Level Rise Impacts** [Boca III]	
	Moderator: **Gerald Arkin**	Moderator: **Radley Horton**	
	Gail Wilkerson Influence of ENSO Phase on Optimal Corn Planting Dates in North Carolina	**Md. Rashed Chowdhury** Rising Sea Level and the Vulnerable Coastal Communities in the U.S.-Affiliated Pacific Islands	
	Brenda Ortiz Effect of Rainfall and Maximum Temperature on Corn Aflatoxin Contamination in the Southeastern U.S. Coastal Plain	**Frederick Bloetscher** Fighting Water with Water: Counteracting the Impacts of Sea Level Rise on South Florida Waters	
	Santiago Meira Yield Forecasting: An Approach Using Crop Simulation Models	**Ajita Atreya** Flood Risk and Risk Perception: Evidence from Property Prices in Georgia	
	Discussion	**Tara McCue** GIS Sea Level Rise Vulnerability Assessment	
		Discussion	
3:00pm-3:30pm	Break		

Thursday, May 26, 2011 (continued)

3:30pm-5:00pm	**Concurrent Panel Sessions**		
	Session 1 **Biodiversity and Conservation in Natural Ecosystems** [Boca IV]	Session 2 **Coastal and Urban Communities: Policy Planning and Adaptation** [Boca III]	Session 3 **Land Use and Land Cover Changes** [Boca I/II]
	Moderator: **John Hayes**	Moderator: **Adam Parris**	Moderator: **Jim Jones**
	Juan Alba Landa Forest Diversity and its Conservation	**Randall Parkinson** Assessing Municipal Vulnerability to Predicted Sea Level Rise: City of Satellite Beach, FL	**Vasubandhu Misra** Anthropogenic influence on Climate over the Southeast United States
	Doug Parsons Current Efforts and Future Directions: A state agency's approach to climate change	**John Fergus** Sea Level Rise at the Local Government Level: Lessons Learned	**John Christy** Summer 2010 Heat in SE USA - Was It Really a Record?
	MD Abdus Salam Climate Change and Fisheries in Bangladesh: Impact and Adaptation	**Whitney Gray** Southwest Florida Plans for Climate Change	**Laura Geselbracht** Modeling Sea Level Rise Impacts on Coastal Wetlands at Gulf of Mexico Estuaries
	Tom Hoctor Large-scale Implications of SLR on Conservation Priority Areas in Florida	**Carlton Hall** Climate Change Projections and Adaptation Strategies for Multi-Objective Resource Management at Kennedy Space Center, Florida	**Guzine El Diwani** Feasibility Study of Biodiesel from Jatropha in Egypt
	Discussion	Discussion	Discussion

Friday, May 27, 2011

7:30am-8:30am	Morning Refreshments [Caribbean IV/V]
7:30am-12:00pm	Symposium Registration Open [Caribbean Registration Desk]
8:30am-10:30am	**Closing Plenary Session** [Caribbean VI/VII]
	Moderator: **Keith Ingram**
	***Managing Risks to Agriculture* - Ian Flitcroft**, University of Georgia, Griffin, GA
	***Land Use and Land Cover Changes* - Jim Jones**, Dept. of Agricultural and Biological Engineering, IFAS, Florida Climate Institute, UF, Gainesville, FL
	***Coastal and Urban Communities* - Radley Horton**, Center for Climate Systems Research, Columbia University, New York, NY
	***Water Resources* - Alison Adams**, Tampa Bay Water, Clearwater, FL
	***Scenarios for Planning* - Vasubandhu Misra**, Florida State University, Tallahassee, FL
	***Biodiversity and Conservation* - John Hayes**, University of Florida, Gainesville, FL
	***Cross-sectoral Impacts* - Caitlin Simpson**, NOAA, Silver Spring, MD
10:00am-10:30am	Break
10:30am-12:00pm	**Plenary Session**
	Moderator: **Jim Jones**
	Keynote Address*:* ***Moving Forward: A Vision for Meeting Future Challenges*** **Steve Shafer**, Deputy Administrator, Agricultural Research Service, USDA, Washington, D.C.
	Closing Comments
12:00pm	Symposium Adjourn
12:00pm-1:00pm	Poster Presenters Remove Posters

Concurrent Panel Session Details

Thursday, May 26, 2011 — 8:30AM-10:00AM

Session 1: Managing Risks to Agriculture—A World Perspective

[Boca I/II; Session Abstracts: Page 29]
Moderator: ***Gerald Arkin***, University of Georgia, Griffin, GA

Farmers' Perceptions of Risk, Impacts and Adaptations to Climate Change: A Perspective from Western India – ***Dineshkumar Moghariya*** and *Richard C. Samrdon*; Department of Environmental Studies, State University of New York College of Environmental Science and Forestry, Syracuse, NY, USA

Climate Services for Vulnerable Communities: Listening to African American Farmers – ***Carrie Furman***[1], *Carla Roncoli*[2], *Wendy-Lin Bartels*[3], *Mark Boudreau*[1], *Heather Gray*[4] and *Gerrit Hoogenboom*[5]; [1]Department of Biological and Agricultural Engineering, University of Georgia, Athens, GA USA; [2]Master's in Development Practice, Emory University, Atlanta, GA USA; [3]Department of Agricultural Education and Communication, University of Florida, Gainesville FL USA; [4]Federation of Southern Cooperatives, Atlanta, GA USA; [5]AgWeatherNet, Washington State University, Prosser, WA USA

Migration of Agriculture to the Southeast as an Adaptation to Regional Climate Change – ***Richard T. McNider,*** *John R. Christy* and *Cameron Handyside*; Earth System Science Center, University of Alabama in Huntsville, Huntsville, AL, USA

Potential Usefulness of Climate Forecasts and AgroClimate for Agriculture in South Carolina – ***M. Shane Perkins***[1], *S. Templeton*[1], *H. Dinon*[2], *B. Lassiter*[3] and *J. Whitehead*[4]; [1]Department of Applied Economics and Statistics, Clemson University, Clemson, SC, USA; [2]State Climate Office of North Carolina, North Carolina State University, Raleigh, NC, USA; [3] Crop Science Department, North Carolina State University, Raleigh, NC, USA; [4]South Carolina Sea Grant Consortium, Charleston, SC, USA

Session 2: Water Resource Management

[Boca III; Session Abstracts: Page 35]
Moderator: ***Alison Adams***, Tampa Bay Water, Clearwater, FL

Climate Change in Water Utility Planning: Decision Analytic Approaches – ***David Yates***; National Center for Atmospheric Research (NCAR), Boulder, CO, USA

Predicting Georgia's Future Water Use Using Climatological and Sociological Factors – ***Pamela N. Knox*** and *David E. Stooksbury*; Biological and Agricultural Engineering Department, University of Georgia, Athens, GA, USA

Performance Evaluation of a Water Resources System under Varying Climatic Conditions: Reliability, Resilience, Vulnerability and Beyond – ***Tirusew Asefa***[1], *John Clayton*[2], *Alison Adams*[1] and *Damann Anderson*[2]; [1]Tampa Bay Water, Clearwater, FL, USA; [2]Hayzen and Sawyer, Tampa, FL, USA

Making of a Green Utility - Environmental Stewardship – ***Stephen McGrew***; Palm Beach County Water Utilities Department, West Palm Beach, FL, USA

Thursday, May 26, 2011 — 8:30AM-10:00AM (continued)

Session 3: Scenarios for Planning

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Moderator: ***Vasubandhu Misra***, Florida State University, Tallahassee, Florida, USA

Addressing Climate Risks in North Texas' Preferred Future – ***John Promise***, *P.E.*; North Central Texas Council of Governments, Arlington, TX, USA

Evolution of Social Science Methods for Climate Adaptation Research and Assessment – ***W. Bartels***[1], *N.E. Breuer*[2], *C.A. Furman*[3] and *J. Bolson*[4]; [1]Department of Agricultural Education and Communication, University of Florida, Gainesville, FL, USA; [2]Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL, USA; [3]Department of Biological and Agricultural Engineering, Athens, GA, USA; [4]Department of Biological and Agricultural Engineering, University of Florida, Gainesville, FL, USA

Impact on Local Community Infrastructure from Sea Level Rise – ***Frederick Bloetscher***; Department of Civil, Environmental, and Geomatics Engineering, Florida Atlantic University, Boca Raton, FL [Abstract added as ADDENDUM, p. 139]

Thursday, May 26, 2011 — 10:30AM-12:00PM

Session 1: Managing Risks to Agriculture – Tools for Understanding

[Boca I/II; Session Abstracts: Page 45]
Moderator: ***Gerald Arkin***, University of Georgia, Griffin, GA

Climate Model Evaluation Tools - Crop Models – ***D. W. Shin***, *S. Cocke* and *James J. O'Brien*; Center for Ocean-Atmospheric Prediction Studies, Florida State University, Tallahassee, FL, USA

Risk and Uncertainty in Crop Model Predictions of Regional Yields under Climate Change and Variability – ***K. J. Boote***, *J. W. Jones*, *S. Asseng* and *G. A. Baigorria*; Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA

The Importance of Scale in Managing Agricultural Risk through Climate Information – ***Mark Boudreau*** and *Elizabeth Kramer*; Department of Biological & Agricultural Engineering, University of Georgia, Athens, GA, USA

The International Environmental Data Rescue Organization: History, Present and Future – *Rick Crouthamel*[1] and ***Teddy Allen***[1, 2]; [1]International Environmental Data Rescue Organization, Deale, MD, USA; [2]Rosenstiel School of Marine & Atmospheric Science, The University of Miami, Miami, FL, USA

Thursday, May 26, 2011 — 10:30AM-12:00PM (continued)

Session 2: Water Resource Management: Tools and Analysis

[Boca III; Session Abstracts: Page 51]
Moderator: ***Alison Adams***, Tampa Bay Water, Clearwater, FL

Development of Community Water Deficit Index (CWDI) for Small to Mid-size Communities of the Southeastern United States – ***Vaishali Sharda***[1], *Puneet Srivastava*[1], *Keith Ingram*[2], *Muthuvel Chelliah*[3], *Latif Kalin*[4] and *Xing Fang*[5]; [1]Department of Biosystems Engineering, Auburn University, Auburn, Al, USA; [2]Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA; [3]Climate Prediction Center, NCEP/NWS/NOAA/U.S. Dept. of Commerce, NOAA Science Center, Camp Springs, Maryland, USA; [4]School of Forestry and Wildlife Sciences, Forestry and Wildlife Building, Auburn University, Auburn, AL, USA; [5]Department of Civil Engineering, Auburn University, Auburn, Al, USA

Agricultural Decision System for the Chesapeake Bay Forecasting System – *Raghu Murtugudde* and ***Michael Maddox***; Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD, USA

Development of a Turfgrass Irrigation Management System for North Carolina – ***Mark S. Brooks***[1], *Ryan P. Boyles*[1], *Charles Peacock*[2], *Dan Bowman*[2] and *Jenifer Reynolds*[2]; [1]State Climate Office of North Carolina, NC State University, Raleigh, NC, USA; [2]Department of Crop Science, NC State University, Raleigh, NC, USA

Climate Change and its Impact on the Hydrological Processes in the Caribbean Islands of Puerto Rico, Jamaica and Dominican Republic – ***Shimelis G. Setegn*** and *Assefa M. Melesse*; Earth and Environment, Florida International University (FIU), Miami, FL, USA

Session 3: Cross-sector Impacts

[Boca IV; Session Abstracts: Page 57]
Moderator: ***Caitlin Simpson***, NOAA, Silver Spring, MD

Cross-sector Climate Impacts and Adaptation Strategies in the New York City Infrastructure-shed – ***Radley Horton***; Center for Climate Systems Research, Columbia University, New York, NY, USA

Climate Impacts on Agricultural Loan Performance: Evidence from the Southeastern US – ***Denis Nadolnyak***; Auburn University, Auburn, AL, USA

Sectoral Engagement Activities at NOAA's National Climatic Data Center – ***Tamara G. Houston***; NOAA's National Climatic Data Center, Asheville, NC, USA

Incorporating Seasonal to Inter-annual (SI) Climate Variability in Point Source Discharge Permitting for Effective TMDL Development and Implementation – ***Suresh Sharma***[1], *Puneet Srivastava*[1], *Latif Kalin*[2] and *Xing Fang*[3]; [1]Bio systems Engineering Department, Auburn University, Auburn, AL, USA; [2]School of Forestry and Wildlife Sciences, Auburn, AL, USA; [3]Civil Engineering Department, Auburn University, Auburn, AL, USA

Thursday, May 26, 2011 — 1:30PM-3:00PM

Session 1: Managing Risks to Agriculture – Indirect Effects

[Boca I/II; Session Abstracts: Page 63]

Moderator: ***Gerald Arkin***, University of Georgia, Griffin, GA

Influence of ENSO Phase on Optimal Corn Planting Dates in North Carolina – ***Gail G. Wilkerson***[1], *Gregory S. Buol*[1], *Ronnie W. Heiniger*[1], *Heather A. Dinon*[2] and *Ryan P. Boyles*[2]; [1]Department of Crop Science, North Carolina State University, Raleigh, NC, USA; [2]State Climate Office, North Carolina State University, Raleigh, NC, USA

Effect of Rainfall and Maximum Temperature on Corn Aflatoxin Contamination in the Southeastern U.S. Coastal Plain – *Arnold R. Salvacion*[1], ***Brenda V. Ortiz***[1], *Brian .T. Scully*[2], *David .M. Wilson3*, *Gerrit Hoogenboom*[4] and *Dewey Lee*[3]; [1]Agronomy and Soils Department, Auburn University, Auburn, AL, USA; [2]USDA-ARS, Tifton, GA, USA; [3]University of Georgia, Tifton, GA, USA; [4]AgWeatherNet, Washington State University, Prosser, WA, USA

Yield Forecasting: An Approach Using Crop Simulation Models – ***Santiago Meira***, *Edgardo Guevara*, *Carlos Hernandorena* and *Jimena Introna*; National Institute for Agricultural Technology (INTA) 2700 Pergamino, Buenos Aires, Argentina

Session 2: Coastal and Urban Communities: Sea Level Rise Impacts

[Boca III; Session Abstracts: Page 69]

Moderator: ***Radley Horton***, Center for Climate Systems Research, Columbia University, New York, NY

Rising Sea Level and the Vulnerable Coastal Communities in the U.S-Affiliated Pacific Islands – ***Md. Rashed Chowdhury***[1] and *Thomas A. Schroeder*[2]; [1]Pacific ENSO Applications Climate Center (PEAC), Joint Institute for Marine and Atmospheric Research (JIMAR), University of Hawaii at Manoa, USA; [2]JIMAR, School of Ocean and Earth Science and Technology, University of Hawaii at Manoa, USA

Fighting Water with Water: Counteracting the Impacts of Sea Level Rise on South Florida Waters – *Barry N. Heimlich*[1] and ***Frederick Bloetscher***[2]; [1]Center for Environmental Studies, Climate Change Research Initiative, Florida Atlantic University, Jupiter, FL; [2]Department of Civil, Environmental, and Geomatics Engineering, Florida Atlantic University, Boca Raton, FL

Flood Risk and Risk Perception: Evidence from Property Prices in Georgia – *Susana Ferreira* and ***Ajita Atreya***; The University of Georgia, Athens, GA, USA

GIS Sea Level Rise Vulnerability Assessment – ***Tara McCue***, *AICP*; East Central Florida Regional Planning Council, Altamonte Springs, FL, USA

Thursday, May 26, 2011 — 3:30PM-5:00PM

Session 1: Biodiversity and Conservation in Natural Ecosystems

[Boca IV; Session Abstracts: Page 75]
Moderator: ***John Hayes***, University of Florida, Gainesville, FL

Forest Diversity and its Conservation – *Juan Alba-Landa*, *Lilia del C. Mendizábal-Hernández*, *Elba O. Ramírez-García*, *Juan Márquez Ramírez* and *Héctor Cruz-Jiménez*; C.A. Recursos Genéticos Forestales, Universidad Veracruzana, Xalapa, Veracruz, México

Current Efforts and Future Directions: A State Agency's Approach to Climate Change – *Doug Parsons*; Florida Fish and Wildlife Conservation Commission, Tallahassee, FL, USA

Climate Change and Fisheries in Bangladesh: Impact and Adaptation – *M. A. Salam*[1], *M. S. Alam*[1], *M. A. Bashar*[1] and *Jianbang Gan*[2]; [1]Department of Aquaculture, Bangladesh Agricultural University, Mymensingh, Bangladesh; [2]Department of Ecosystem Science and Management, University of Texas A&M, TX, USA

Large-scale Implications of SLR on Conservation Priority Areas in Florida – *Tom Hoctor*; Center for Landscape Conservation Planning, College of Design, Construction, and Planning, University of Florida, Gainesville, FL, USA

Session 2: Coastal and Urban Communities: Policy Planning and Adaptation

[Boca III; Session Abstracts: Page 81]
Moderator: ***Adam Parris***, NOAA's Climate Program Office, Silver Spring, MD

Assessing Municipal Vulnerability to Predicted Sea Level Rise: City of Satellite Beach, FL – *Randall W. Parkinson*, *Ph.D., P.G.*; RWParkinson Consulting Inc., Melbourne, FL, USA

Sea Level Rise at the Local Government Level: Lessons Learned – *John Fergus*, *Ph.D*; City of Satellite Beach, FL, USA

Southwest Florida Plans for Climate Change – *James W. Beever III*[1], ***Whitney Gray*[1]**, *Daniel Trescott*[1], *Jason Utley*[1], *David Hutchinson*[1], *Tim Walker*[1], *Dan Cobb*[1] and *Lisa Beever*[2]; [1]Southwest Florida Regional Planning Council, Ft. Myers, FL, USA; [2]Charlotte Harbor National Estuary Program, Ft. Myers, FL, USA

Climate Change Projections and Adaptation Strategies for Multi-Objective Resource Management at Kennedy Space Center, Florida – *Carlton Hall*[1], *Brean Duncan*[1], *John Drese*[1], *Dave Breininger*[1], *Eric Stolen*[1], *Paul Schmalzer*[1], *Doug Scheidt*[1], *Ron Schaub*[1],*Tim Kozusko*[1], *Ray Wheeler*[2] and *John Shaffer*[2]; [1]Innovative Health Applications; [2]NASA, KSC

Thursday, May 26, 2011 — 3:30PM-5:00PM (continued)

Session 3: Land Use and Land Cover Changes

[Boca I/II; Session Abstracts: Page 87]

Moderator: ***Jim Jones***, Department of Agricultural and Biological Engineering, IFAS, UF Director of the Florida Climate Institute, Gainesville, FL

Anthropogenic Influence on Climate over the Southeast United States – ***V. Misra***; Department of Earth, Ocean, and Atmospheric Science, Florida State University, Tallahassee, Florida, USA

Summer 2010 Heat in SE USA - Was It Really a Record? – ***John R. Christy***; University of Alabama in Huntsville, Huntsville, AL, USA

Modeling Sea Level Rise Impacts on Coastal Wetlands at Gulf of Mexico Estuaries – *Doria Gordon*[1], ***Laura Geselbracht***[2], *Kathleen Freeman*[3] and *Eugene Kelly*[3]; [1]University of Florida, Department of Biology, Gainesville, FL, USA; [2]The Nature Conservancy, Wilton Manors, FL, USA; [3]The Nature Conservancy, Altamonte Springs, FL, USA

Feasibility Study of Biodiesel from Jatropha in Egypt – ***Guzine El Diwani***[1], *Shadia Ragheb*[1], *Salwa Hawash*[1], *Nahed K.Atteya*[1] and *Ihab H. Farag*[2]; [1]Chem. Engineering and Pilot Plant Dept., Eng. Res. Division, National Research Centre, Cairo, Egypt; [2]Chemical Engineering Department, University of New Hampshire (UNH), Durham, NH, USA

Poster Directory

Poster presentations are listed by topic and in alphabetical order by the presenting author's last name.

Coastal and Urban Communities

Poster Number
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1 .... **Risk Quantification for Sustaining Coastal Military Installation Assets and Mission Capabilities** – ***Kelly A. Burks-Copes*** and *Edmond J. Russo*; Environmental Laboratory, US Army Engineer Research and Development Center, Vicksburg, MS

2 .... **Factors Facilitating Sea Level Rise Adaptation Planning – *Kathryn I. Frank***; Department of Urban and Regional Planning, University of Florida, Gainesville, FL, USA

3 .... **Regional Policies and Strategies for Climate Change Adaptation –** *Tara McCue* and ***Keith Smith***; East Central Florida Regional Planning Council, Altamonte Springs, FL, USA

4 .... **Using Climate Risk Information in Assessing the Vulnerability of Coastal Areas in the Southeast: The Case of Louisiana and Mississippi – *Edmund Merem***, *Yaw Twumasi*, *Joan Wesley*, *Sudha Yeramilli*, *Chandra Richardson* and *B. Robinson*; Department of Urban and Regional Planning, Jackson State University, Jackson, MS, USA

5 .... **Using Surface Population Models to Improve Spatial Accuracy of Sea Level Rise Vulnerability Assessment – *Diana Mitsova***, *Ann-Margaret Esnard* and *Yanmei Li*; Florida Atlantic University, Boca Raton, Florida, USA

Land Use and Land Cover Changes

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6 .... ***Vegetation Change Detection Using Remote Sensing in the Florida Everglades – Shimelis G Setegn***[1,2] *and Rosanna Rivero*[2]; [1]Florida International University, Department of Earth and Environmental, Miami, Florida, USA; [2]Everglades Foundation, Palmetto Bay, Florida, USA

7 .... **Impact of *Biofuels* on the Propensity of Land-Use Conversion among Non-Industrial Private Forest Landowners in Florida –** *Nishita Pancholy*[1], *Michael H. Thomas*[1], ***Daniel Solís***[2] and *Nicholas Stratis*[3]; [1]Florida A&M University, Division of Agricultural Sciences, Tallahassee, FL; [2]University of Miami, Division of Marine Affairs and Policy, RSMAS, Miami, FL; [3]Department of Environmental Protection, and Florida State University, Tallahassee, FL

Managing Risks to Agriculture

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9 .... **Agricultural Applications for a Linear Inverse Model Describing Midsummer Dry Spell Variability within the Intra-Americas Sea – *Teddy Allen***; Rosenstiel School of Marine & Atmospheric Science, The University of Miami, Miami, FL, USA

10 ..... **Climatic Elements Variability Affecting Maize Yield in Northern Minas Gerais, Brazil – *Maria Emilia B. Alves***[1], *Camilo L. T. Andrade*[1], *Ramiro Ruiz-Cárdenas*[2], *Tales A. Amaral*[1] and *Denise F. Silva*[1]; [1]Embrapa Maize and Sorghum, Sete Lagoas, MG, Brazil; [2]Department of Statistics, Federal University of Minas Gerais, Belo Horizonte, MG, Brazil

11 ..... **Seasonal Rainfall Forecasts as an Adaptation Strategy for Climate Change – *Senthold Asseng***[1,2], *Peter McIntosh*[3], *Guomin Wang*[4] and *Nirav Khimashia*[5]; [1]Universtity of Florida, Department of Agricultural and Biological Engineering, Gainesville, FL, USA; [2]Former address: Centre for Environment and Life Sciences, CSIRO Climate Adaptation Flagship, Wembley, Australia; [3]Centre for Australian Weather and Climate Research, CSIRO Climate Adaptation Flagship, Hobart, Australia; [4]Centre for Australian Weather and Climate Research, Bureau of Meteorology, Melbourne, Australia; [5]Centre for Environment and Life Sciences, CSIRO Climate Adaptation Flagship, Wembley, Australia

12 ..... **The Impact of Climate Change on Soybean Production in the Southeastern USA and Potential Adaptation Strategies – *Yawen Bao***[1], *Gerrit Hoogenboom*[2] and *Ron McClendon*[1]; [1]Department of Biological and Agricultural Engineering, The University of Georgia, Athens, GA, USA; [2]AgWeatherNet, Washington State University, Prosser, WA, USA

13 ..... **Climate Decision Support Research to Foster Resilience in Agrosocioecosystems – *Norman E. Breuer***[1] and *Clyde W. Fraisse*[2]; [1]Rosenstiel School of Marine and Atmospheric Science, University of Miami; [2]Dept. of Agricultural and Biological Engineering, University of Florida

14 ..... **Climate Change and Agriculture: Perspectives from Michigan Farmers – *Julie E. Doll***[1] and *Claire N. Layman*[2]; [1]W.K. Kellogg Biological Station, Michigan State University, Hickory Corners, MI USA; [2]Michigan State University Extension, East Lansing, MI USA

15 ..... **FAWN: Providing Weather-related Information to a Wide Variety of Users since 1998 – *Brent Ferraro***; Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL USA

16 ..... **AgroClimate: Climate Information and Decision Support Tools for Reducing Risk in Agriculture – *C. Fraisse***, *O. Uryasev*, *B. Ferraro*, *C. Villalobos*, *Z. Hu* and *T. Zortea*; Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA

18 ..... **Spatial and Temporal Variability of the Agricultural Reference Index of Drought (ARID) in Florida – *Eduardo Gelcer***[1], *Clyde Fraisse*[1], *Jerome Maleski*[1], *Zhengjun Hu*[1] and *Renan Mendes*[2]; [1]Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA; [2]Mines Paristech Engineering School, Paris, France

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19 ..... **Climate Scenario Generation for the Agricultural Model Intercomparison and Improvement Project (AgMIP) –** *Cynthia Rosenzweig*[1], *Jim Jones*[2], *Jerry Hatfield*[3], *Alex Ruane*[1] and ***Radley Horton***[4]; [1]NASA Goddard Institute for Space Studies; New York, NY, USA; [2]University of Florida; Gainesville, FL, USA; [3]USDA-Agricultural Research Service; Ames, IA, USA; [4]Center for Climate Systems Research, Columbia University, New York, NY, USA

20 ..... **Monitoring and Managing Effects of Climate Change on Rangeland Ecosystem Goods and Services –** ***Kristie Maczko***[1], *Daniel W. McCollum*[2], *Jack A. Morgan*[3], *Clifford Duke*[4], *William E. Fox*[5], *Lori A. Hidinger*[6], *Urs Kreuter*[7], *John E. Mitchell*[8] and *John A. Tanaka*[9]; [1]Sustainable Rangelands Roundtable, University of Wyoming, Fort Collins, CO; [2]Rocky Mountain Research Station, USDA Forest Service, Fort Collins, CO; [3]Rangeland Resources Research Unit, USDA-ARS, Fort Collins, CO; [4]Science Programs, Ecological Society of America, Washington, DC; [5] Texas AgriLife Research, Texas A&M University, Temple, TX; [6]Consortium for Science, Policy and Outcomes, Arizona State University, Tempe, AZ; [7]Ecosystem Science and Management, Texas A&M University - College Station, College Station, TX; [8]USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO; [9]Department of Renewable Resources, University of Wyoming, Laramie, WY

21 ..... **Monitoring and Modeling Leaf Wetness Duration for Optimizing Fungicide Use in Strawberry Production –** ***Verona Oliveira Montone***[1], *Natalia Peres*[2] and *Clyde Fraisse*[1]; [1]Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA; [2]Gulf Coast Research and Education Center, University of Florida, Wimauma, FL, USA

22 ..... **Financial Management of Beginning Farmers and the Use of Climate Information –** ***Denis Nadolnyak***; Auburn University, Auburn, AL, USA

23 ..... **Long-Term Climate Variability and Rainfall Index Insurance –** ***Denis Nadolnyak***; Auburn University, Auburn, AL, USA

24 ..... **ENSO and Corn Aflatoxin Contamination in the Southeastern U.S. –** *Arnold R. Salvacion*[1], ***Brenda V. Ortiz***[1], *Gerrit Hoogenboom*[4], *Brian .T. Scully*[2], *David .M. Wilson*[3] and *Dewey Lee*[3]; [1]Agronomy and Soils Department, Auburn University, Auburn, AL, USA; [2]USDA-ARS, Tifton, GA, USA; [3]University of Georgia, Tifton, GA, USA; [4]AgWeatherNet, Washington State University, Prosser, WA, USA

25 ..... **Soil Temperature: Indicator of Earlier Shifts in Planting Season for Agronomic and Horticulture Crops –** ***Tapan B. Pathak***[1], *Kenneth G. Hubbard*[1,2] and *Martha Shulski*[1,2]; [1]School of Natural Resources, University of Nebraska, Lincoln, NE, USA; [2]High Plains Regional Climate Center, University of Nebraska, Lincoln, NE, USA

17 ..... **Risk Mapping to Support Decision Making on Plant Disease Management in Brazil –** Presented by: ***Clyde Frasisse;*** *Willingthon Pavan*[1], *José Mauricio Cunha Fernandes*[2], *Jorge Luis Boeira Bavaresco*[1], *Jaqson Dalbosco*[1] and *Emerson M. Del Ponte*[3]; [1]Curso de Ciência da Computação, Universidade de Passo Fundo, Passo Fundo, RS, Brazil; [2]Empresa Brasileira de Pesquisa Agropecuária - Embrapa, Passo Fundo, RS, Brazil; [3]Departmento de Fitossanidade, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil

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26 ..... **Some Edaf- Climatic Effect on Variability of S and B in an Argentine Republic Soil – *Emilia Rivero***, *Gustavo Cruzate*, *Susana Russo*, *Marcelo Beltran*, *Roberto Casas* and *Tomas Bosco*; Soil Institute, CRN- National Institute of Agricultural Technology. Castelar, Buenos Aires- Argentina

27 ..... **Edafo- climate Factors in the Variability of Nutrients in an Argentine Republic Soil – *Emilia Rivero***, *Gustavo Cruzate*, *Susana Russo*, *Marcelo Beltran*, *Roberto Michelena* and *Tomas Bosco*; Soil Institute, CRN- National Institute of Agricultural Technology. Castelar,Buenos Aires- Argentina

8 .... **Assessing the Value of Climate Information in Agriculture Using the Stochastic Production Frontier Approach – *Daniel Solís*** and *David Letson*; University of Miami, Division of Marine Affairs and Policy, RSMAS, Miami, FL

28 ..... **Carbon Footprint Calculator – *Oxana Uryasev***; University of Florida, Gainesville, FL, USA

29 ..... **An Approach for Encapsulating Fortran Coded Models into a R Package – *Tiago Zortea***[1], *Willingthon Pavan*[2], *José Mauricio Cunha Fernandes*[3] and *Carlos H. Holbig*[2]; [1]Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA; [2]Department of Computer Science, University of Passo Fundo, Passo Fundo, RS, Brazil; [3]Empresa Brasileira de Pesquisa Agropecuária - Embrapa, Passo Fundo, RS, Brazil

Water Resource Management

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30 ..... **Drought Forecasts for Managing Water Resources in the Face of Climate Variability – *Jonathan Alldridge*** and *Christopher Martinez*; Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA

31 ..... **Effects of Sea Level Rise and Other Climate Change Impacts on Southeast Florida's Water Resources –** *Barry N. Heimlich*[1] and ***Frederick Bloetscher***[2]; [1]Center for Environmental Studies, Climate Change Research Initiative, Florida Atlantic University, Jupiter, FL; [2]Department of Civil, Environmental, and Geomatics Engineering, Florida Atlantic University, Boca Raton, FL

32 ..... **Assessing Perceptions, Uses, and Needs for Climate Information among Water Managers in the ACF River Basin –** *Christopher Martinez*[1], *Norman Breuer*[2], *P. Srivastava*[3] and ***Jessica Bolson***[1]; [1]Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA; [2]Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL, USA; [3]Department of Agricultural Engineering, Auburn University, Auburn, GA, USA

33 ..... **ENSO Impacts on Heavy Rain Events in the Southeast –** *James J. O'Brien*, ***Preston W. Leftwich*** and *David F. Zierden*; Center for Ocean-Atmospheric Prediction Studies, Florida State University, Tallahassee, FL, USA

34 ..... **Optimized Climatic Indicators to Provide Probability of Exceedance Streamflow Forecasts – *Susan Risko*** and *Chris Martinez*; Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL USA

35 ..... **Assessment of Precipitation Reforecast Analogs in the Tampa Bay Region –** *Christopher J. Martinez* and ***Robert W. Rooney***; Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA

Plenary Speaker Biographies

Wednesday, May 25, 2011

Keynote Address: Climate Science and Service from Local to Global Scales

Chester J. Koblinsky, Ph.D.
Executive Director, Climate Program Office, Office of Oceanic and Atmospheric Research, NOAA, Silver Spring, MD

As Director of NOAA’s Climate Program Office and leader of NOAA’s climate mission, Dr. Koblinsky leads the formulation of NOAA’s future climate activities and the execution of NOAA’s climate competitive research programs. As the transition Deputy Director for Climate Services, Dr. Koblinsky manages various aspects of the planning for a new organization in NOAA focused on climate science and services. Dr. Koblinsky joined NOAA in 2003 after a 25-year career as a research oceanographer and science manager at the Scripps Institution of Oceanography and NASA’s Goddard Space Flight Center. He has published numerous scientific papers, primarily on ocean circulation and monitoring, and led the development of research satellite missions including Aquarius, which will be launched in 2011. He is a recipient of the Presidential Rank award for federal senior executives and NASA’s Medal for Exceptional Scientific Achievement.

Abstract:

Climate Science and Service from Local to Global Scales

Chester Koblinsky
NOAA Climate Program Office, Office of Oceanic and Atmospheric Research,
National Oceanic and Atmospheric Administration, Silver Spring, MD

The National Oceanic and Atmospheric Administration's (NOAA) Climate Program Office (CPO) sponsors the development climate science and services from local to global scales. CPO supports the research community in earth system science (ESS), modeling analysis predictions and projections (MAPP), climate observations and monitoring (COMS), and climate and societal interactions (CSI). The portfolio of research funded by CPO exemplifies the breadth and depth of science required to provide robust services in managing the risks associated with climate variability and change. Moving forward in response to climate adaptation needs, CPO will integrate between these areas to provide end-to-end science. However, integration requires communication between different scientific disciplines as well as with decision and policy communities, who utilize the information. In order to be relevant to decision makers, all of these research endeavors must grapple with the communication of uncertainty and risk including probabilities or likelihoods of extreme events.

Contact Information: Chester Koblinsky, Executive Director, NOAA Climate Program Office, 1315 East West Highway, Room 12837 - 12th Floor, Silver Spring, MD 20910; Phone: 301-734-1263, Fax: 301-713-0517, Email: chester.j.koblinsky@noaa.gov

Scenarios for Planning

Holly Hartmann
Director, Arid Lands Information Center,
University of Arizona, Tucson, AZ

Dr. Holly Hartmann is Director of the Arid Lands Information Center at the University of Arizona, is a co-investigator at the Climate Assessment for the Southwest (CLIMAS), and led the scenario development team at the Science and Technology Center for the Sustainability of Semi-Arid Hydrology and Riparian Areas (SAHRA). Dr. Hartmann's research has focused on making climate and water research more usable, based on engagement with stakeholders, development of decision support resources and tools, and transition of decision support into sustainable operations. Current projects address climate and hydrologic forecasts; climate change scenario planning and risk management; water policy in the US West; collaborative software development; and national climate services.

Currently she is a member of the National Academy of Sciences Committee on the Assessment of the National Weather Service's Modernization for the National Academy of Sciences, and the Climate Working Group of the NOAA Science Advisory Board. She is also a member of the American Meteorological Society's (AMS) Committee on Climate Services, the Board of the International Environmental Modeling and Software Society, the Editorial Board of the journal Environmental Modeling and Software, and the Executive Committee of Carpe Diem West. Holly received her MS degree in water resources management from the University of Michigan and her PhD in hydrology and water resources from the University of Arizona.

Water Resources

Photo Courtesy of Carlye Calvin, UCAR

David Yates
National Center for Atmospheric Research, Boulder, CO

David Yates is a Scientist at the National Center for Atmospheric Research and an Associate with the Stockholm Environment Institute (SEI) in Boulder, Colorado. He researches coupled natural and managed water systems, developing and applying numerical models to understand, predict, and assess their interactions, with a specific focus on climate change.

David Yates has been a part of the development team of SEI's Water Evaluation and Planning (WEAP) model and has focused on applying WEAP to help water utilities with long-range planning that includes climate change impacts and adaptation strategies. Dr. Yates developed an educational primer for the Water Research Foundation (WaterRF) that outlines the current state of scientific knowledge regarding the potential impacts of global climate change on water utilities, including impacts on water supply, demand and relevant water quality characteristics. A follow-on study with the WaterRF has focused on robust adaptation strategies, with explicit consideration of climate. The partnering utilities include the Inland Empire Utility Agency (CA), the El Dorado Irrigation District (CA), Portland Water (OR), Colorado Springs Utilities (CO), Massachusetts Water Resource Authority (MA), Durham Water (NC), and Palm Beach County Water (FL).

Coastal and Urban Communities

Margaret Davidson
Director, NOAA Coastal Services Center, Charleston, SC

Margaret Davidson has been an active participant in coastal resource management issues since 1978, when she earned her juris doctorate in natural resources law from Louisiana State University. She later earned a master's degree in marine policy and resource economics from the University of Rhode Island.

Davidson served as special counsel and assistant attorney general for the Louisiana Department of Justice, and was the executive director of the South Carolina Sea Grant Consortium. She joined NOAA as the director of the NOAA Coastal Services Center in 1995, a position she continues to hold. During this time she also served as the acting assistant administrator for NOAA's National Ocean Service from 2000 to 2002. She holds a faculty appointment at the University of Charleston and serves on the adjunct faculties of Clemson University and the University of South Carolina.

Davidson has served on numerous local, state, and federal committees and has provided leadership for national professional societies. She has focused her professional work on environmentally sustainable aquaculture, mitigation of coastal hazards, and impacts of climate variability on coastal resources.

Biodiversity and Conservation

Jean Brennan
Coordinator, Appalachian LLC, US Fish and Wildlife Service, Blacksburg, VA

Jean Brennan is a Landscape Conservation Coordinator for the U.S. Fish and Wildlife Service, working with the Appalachian Landscape Conservation Cooperative (LCC). The geographic extent of the Appalachian LCC extends from southern New York State to central Alabama and from southern Illinois to central Virginia. It is part of a national conservation network established through the Department of Interior.

As the Appalachian LCC Coordinator, Jean works with land and resource management agencies, environmental organizations, and regional initiatives, to forge strategic collaborative science-management partnership among individuals and organizations to achieved shared goals. Such partnerships are intended to promote innovative, practical, landscape-level strategies for managing large-scale and climate change impacts and other broad-scale changes.

Before joining the U.S. Fish and Wildlife Service, Dr. Brennan worked as a Senior Climate Change Scientist for an environmental NGO based in Washington DC. Her work involved synthetic research into the impacts of climate change on natural systems and adaptation strategies. She has also worked extensively internationally as Senior Conservation Scientist for the U.S. Agency for International Development, and as a staff scientist for the U.S. State Department, Office of Global Change. Jean served as a member of the U.S. Delegation to the Intergovernmental Panel on Climate Change (IPCC) and was honored to be selected among a small group of scientists recognized by the IPCC for her contributions and shares the 2007 Nobel Peace Prize awarded to the IPCC.

She is an accomplished field biologist and holds graduate degrees in Population Biology and Genetics from the University of Tennessee; Forest Ecology from Yale University School of Forestry; and Anthropology from the University of Pennsylvania. She has taught Conservation Biology at the University of Michigan, School of Natural Resources and Environment, and Air Resources at the University of California Davis.

Agricultural Risk Management

Cynthia Rosenzweig
NASA Goddard Institute for Space Studies, New York, NY

Dr. Cynthia Rosenzweig is a Senior Research Scientist at NASA Goddard Institute for Space Studies where she heads the Climate Impacts Group. She has organized and led large-scale interdisciplinary regional, national, and international studies of climate change impacts and adaptation. She is a co-chair of the New York City Panel on Climate Change, a body of experts convened by the mayor to advise the city on adaptation for its critical infrastructure. She has co-led the Metropolitan East Coast Regional Assessment of the U.S. National Assessment of the Potential Consequences of Climate Variability and Change, sponsored by the U.S. Global Change Research Program. She was a Coordinating Lead Author of the IPCC Working Group II Fourth Assessment Report observed changes chapter, and served on the IPCC Task Group on Data and Scenarios for Impact and Climate Assessment.

Dr. Rosenzweig's research involves the development of interdisciplinary methodologies to assess the potential impacts of and adaptations to global environmental change. A recipient of a Guggenheim Fellowship, she joins impact models with climate models to predict future outcomes of both land-based and urban systems under altered climate conditions. She is a Professor at Barnard College and a Senior Research Scientist at the Columbia Earth Institute.

Cross-sectoral Impacts

Kenneth Mitchell
Special Assistant to the Director, Air, Pesticides, and Toxics Management Division, U.S. EPA, Atlanta, GA

Dr. Ken Mitchell has 20 years of wide-ranging multi-media environmental experience including work in the private sector, Federal and State governments, and international assignments on a wide array of environmental programs, including the Clean Air Act, RCRA, Superfund, water issues, and energy and climate change concerns. He is currently the Special Assistant to the Director of the Air, Pesticides, and Toxics Management Division at EPA Region 4 in Atlanta. He also leads the Region's climate change adaptation efforts. He holds a PhD in chemistry from the Georgia Institute of Technology and a BS in chemistry from UNC Chapel Hill.

Public Health and Climate

George Luber
Associate Director for Climate Change, Division of Environmental Hazards and Health Effects, NCEH, CDC, Atlanta, GA

Dr. George Luber is an epidemiologist and the Associate Director for Climate Change in the Division of Environmental Hazards and Health Effects at the National Center for Environmental Health, CDC.
Since receiving his PhD in Medical Anthropology from the University of Georgia, and joining CDC, Dr. Luber has served as an Epidemic Intelligence Service (EIS) Officer and staff epidemiologist at the National Center for Environmental Health. His research interests in Environmental Health are broad and include the health impacts of environmental change and biodiversity loss, harmful algal blooms, and the health effects of climate change. Most recently, his work has focused on the epidemiology and prevention of heat-related illness and death, the application of remote sensing techniques to modeling vulnerability to heat stress in urban environments, and Climate Change adaptation planning.

In addition to managing the Climate Change Program at CDC, Dr. Luber is a Co-Chair of the Climate Change and Human Health Interagency Workgroup at the US Global Change Research Program and is a lead author for the Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report.

Miami-Dade: A Case Study on Adaptation and Mitigation

Nichole L. Hefty
Miami-Dade Dept. of Environmental Resources Management
Miami-Dade County Climate Change Program Coordinator

Nichole Hefty earned a Bachelor of Science Degree in Biology from the University of Miami, Florida in 1987. She has worked with the Miami-Dade Department of Environmental Resources Management (DERM) since 1989, and has been coordinating Miami-Dade County's Climate Change Program since 2005. Her responsibilities include coordinating and facilitating implementation of County (internal) and community-wide climate change mitigation and adaptation initiatives, and aligning them with regional, state, and federal resources and priorities. Since the summer of 2009, Mrs. Hefty has been part of the core team developing and now implementing "GreenPrint; Our Design for a Sustainable Future," Miami-Dade County's community-wide Sustainability Plan. Mrs. Hefty's primary responsibility for GreenPrint has been developing and implementing the initial five year climate action plan (CAP) for Miami-Dade County, which is an integral component of the overall sustainability plan. She is currently serving on the Steering Committee of the SE Florida Regional Climate Compact, which is a groundbreaking regional collaboration of four SE Florida counties (Monroe, Miami-Dade, Broward, & Palm Beach) on climate change issues, policies, and strategies for the SE Florida region.

Friday, May 27, 2011

Closing Address:
Moving Forward: A Vision for Meeting Future Challenges

Steve Shafer
Deputy Administrator, Agricultural Research Service, USDA, Washington, D.C.

Dr. Shafer has devoted his entire professional career to public service in the United States Department of Agriculture (USDA). Since 2008, he serves as Deputy Administrator for Natural Resources and Sustainable Agricultural Systems in the Office of National Programs, Agricultural Research Service (ARS), where he leads programmatic oversight for ARS' research on soil, water, and air resources; global climate change; biofuels; rangelands, pastures, and forages; agricultural and industrial byproduct utilization; and agricultural systems and competitiveness. These ARS programs encompass more than $200 million in annually appropriated resources and 550 scientists conducting nearly 200 research projects at approximately 70 locations across the nation. During 2009 - 2010, he served concurrently as Senior Advisor for Climate Science in the Office of the Chief Scientist, USDA, and continues to provide this scientific expertise to upper USDA administration. Prior to his current position, he was the ARS Midwest Area Director (2006-2008), the Agency's senior line manager in an eight-state Area (OH, MI, IN, IL, MN, WI, IA, MO) for all fiscal (~$145 million), personnel (~1400, including ~360 research scientists, engineers, and veterinarians), and infrastructural resources (including the National Center for Agricultural Utilization Research in Peoria, IL and the National Animal Disease Center in Ames, IA); was responsible for implementation and excellence of all research programs; and directly supervised >30 ARS senior Research Leaders and Laboratory Directors. He was appointed to the Senior Executive Service of the U.S. Government in 2005, when he became the ARS Midwest Area's Associate Director (2005-2006). He was the ARS National Program Leader for Global Change research (2000-2005, Beltsville, MD); Deputy Director for Environment and Plant Health in the USDA Office of Risk Assessment and Cost-Benefit Analysis (1998-2000, Washington, DC); and a plant pest risk analysis specialist in the Animal and Plant Health Inspection Service (1997-1998, Raleigh, NC). During 1983-1997, he was a Research Plant Pathologist in ARS' Air Quality-Plant Growth and Development Research Unit at Raleigh, NC, with concurrent USDA faculty appointment in the Plant Pathology and Soil Science departments at North Carolina State University. His research focused on interactions among atmospheric components such as ozone, acid rain, and carbon dioxide with plants, pathogenic and beneficial microorganisms, and soils. He received B.S. Agr. and M.S. degrees from The Ohio State University and a Ph.D. from North Carolina State University, all in plant pathology. He had his first job in USDA as an undergraduate, working two summers as a Biological Aid with the Forest Service's Dutch elm disease research program in Delaware, Ohio. He is a native of Marion, Ohio.

Thursday, May 26, 2011
8:30AM-10:00AM

Concurrent Panel Session 1
Managing Risks to Agriculture—A World Perspective

Farmers' Perceptions of Risk, Impacts and Adaptations to Climate Change: A Perspective from Western India

Dineshkumar Moghariya and *Richard C. Samrdon*
Department of Environmental Studies, State University of New York College of Environmental Science and Forestry, Syracuse, NY, USA

People's risk perceptions and their levels of concern can compel or constraint climate change policy. A study initiated in rural Saurastra and Kutch region of Western India informs that rural people are able to detect climate change correctly; however there exist misconception about climate change knowledge. Farmers detect a wide range of climate change impacts on their agriculture and farm properties, ranging from increased pest and disease infestation, decrease in quality and quantity of agriculture production, and disturbance in cattle conception to damage to their farm properties such as water pipelines. Farmers perceive moderate to high risks, detect wide range of impacts on their agriculture; however they are moderately concerned about risks of climate change. They think that innovations and non farm income options would protect them from adverse impacts of climate change. People in cyclone prone area express higher levels of perceived risk and slightly higher levels of concerns than their counterparts in drought prone areas. Farmers use integrated approach with blend of traditional and modern practices such as crop rotation, intercropping, water harvesting to use of chemical fertilizers and pesticides and hybrid BT seeds for successful adaptation to climate change. There is need to make people aware of causes, impacts and solutions to climate change as a science and economics, to include everybody in addressing the issue of climate change.

Contact Information: Dineshkumar Moghariya, Department of Environmental Science, State University of New York College of Environmental Science and Forestry, 1' Forestry Drive, Syracuse, NY 13210, USA; Phone: 315-586-2094, Email: dmoghari@syr.edu

Climate Services for Vulnerable Communities: Listening to African American Farmers

***Carrie Furman*[1]**, *Carla Roncoli*[2], *Wendy-Lin Bartels*[3], *Mark Boudreau*[1], *Heather Gray*[4] and *Gerrit Hoogenboom*[5]
[1]Department of Biological and Agricultural Engineering, University of Georgia, Athens, GA USA
[2]Master's in Development Practice, Emory University, Atlanta, GA USA
[3]Department of Agricultural Education and Communication, University of Florida, Gainesville FL USA
[4]Federation of Southern Cooperatives, Atlanta, GA USA
[5]AgWeatherNet, Washington State University, Prosser, WA USA

The research presented is part of a larger project funded by the NOAA SARP program that aims to develop and disseminate climate information to African American farmers in the Southeastern US. The research was conducted in the context of the Southeast Climate Consortium, whose aim it is to develop and disseminate climate information for risk management in agriculture. We employed a mixed method research design that combined a phone survey, in-depth interviews, farmer workshops, and participant observation. Based on this research, we found that African American farmers are highly vulnerable to climate shocks due to the environmental and social conditions in which they are embedded. African American farmers are less likely to have irrigation, crop insurance, financial resources, and access to technical assistance than conventional farmers. This is due, in part, to the social profile of the population and the small-scale, part-time, diversified nature of their operations. As a result, farmers who face, for example, a multi-year drought risk losing their farms. While many social inequalities need to be remedied to help protect African American farmers, it is imperative that they have access to at least the same climate information and forecasts offered to other farmers in the region. The paper also reports on programmatic lessons learned in the course of an unprecedented partnership among a well-established civil rights organization, and two universities, including an 1862 land-grant university and a 1890s Historically Black University that provides extension services to minority farmers.

Contact Information: Carrie A. Furman, Department of Biological and Agricultural Engineering, University of Georgia, 1109 Experiment Street, Griffin, GA 30223-1797, Phone: 770-228-7216, Fax: 706-770-228-7218, Email: cfurman@uga.edu

Migration of Agriculture to the Southeast as an Adaptation to Regional Climate Change

Richard T. McNider, *John R. Christy* and *Cameron Handyside*
Earth System Science Center, University of Alabama in Huntsville, Huntsville, AL, USA

At the beginning of the last century most of the United States agricultural production was carried out under a rain-fed agricultural system east of the Mississippi. However, by the end of the last century a significant part of the Nation’s agriculture had migrated to the arid West under irrigation. At the same time during the last century grain production became concentrated in a few states in the deep water holding soils of the upper Midwest. The Southeast with sporadic growing season precipitation and poor water holding soils could not compete economically with the highly efficient production in the West and Midwest and lost substantial agricultural production. The remarkable U.S. agricultural production from irrigation in arid climates developed in the 20th century is likely to contract substantially in the present century due to water resource limitations. The concentration of grain production in the Midwest leaves U.S. food and bio-fuel production vulnerable severe mid-west regional drought. The Southeast may be in a unique position relative to climate change compared to other parts of the country. While regional precipitation changes are uncertain, the IPCC concluded that dry areas are likely to become drier and wet areas wetter. Migration of production back to the Southeast, if sustainable, would be an adaptation strategy to climate change and provide additional capacity for long-term agricultural security. This talk will present preliminary water resource, agricultural and ecological assessments on the viability of this strategy as well as a major new NSF-USDA project.

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Potential Usefulness of Climate Forecasts and AgroClimate for Agriculture in South Carolina

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Seasonal climate variability is a major cause of production risks in agriculture. Farmers can and do use information about this variability to manage the risks. In cooperation with farmers and extension agents, the Southeast Climate Consortium (SECC) has developed AgroClimate to provide such information and related decision-support tools online. The purpose of our research has been to evaluate the potential usefulness of seasonal climate forecasts and AgroClimate for managing agricultural production risks in South Carolina. AgroClimate has seven tools available for the Palmetto State. Twenty two extension agents, specialists, and farmers attended an SECC-sponsored workshop in Florence, South Carolina on January 14 to learn and provide feedback about AgroClimate. Participants in focus groups indicated that *County Yield Database*, *Climate Risk*, and *Agricultural Reference Index for Drought* were the most useful AgroClimate tools for extension agents and farmers. These tools are available for South Carolina. They identified the *Strawberry Advisory System* and *Yield Risk Forecast*, which are available for other southeastern states, as priorities for future development. Several participants indicated that AgroClimate should have a decision-support tool for irrigation scheduling. In addition to focus groups, a survey of Clemson's extension personnel has been conducted to assess their attitudes and awareness about climate variability and the potential usefulness of seasonal climate forecasts to reduce risks of agricultural production in the state. Fifty people, or 28 percent of the survey population, have responded. Survey data will be analyzed with feedback from the focus groups to prioritize development of AgroClimate tools for the state.

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Thursday, May 26, 2011
8:30AM-10:00AM

Concurrent Panel Session 2
Water Resource Management

Climate Change in Water Utility Planning: Decision Analytic Approaches

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Municipal water providers are become increasingly aware of global climate change and its possible impacts on their water resource planning and operations. The Water Research Foundation (WaterRF) and NCAR supported a research project with seven water utilities across the U.S., including the Palm Beach County Water agency, resulting in a decision support process to facilitate assessments of water utility vulnerabilities and response options to future climate change. This project focused, in particular, on the problem of planning in the context of uncertainties surrounding the local-scale hydrologic changes that will result from global climate change. This presentation will provide lessons learned and summarize the structured assessment process that was used to help these utilities conduct scientifically sound and cost-effective assessments of utility vulnerabilities and adaptation options in the context of climate variability and change.

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Predicting Georgia's Future Water Use Using Climatological and Sociological Factors

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Future water availability is a key issue for growth and long-term risk management in Georgia and surrounding states as well as in most areas of the country. Understanding the potentials and limitations of water for human consumption, agriculture, and industry are essential for developing a strategy for intelligent growth in the coming decades. In this paper we first discuss the current state of Georgia's water usage across geographical and sectoral areas. Then we discuss the major factors identified by water managers and other stakeholders for making useful and valid predictions of future water use. Climatological factors include trends in annual and seasonal precipitation and temperature as a driver of evaporation, extreme storm events and the recurrence of drought. Sociological factors include current population trends, instate and external migration, development of coastal areas, and economic growth. These factors are discussed in turn to explore current knowledge, predictions of trends and interdependencies between climate and society and their implications for making a useful prediction of Georgia's future water use.

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Performance Evaluation of a Water Resources System under Varying Climatic Conditions: Reliability, Resilience, Vulnerability and Beyond

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First introduced by *Hashimoto et al.* (1982) Reliability, Resilience, and Vulnerability (RRV) metrics measure different aspects of a water resources system. As a unit, RRV metrics provide one of the most comprehensive approaches for analyzing the frequency or probability of success or failure of a system, the rate of recovery (or rebound) of a system from unsatisfactory state , as well as quantifying the consequence of being in unsatisfactory states for extended periods. Inherently, for a water resources system the method requires a subjective decision defining what constitutes an "unsatisfactory state" depending on acceptable risks. Assessing these comprehensive metrics at current (baseline) and future scenario provide insight into how the system may perform in changing or varying climatic conditions. Such an approach makes it possible to analyze different scenarios that could include specific mitigation or adaptation strategies to accommodate a varying climate. The methodology is demonstrated using Tampa Bay Water's Enhanced Surface Water System. In this case, a thousand ensembles of 300-years stream flow traces were first generated by a multi-site rainfall/runoff model. The daily stream flow traces are passed through an operational model that produced several system variables (such as diversions, surface water production and reservoir storage) at different locations. Outputs from the operational model were then used to define criteria over which the RRV and other metrics were evaluated. Several mitigation scenarios such as treatment and reservoir capacity expansions as well as adaptation through changes in operation, namely, different production level were considered to evaluate system performance. The result demonstrates the benefit of a comprehensive system performance metrics that is easy to understand by decision makers.

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Making of a Green Utility - Environmental Stewardship

Stephen McGrew
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The Palm Beach County Water Utilities Department (PBCWUD) serves approximately 500,000 people and is a leader in Environmental Stewardship through conservation, sustainability, energy efficiency, and green house gas reduction.

Sustainable water resource programs will help maintain aquifer levels thereby reducing potential for salt water intrusion. PBCWUD promotes conservation through its alternative water resources program saving over ten billion gallons of water per year. The water resources program includes the largest reclaimed water system in Southeast Florida, 150 acres of created wetlands, aquifer storage and recovery wells, and brackish aquifer reverse osmosis. The reclaimed water system capacity for residential homes, golf courses and green spaces is 29 million gallons per day (MGD). PBCWUD is now helping solve the water energy nexus by providing up to 27 MGD of reclaimed water for the 3,750 megawatt FPL West County Energy Center. Planning for future water resources includes an option to construct a reservoir to capture storm water which is currently being discharged to tide.

Public water and wastewater utilities account for approximately 3 percent of the annual U.S. electricity usage. PBCWUD has set goals for a 10% energy reduction and 5% alternative energy per customer by 2020. Energy intensive ozone water treatment systems are being replaced with low energy ion exchange. Wastewater biogas will be used to up to generate up to 670 kW of alternative energy. A paradigm shift is occurring as both energy efficiency and greenhouse gas emissions are now being considered when developing capital projects.

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Thursday, May 26, 2011
8:30AM-10:00AM

Concurrent Panel Session 3
Scenarios for Planning

Addressing Climate Risks in North Texas' Preferred Future

John Promise, *P.E.*
North Central Texas Council of Governments, Arlington, TX, USA

North Texas - the metropolitan region including Dallas and Fort Worth – is the fourth largest in the nation with 6.5 million people. It added more people during the past decade than any other region and most states. It is expected to reach 12 million by the year 2050. With this growth comes significant infrastructure and investment challenges for transportation, development, education, health and the environment.

Recognizing that "business-as-usual" patterns of future growth will not be sustainable, a private-public-academic partnership titled Vision North Texas was created to serve as a forum for dialogue and action on these important issues. Beginning with a regional visioning workshop in 2005, the partnership has involved people of all interests and backgrounds to consider choices for the region's future.

Five alternative futures were evaluated in detail. Compared to "business-as-usual," these scenarios would result in reduced carbon dioxide emissions from 7% to 10% below the 2030 projections. The "preferred future" would result in less vehicle miles traveled and lower energy consumption in building construction and operation.

North Texas 2050 describes this preferred future. One of the eight investment areas is climate resilience, on an equal footing with mobility, housing and the economy. Local action on climate risks is already underway, with more than 60% of the region's citizens living in cities whose mayors have signed the U.S. Conference of Mayors Climate Protection Agreement.

As the Mayor of Fort Worth chanted at the most recent Regional Summit, "business-as-usual is dead."

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Evolution of Social Science Methods for Climate Adaptation Research and Assessment

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This presentation reviews the evolution of social science research within the Southeast Climate Consortium (SECC) as the Consortium diversifies its target audience and broadens research topic areas and time scales. Social science research began with methods such as Sondeos, interviews, and surveys that investigated the potential utility of seasonal forecasts for agricultural and water resources decision making. Social scientists then employed iterative interviews with stakeholders in the development of AgroClimate, a decision support system to reduce climate risk in agriculture. Current approaches to stakeholder engagement include participatory processes, such as climate working groups, that convene diverse stakeholders in discussions about the impacts of climate change and potential adaptation responses. As the SECC moves beyond climate variability and embraces the complexities associated with climate change, social scientists face new challenges. In the past we linked with agricultural stakeholders through the Land Grant University's Extension system. However, we are now developing new relationships with our audiences in the coastal, terrestrial, urban, and socially disadvantaged sectors, often in the absence of defined boundary organizations. We are also testing innovative methods for communicating about climate change to gain a deeper understanding of climate-related information needs at multiple decision-making timescales. By fostering opportunities for on-going dialog and learning, we aim to build stronger linkages and more sustainable networks between scientific and public communities. Lessons learned have implications for other academic institutions that are engaging with stakeholders to co-develop tailored scientific outputs for climate adaptation and risk management.

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Thursday, May 26, 2011
10:30AM-12:00PM

Concurrent Panel Session 1
Managing Risks to Agriculture – Tools for Understanding

Climate Model Evaluation Tools - Crop Models

D. W. Shin, *S. Cocke* and *James J. O'Brien*
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Values added by a regional climate model, compared to a global climate model, are explicitly unveiled by using non-traditional skill evaluation statistics. The conventional model evaluation methods, such as temporal correlation of seasonal average rainfall, cannot explain the values of dynamically downscaled data. One of our primary metrics for evaluating the downscaling methodologies is comparing the variation of crop yields simulated using the downscaled data, assuming non-irrigated conditions, to yields simulated using observations. The hidden values of the regional model are better uncovered by using a crop model as a forecast evaluation tool because the crop yield data include the high-frequency variability of seasonal climate (e.g., dry/wet spell sequences). In addition, the values of the regional model were also exposed by high frequency statistics, e.g., the time series of accumulated rainfall and Lawn-and-Garden Moisture Index, which are derived from rainfall data only.

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Risk and Uncertainty in Crop Model Predictions of Regional Yields under Climate Change and Variability

K. J. Boote, *J. W. Jones*, *S. Asseng* and *G. A. Baigorria*
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Crop growth models can be used as strategic tools to evaluate the consequences of climate change and weather variability on production for site-specific fields or whole regions. Crop models can be used to evaluate weather risks in production as well as suggest management or genetic improvement to adapt to the effects of climate change and variability. Crop models can be calibrated to more accurately predict regional crop yields, but the process is difficult because district-wide yields for comparison are aggregated over many soils, fields, sowing dates, and farmers. Regional yield data over multiple decades are available but they are missing the site-specific information on soils, cultivars, sowing dates, crop management, irrigation, pest control, etc. There are also unknown degrees of yield gap compared to well-managed crops on known farmer fields. Information on representative crop management (cultivar, sowing date, fertility, irrigation, and pest control) and representative soils are needed for running the models for comparison to district-wide yields. Potential sources of error in accurate yield prediction under climate variability include errors in model responsiveness to weather as well as uncertainty in accuracy of soil water holding traits and soil C, uncertainty of rooting characteristics for crops in the different soils, uncertainty of irrigation record, uncertainty of fertilization, and lack of knowledge of biotic pest presence. Modelers will calibrate to the central tendency of the regional yields, but which uncertain parameters are calibrated “down” if actual yields are less than climatic-limited yields? Modelers should test yield predictions against historical yields to verify that effects of weather variability are accounted for. Examples will be given for maize, cotton, peanut, and soybean in Southeastern USA.

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The Importance of Scale in Managing Agricultural Risk through Climate Information

Mark Boudreau and *Elizabeth Kramer*
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Information on atmospheric conditions comes in a range of spatial and temporal scales, and difficulties arise when derived estimates of physical or biological responses to these conditions do not match the scale of the climate data. Using the example of apple disease in the southern Appalachians, we examine which risk estimators and management tools are scale-appropriate for given types of information. At the level of weather, many empirical and mechanistic models exist for predicting daily, orchard-specific risk from diseases such as apple scab or fireblight, and are coupled with spray advisories. At the scale of climate variability, data on seasonal disease patterns in response to ENSO phases may inform recommendations for orchard floor management, spray programs, etc. in a production region. Finally, estimating climate change impacts and adaptation strategies requires a regional model at a coarser resolution, incorporating the critical role of land use change. We propose the application of techniques from landscape ecology, viewing orchards as "habitat patches" with varying levels of connectivity which are influenced by climate and land use. We will use connectivity metrics to assess landscape impact on individual patches in a representative area to determine the potential for between-field interactions. Scale-appropriate decisions at this level include site selection, breeding strategies, and multi-state policy and infrastructure modification.

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The International Environmental Data Rescue Organization: History, Present and Future

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The International Environmental Data Rescue Organization (IEDRO) is a 501(c)(3) non-profit group that locates, rescues, and digitizes all historic environmental data worldwide to ensure that those data are available in a safe, open, and unrestricted data base. The IEDRO process described above involves active participation from the data owners, IEDRO volunteers, and contracting digitizing institutions. Preference with data rescue and digitization is given to data suppositories in developing nations, especially from those in the Southern Hemisphere, due to both humanitarian and scientific reasons respectively.

IEDRO takes responsibility for training the host nation in both pre-digitizing organization and sorting of the data as well as with initial data transfer via digital photography. In addition, IEDRO provides the necessary equipment to accomplish this task. The resulting digital files are relayed via CD to the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center where they are digitized and resent to the NOAA world database and back to the original host nation.

Since 2005, IEDRO has digitized over one million observations in over 12 countries. Increasing the pool of rescued and digitized environmental data allows us to better understand the nature and extent of climate variability, aids in the prevention of the vector diseases, improves lifesaving flood forecasts, prevents famine and starvation, while also painting a clearer understanding of human history. Future success of IEDRO and global data digitization and rescue projects depend on continued support through a wide array of volunteers along with increased financial funding.

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Thursday, May 26, 2011
10:30AM-12:00PM

Concurrent Panel Session 2
Water Resource Management: Tools and Analysis

Development of Community Water Deficit Index (CWDI) for Small to Mid-size Communities of the Southeastern United States

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El Niño Southern Oscillation (ENSO) greatly affects water availability in the Southeast, for e.g., it is well-understood that La Niña conditions bring drought to this region. Public water supply shortages resulting from drought are a major concern to communities of this region, especially those that rely of surface water systems. However, since small to mid-size communities are most vulnerable, this study was undertaken to develop a Community Water Deficit Index (CWDI) for use by water managers in these communities. The index was conceptualized keeping in mind that it should operate at a high spatial resolution, should address both water supply and demand during drought and should be able to forecast drought. System dynamics modeling software STELLA® was used to develop a modeling framework that can be used to evaluate differences in water supply and demand, and thus the severity of drought. Water supply is calculated using a simple hydrologic model that uses ENSO-based precipitation and temperature forecasts. ENSO-based water demand is estimated using two components: the fixed demand of the community based on past data, and the dynamic demand, which is climate dependent and is affected by consumptive demand resulting from lawn and golf course irrigation. This demand increases during La Niña (hot and dry) phase due to the loss of soil moisture and was calculated as the difference between potential and actual evapotranspiration. The CWDI is estimated by combining the supply and demand components, and is currently being tested in two small to mid-size communities of this region.

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Agricultural Decision System for the Chesapeake Bay Forecasting System

Raghu Murtugudde and ***Michael Maddox***
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The Chesapeake Bay Forecasting System (CBFS) is a tool designed for regional Earth System prediction. Within the framework of the CBFS, the non-tidal watersheds are modeled using the Soil and Water Assessment Tool 2009 (SWAT) which is utilized to predict river discharge to the Chesapeake Bay (CB) on a daily and seasonal basis, and also sediment, nitrogen and phosphorus loads delivered to the CB on a daily basis. Agricultural land represents 26% of the land area in the CB watershed and is responsible for ~ 40% of excess nutrients into the CB. Over the CB's 168,000km^2 watershed, plant growth and cropping practices can vary widely due to differences in orographic weather phenomena, latitude and geology. To model agricultural lands, a decision tool based on regional climatology and common agronomic practices was developed for the CBFS. The Agricultural Management Selection Tool (AMST) calculates and selects the timing of agricultural practices and crop variety based on climate factors coupled with plant phonological events and land characteristics. Agricultural adaptations based on climate scenarios can be modeled and/or predicted using the AMST. A Geographic Information System (GIS) interface is currently being developed to enhance the use of the AMST. The AMST also provides a methodology for quickly generating input files for the SWAT model.

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Development of a Turfgrass Irrigation Management System for North Carolina

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Water supply issues are becoming significant economic and social concerns for many states, including North Carolina. Drought conditions in North Carolina during 2007 were the worst since modern weather records began in 1895. Drought is exacerbated by increasing population and increasing demands for water. The population of NC is projected to double in the next 65 years. Long-term weather predictions offer little guidance in what the future holds. This is compelling municipalities to develop long-range water conservation strategies.

The Turf Irrigation Management System (TIMS) was launched in 2007. The simple website gives everyone, from the dedicated turf professional to the homeowner, help in making irrigation management decisions.

TIMS guides the user as they establish their individual account. Users provide their physical address and then answer a few simple questions about the type of grass, soil and irrigation system. TIMS then calculates irrigation needs based on up-to-date weather data. Weather and climate information is retrieved from the Climate Retrieval and Observations Network of the Southeast (CRONOS), an environmental observations database at the State Climate Office. Based on recent weather conditions, including precipitation and evapotranspiration estimates, and known crop irrigation demands, the suggested amount of irrigation is calculated. Results are given in minutes of irrigation needed to keep the user’s lawn alive and healthy.

Use of this tool could save millions of gallons of water. Additionally, the amount of over-watering will decrease thereby reducing silt-runoff, which is one of the most tenacious environmental concerns of NC’s water systems.

TIMS is a proven resource for helping homeowners conserve water. To date, there are over 1,900 accounts using this decision support tool. It is available online for North Carolinians to calculate and track irrigation use: http://www.turffiles.ncsu.edu/tims/

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Climate Change and its Impact on the Hydrological Processes in the Caribbean Islands of Puerto Rico, Jamaica and Dominican Republic

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This study concerns the analysis of climate change impact on the hydrology of Caribbean islands of Puerto Rico, Dominican Republic and Jamaica. Climate change cause significant economic and environmental risks worldwide especially in the developing countries. There are limited studies in the Caribbean islands in terms of trends in climate change and its impact on hydrology and environmental problems. Drought, heavy rainfall, high winds, and flooding cause losses to the agricultural and natural resources sectors in the Caribbean islands. Comparison of projected changes in precipitation and temperature across different models for three seasons (2011-2040, 2041-2070 and 2071-2100) was carried out to get an indication of the consistency of the projected changes in the region. Although the GCMs uniformly suggest increases in temperature, the rainfall projections are not consistent. Secondly, we investigated how changes in daily temperature and precipitation might translate into changes in stream flow and other hydrological components. For this, we generated daily climate projections by modifying the historical datasets to represent the changes in the GCM climatologies. The hydrological changes due to climate change were predicted using the Soil and Water Assessment Tool (SWAT). The result indicated that climate change will have significant impact on the surface and ground water resources of the region. Many of the models show statistically-significant declines in mean annual flow for the different time-periods and scenarios. The directions of the streamflow changes generally follow the changes in rainfall. The study indicated that there is considerable difference between the output of different GCM and care should be taken to make conclusion on the effect of climate change on local hydrological processes.

Key Words: Climate Change; GCM; Hydrological process; SWAT; Hydrological Modeling; Water balance; Streamflow; Caribbean

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Thursday, May 26, 2011
10:30AM-12:00PM

Concurrent Panel Session 3
Cross-sector Impacts

Cross-sector Climate Impacts and Adaptation Strategies in the New York City Infrastructure-shed

Radley Horton
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Climate hazards including heat waves, cold air outbreaks, intense precipitation events and coastal storms currently have large and unique impacts on urban regions such as New York City. This presentation will outline how future changes in climate and other factors may modify both the risk profiles for key assets and achievability of operational mandates for a range of sectors including transportation, water, and energy. An innovative approach to identifying and managing these risks and vulnerabilities in New York City will be highlighted, with linkages drawn to expanding risk management efforts throughout the urban Northeast U.S. and beyond.

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Climate Impacts on Agricultural Loan Performance: Evidence from the Southeastern US

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Objectives. Investigate the possibility that agricultural loan portfolios of banks serving agricultural producers in the southeastern U.S. are affected by inter-annual climate fluctuations. In the Southeast USA, draughts and floods caused by ENSO events affect agricultural producers whose risk management options include farm supports and crop insurance. Impacts of climate variability on agricultural banks are expected through possible changes in repayment patterns including charge offs, delinquencies, defaults, and loan restructuring. Understanding if and how much agricultural loan portfolios in the Southeast are affected by climate variability measured by the ENSO event index would be suggestive of the degree to which the weather related risks are sufficiently diversified through the financial system.

Background. In the U.S., commercial banks are one of several sources of external funds available to qualified farmers. Since emerging climate research shows that long term climate variability measured by El Niño Southern Oscillation (ENSO) events affects producers in the Southeastern USA, we study how such events affect loan portfolios of agricultural banks in this region. There is emerging literature studying how financial markets are affected by catastrophic risk events many of which are caused by climate extremes. The basic conclusion is that commercial banks and their clients are affected by these events in the absence of adequate insurance markets (Garmaise and Moskowitz, 2009; Kau and Keenan, 1999; Collier, Katchova, and Skees, 2010).

Data & Methodology. Detailed analysis of the impact of ENSO on yields of various crops in the region has been done for several crops (Martinez, et al., 2009; Baigorria, et al., 2008). Aggregate impacts of ENSO on production risk (as opposed to production level) have also been analyzed. For example, ENSO events were found to be positively associated with agricultural disaster payments in county level analysis (Nadolnyak and Hartarska, 2010). ENSO events were also found to affect production risk at more moderate levels in crop insurance analysis (Nadolnyak and Vedenov, 2008).

To match the semi-annual bank data, bi-monthly and MA's of the MEI and related SST-based indexes are used to classify years according to their observed impacts on the local climate. The dataset we compiled from non-archived call reports for 2001-2008 comprises data on commercial banks with agricultural to total loans ratio of > 25% (FDIC definition of agricultural bank) in the Southeastern states: AL, FL, GA, MS, and SC. The variables of interest include performance indicators on agricultural loans & loans to farmers as well as the performance of loans and leases secured by farmland, broken out by their size.

Preliminary results indicate that ENSO events do have impact on the number and value of agricultural loans and some impact on the loan portfolio performance of banks. For loans secured by farmland, production loan charge-offs increase significantly with the strength of the ENSO signal (positive MEI values). Lower index values are associated with a shift towards lending to bigger borrowers. There is also a statistically significant increase in lending in terms of both numbers of loans disbursed and their values in non-neutral years. However, the impacts of inter-annual climate variability on banks serving agricultural producers are weaker than the impacts on agricultural production which suggests that only a small part of agricultural production risk is transmitted to financial institutions.

The results above are also confirmed by standard econometric analysis, such as fixed effects and censored variable regression. This may be in part due to efficient financial management practices of both the banks and the producers and to the production supports that mitigate the climate risks. Currently, we are working on refining the ENSO data to more fully reflect the growing period conditions and banking data to (1) separate operational (production) loans expected to be most impacted by climate variability and (2) introducing more spatial elements in the analysis.

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Sectoral Engagement Activities at NOAA's National Climatic Data Center

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NOAA's National Climatic Data Center (NCDC) recently expanded its customer service activities to include engagement with several climate sensitive sectors. As a starting point, NCDC identified 12 sectors which represent a majority of the customers requesting climate data and information from NCDC. These sectors include: *Agriculture*, *Civil Infrastructure*, *Coastal Hazards*, *Energy*, *Health*, *Insurance*, *Litigation*, *Marine and Coastal Ecosystems*, *National Security*, *Tourism*, *Transportation*, *and Water Resources*. Each sector has a team dedicated to learning more about and serving the needs of the sector. Activities within each sector include the development of sectoral fact sheets, hosting or co-hosting sectoral workshops, attending and/or participating at sectoral conferences, partnering on research activities, and representing NCDC at sectoral trade shows. Examples of successful sectoral collaboration will also be discussed.

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Incorporating Seasonal to Inter-annual (SI) Climate Variability in Point Source Discharge Permitting for Effective TMDL Development and Implementation

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National Point Source Discharge Elimination System (NPDES) permits are used to control point source pollution in a watershed. Most often these permits are issued to discharge pollutants at a fixed rate and continuously monitor their discharges to demonstrate that they are in compliance with the permit. During low flow periods water quality impairments often result from point source discharges. On the contrary, during high flow periods contributions from point source dischargers are relatively very small. In addition to the seasonal variability in stream flows, stream flows are also affected by inter-annual climate variability resulting from a number of ocean-atmosphere phenomena that operate at seasonal to decadal time scales. Currently, reliable El Nino Southern Oscillation (ENSO) forecasts are being issued by National Oceanic and Atmospheric Administration (NOAA) that can be used in the NPDES permitting process to further decrease the effect of point source discharge on stream water quality. In this paper, we quantify the effect of point source discharge on seasonal and monthly Biological Oxygen Demand (BOD), Ammonia Nitrogen loading (and concentration) and demonstrate how ENSO forecasts can be used in the NPDES permitting process to improve stream water quality. The study was conducted in the Chickasaw Creek Watershed in south Alabama using the Loading and Simulation Program C^{+++} (LSPC). The model was calibrated and validated for flow, BOD and Ammonia Nitrogen. The model was then used to demonstrate how climate variability forecasts can be incorporated in the NPDES permitting and the water quality benefits resulting from such endeavor.

Keywords: LSPC, TMDL, BOD, Ammonia Nitrogen, Point source, Nonpoint source

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Thursday, May 26, 2011
1:30PM-3:00PM

Concurrent Panel Session 1
Managing Risks to Agriculture – Indirect Effects

Influence of ENSO Phase on Optimal Corn Planting Dates in North Carolina

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In North Carolina, corn is usually planted from late March through early May, in large part to avoid damage that later planted corn suffers from corn borer and corn earworm. New corn hybrids allow growers to plant in May and June and still avoid serious crop damage from these pests. This raises questions about the wisdom of early corn planting. Drought stress during the critical two-week pollination and grain-setting period greatly reduces corn yield potential and planting in late May or early June may reduce the likelihood of stress during this period.

This research explored: 1) likelihood of drought stress during pollination and grain-setting for different planting dates, corn hybrids, and locations, and 2) whether optimal planting date and corn hybrid vary with ENSO phase. Historical climate data from 1950 through 2009 were used to simulate drought stress, corn growth, and yield for planting dates from April 1 – June 19 in top corn-producing counties, using the CSM-CERES-Maize model. Three ENSO indices were evaluated: Japan Meteorological Agency, Oceanic Niño Index, and Multivariate ENSO Index.

Rainfall pattern, especially during July, varied according to ENSO index values in the preceding fall, winter, and spring. Drought stress was generally greater in El Niño years. Mid- to late-May appears to be a viable time for planting corn, except in El Niño years in some counties. In an El Niño year, growers might want to plant as early as possible in these counties. April and June planting dates appear more risky in a La Niña year.

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The Influence of Extreme Winter/Spring Temperature on Insect Vectors Population Build-up in the Southeastern United States

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The survival of an insect vector through the winter/spring is as important as the pathogen it transmits to crops during the growing season. While synchronization of insect vector populations with the host plant at early developmental stage may result in a devastating year for growers, a delay due to unfavorable extreme temperature also brings a unique opportunity for mitigating the spread of an emerging plant disease vector. The objective of the study was to investigate how frequency of extreme events may affect vectors population build-up during winter/spring season, and the long-term implication on disease incidence in the southeastern United States. Analysis showed that in 2010, south Alabama, north Florida, and southwest Georgia experienced near record below-normal temperature during the winter/spring season. The extreme temperature may have resulted in the lowest incidence of *Tomato spotted wilt virus* (TSWV) in peanut in nearly 15 years. The risk of a vector-transmitted disease epidemic is higher during a mild winter/spring year when the chance of vector survival increases. Understanding the influence of extreme events may enhance our approach in developing more accurate risk tools for managing vector-transmitted diseases in the southeastern United States.

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Effect of Rainfall and Maximum Temperature on Corn Aflatoxin Contamination in the Southeastern U.S. Coastal Plain

Arnold R. Salvacion[1], ***Brenda V. Ortiz***[1], *Brian .T. Scully*[2], *David .M. Wilson3*, *Gerrit Hoogenboom*[4] and *Dewey Lee*[3]

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Corn aflatoxin contamination is a major problem in the southeastern U.S. coastal plain. Lack of rainfall and high temperature during the summer in this region induces corn water stress making the crop susceptible to aflatoxin contamination. Quantifying the effect of rainfall (RF) and maximum temperature (Tmax) on aflatoxin contamination can be useful information to predict contamination risk early in the growing season. Using logistic regression, relationship between corn aflatoxin contamination records from 1977 to 2007 in 53 counties in South Georgia and total monthly RF, and monthly average Tmax recorded at different corn growth stages was tested. Based on the results, RF and Tmax measured at various months were significant in explaining aflatoxin contamination. Decrease in the amount of RF during the month of June and increase in average Tmax in the months of June and July, approximately silking to corn dough stage, significantly increased the probability of getting aflatoxin contamination greater than 20 parts per billion (ppb), aflatoxin threshold for interstate commerce of food and feed. The results from this study can be utilized to determine the risk of aflatoxin contamination for a given seasonal forecast of RF and Tmax during growing season and advice farmers adjusting management practices such as planting date and irrigation to minimize losses.

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Yield Forecasting: An Approach Using Crop Simulation Models

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In Argentina, annual, national scale crop yield forecasts are usually based on direct examination of crops in the field. The field observation is performed by crop scouts according to a predetermined sampling plan. The plan involves driving through an area, assessing the field, and conducting physical counts.

Crop yield forecasting requires detailed knowledge of two components for each crop: the hectares cultivated and the expected grain yield. Additionally, the evaluation of cultivated area is technically possible using satellite images. The crop yield usually is derived through regression models, with or without additional weather information. Crop simulation models currently have the capacity to improve yield forecasts, but they tend to be unwieldy to use.

An interface developed for DSSAT crop models enables their use as yield forecast tools. Soil data, historical weather data and cultivar information are conveniently located in databases. With this system, crop management can be simulated according to initial conditions of water and nitrogen content, planting date, nitrogen rate, plant population and irrigation or rainfed conditions for each county (partido) of the Pampas region.

During the actual growing season, the model can be run from planting to the present moment using observed weather data, but from the current data forward will use data from the historical daily weather database. In this way, a yield forecast will be generated for each year of data in the weather database. The interface will plot the maximum, minimum and average yield. The range of yield estimates will decrease as the model is re-run during the advancing crop season. As harvest approaches, these minimum and maximum simulated yield estimates will tend to converge toward the actual yield.

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Thursday, May 26, 2011
1:30PM-3:00PM

Concurrent Panel Session 2
Coastal and Urban Communities: Sea Level Rise Impacts

Rising Sea Level and the Vulnerable Coastal Communities in the U.S-Affiliated Pacific Islands

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The U.S-Affiliated Pacific Islands (USAPI) region is noteworthy for its naturally vibrant and dynamic climatic nature–extreme events, interannual variability, and longer-term changes are ubiquitous. The rising sea level in these islands raises immediate concern. According to the Intergovernmental Panel for Climate Change (IPCC), without the contribution of ice flow, global average sea level rose at a rate of 1.8 [± 0.5] mm per year over the period from 1961 to 2003. With the contribution of increased ice flow at the rates observed from 1993 to 2003, the average sea level rose about 3.1 [± 0.7] mm per year. This 3.1 mm per year rising trend is in approximate agreement with the rise observed in some of the USAPI locations. In fact, the observed rate of rise at the Federated States of Micronesia (FSM) is higher (4-6 mm/year) than the IPCC projection over the globe in general. Considering the dynamic effect of ice-melt contribution to global sea level rise (N.B. IPCC-AR4 assessment report did not include the full effects of rapid ice flow changes in its projected sea level ranges), the rise will be much faster, resulting in considerably higher final rise values. These results are compelling enough to accept that significant sea level rise is inevitable in the future, regardless of the exact amount.

With regard to implications for the future, the critical question is what can be done to help, support, or even save, the vulnerable communities in the Pacific. We recognize that there are no easy answers, but some immediate responses are justified.

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Fighting Water with Water: Counteracting the Impacts of Sea Level Rise on South Florida Waters

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Sea level rise and changes in precipitation patterns due to climate change increasingly imperil south Florida's water resources and Everglades. Water managers are faced with daunting challenges to preserve the region's water supply and ecological systems. These include: 1) maintaining adequate water supplies during periods of extended severe drought in the face of saltwater intrusion exacerbated by sea level rise, 2) preventing potentially devastating urban flooding during torrential rain events of increasing intensity when stormwater drainage systems will be compromised by sea level rise, and 3) moderating inundation of the Everglades and coastal wetlands by seawater. In south Florida, urban water supply, wastewater treatment, stormwater management are intricately linked with the natural Everglades environment. All are under siege due to accelerating sea level rise and changing precipitation patterns. Current practices and plans may no longer be applicable in the face of climate change. New approaches will be required to improve the resilience and prolong the sustainability of the region's water resources and wetlands. A number of logical, though potentially controversial alternatives will be presented to stimulate thinking about new solutions.

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Flood Risk and Risk Perception: Evidence from Property Prices in Georgia

Susana Ferreira and ***Ajita Atreya***
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This paper examines whether or not homeowners' perceive flood risk as is designated in flood hazard maps. With an assumption that homeowners' capitalize flood risk in property prices; I merge individual property sale data with flood hazard maps to see if homeowners' update their assessment of flood risk with an updated flood map in an inland and coastal county in Georgia. A hedonic pricing analysis is conducted where the property sales price of a household are modeled as a function of their structural characteristics, location characteristics and the flood risks. The dataset is constructed by merging individual property sales data with the parcel level Geographic Information System (GIS) database which in turn, is merged with the Federal Emergency management Agency's (FEMA's) flood hazard maps to identify parcels in 100-year and 500-year floodplains. Models are run separately for an old and an updated flood hazard map to see if homeowner's perceived risk has changed over time with an update of FEMA's hazard map. This study will improve our understanding of homeowner's perception of flood risks which in turn can be used as a building block to disaster resilient communities. If the research identifies that the homeowner's do not update their risk perception with new available information than the primary focus should be education program to adapt to climate change hazards such as flood.

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GIS Sea Level Rise Vulnerability Assessment

***Tara McCue**, AICP*
East Central Florida Regional Planning Council, Altamonte Springs, FL, USA

To begin climate change discussions with Satellite Beach City Council and its planners, an assessment of municipal asset, infrastructure and development vulnerability to varying levels of sea level rise was necessary. The assessment included three steps: (1) development of a three-dimensional model of the City of Satellite Beach, (2) compilation and mapping of "critical infrastructure and assets" and (3) quantification sea level rise impacts.

Using ArcGIS 9.3, a three-dimensional model of the City was constructed and critical assets were derived based upon a working definition – Buildings and facilities essential to a municipality's economy and the quality of life of its residents. The assessment was performed using a time-series analysis of rising sea level at 1ft (0.3) intervals with an upper boundary of +6 ft (1.8 m).

During the initial +2 ft (0.6 m) rise about 5% of the City's landscape is submerged. Submergence is again widespread as sea level rise approaches +6 ft (1.8 m). By then, 52% of the City is underwater, compromising the function of critical assets, emergency evacuation routes, and/or gravity driven surface- and storm-water systems.

The analysis was included in a final report to the City Council and a series of updates and revisions to the City's Comprehensive Plan were drafted. If approved, the amendments will provide the legal basis for implementing an adaptive management plan designed specifically to mitigate the City's risk to sea-level rise.

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Thursday, May 26, 2011
3:30PM-5:00PM

Concurrent Panel Session 1
Biodiversity and Conservation in Natural Ecosystems

Forest Diversity and its Conservation

Juan Alba-Landa, *Lilia del C. Mendizábal-Hernández, Elba O. Ramírez-García, Juan Márquez Ramírez* and *Héctor Cruz-Jiménez*
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The natural deterioration of ecosystems by the pressure they are subjected to environmental and human factors generates a concern and alarm that encourages people of all levels to provide views and options for mitigation, however when dealing with issues of biodiversity and conservation not detailed the what must be preserved and logic should understand that for populations of species and the species themselves are maintained over time. In the case of forest species diversity should be considered biology in living memory that contains individuals who have the ability to interbreed and their offspring inherit characteristics, which is composed of individuals called brothers so conserving populations species and the species itself be considered a strategy to deliver the highest number of unrelated groups closely, paying attention to the selection of parents for conservation.
In this sense, a study with *Pinus teocote* which genetic diversity was threatened, we selecting 38 progenitors from the three provenances of the specie in Veracruz state, Mexico each with a minimum distance of 80 m. After evaluations at 10 years of establishment of tree provenance/progeny tests were found that one of the original populations had vanished, leaving the plantation families like the only alternative to preserve the original biodiversity of this provenance, analysis of which follows: 1. You can build roads for the conservation and restoration through specific designs. 2. Plantations should be promoted as a strategy for species conservation. 3. The designs of crosses where appropriate, will build populations able to withstand the changes that lie ahead.

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Current Efforts and Future Directions: A State Agency's Approach to Climate Change

Doug Parsons
Florida Fish and Wildlife Conservation Commission, Tallahassee, FL, USA

The Florida Fish and Wildlife Conservation Commission has only begun to address the issue of climate change in the past few years, although, within that time frame FWC has made substantial progress. FWC has developed internal teams focusing on: adaptation, research and monitoring; and communication strategies. FWC is also currently working on integrating adaptation planning into one of its key conservation programs: the state wildlife action plan. Also, a key part of FWC's climate strategy is to provide educational opportunities to its staff to learn more about this emerging issue. FWC has developed a ten month long climate change training course, providing information on the fundamentals of this issue, for course participants. This presentation will provide an overview of FWC's climate change efforts and potential future opportunities with our stakeholders and partners.

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Climate Change and Fisheries in Bangladesh: Impact and Adaptation

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Climate change is emerging as a major threat to both natural ecosystems and human livelihoods in Bangladesh, one of the most vulnerable countries to climate change in the world. Among the economic sectors that are most susceptible to climate change is fisheries and aquaculture on which millions of fishermen livelihoods depend, creating challenges to the sustainability of fisheries and the fish farming sector in the country. This paper provides an overview of the impact of climate change on fisheries and fish farming systems and the adaptations taken by fishermen in the Northern and Northwestern districts of Bangladesh. Climate change has increased the fluctuation of temperature and rainfall, prolonged drought, delayed the winter and summer seasons, increased the occurrence and intensity of storms, changed physical properties of the water bodies, and deteriorated the quality and availability of water and the ecosystems as a whole. It also has increased the disease prevalence in most of the cultural and natural fish species, henceforth fish mortality and decreased the fish production which makes the traditional fishermen livelihood vulnerable. Similarly, in hatchery operation, fish do not respond in breeding in time, leading to lower ovulation, small number of eggs produced per individual, lower rate of egg fertilization, poor hatching and low survival rate that reduces total fry and fingerling production in the region. Adaptations by fishermen include fishing day and night, switching over to other jobs or migrating to the town. In addition, hatchery owners and fish farmers increase the depth of their fish ponds, provide shade over the ponds, and add more water to the ponds to alleviate the impact of climate change. Besides fostering a better understanding of climate change impact and adaptation, this paper also provides substantial input and useful suggestions for setting future research directions on improving the sustainability of fisheries and the fish farming sector in the country.

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Large-scale Implications of SLR on Conservation Priority Areas in Florida

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Florida still has vast areas of conservation significance threatened by myriad human activities and especially habitat loss and fragmentation caused by urban and suburban development and sprawl. Existing Florida conservation planning and initiatives include ambitious conservation land acquisition, identification of Strategic Habitat Conservation Areas and rare species habitat, delineation of significant landscape and wildlife corridors, and synthesis of statewide conservation planning GIS data in the Critical Lands and Waters Identification Project. These data provide an important foundation for state and regional conservation planning but currently do not include assessment of potential climate change impacts or specifically sea level rise. Florida also has useful statewide and regional development growth projection models, such as the Florida 2060 analysis, depicting potential future scenarios for human settlement extent and pattern. However these growth projection models also do not currently account for sea level rise or other potential influences of climate change. As a starting point, I have analyzed the potential relationship between current state conservation priority areas, future development growth projections, and sea level rise. Based on these results, I will also discuss future research directions for integrating identification of state conservation priorities, growth projections, and sea level rise to avoid, mitigate, or facilitate adaptation to sea level rise to minimize the impacts on Florida's biodiversity and ecosystem services.

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Thursday, May 26, 2011
3:30PM-5:00PM

Concurrent Panel Session 2
Coastal and Urban Communities: Policy Planning and Adaptation

Assessing Municipal Vulnerability to Predicted Sea Level Rise: City of Satellite Beach, FL

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In the fall of 2009 the City of Satellite Beach (City), Florida, authorized a study designed to assess municipal vulnerability to rising sea level and facilitate discussion of potential adaptation strategies. The project is one of the first in Florida to seriously address the potential consequences of global sea level rise, now forecast to rise a meter or more by the year 2100. Results suggest the tipping point between relatively benign impacts and those that disrupt important elements of the municipal landscape is +2 ft (0.6 m) above present. Seasonal flooding to an elevation of +2 ft is forecast to begin around 2050 and thus the City has about 40 years to formulate and implement an adaptation plan.

Given the limited funding ($25,000) and project duration (1 year), the investigation was conceived as a pilot project with possible application to other Atlantic coast municipalities in Florida.

Elements key to the success of this project included: (1) external funding, (2) inclusion of municipal staff on the project team, (3) establishing a Sea Level Rise Subcommittee that reported directly to the Comprehensive Planning Advisory Board, (4) public education and outreach, and (5) stakeholder confidence in the objectivity of the investigation and its recommendations. This ultimately allowed for the project to be successfully completed in less than one year.

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Sea Level Rise at the Local Government Level: Lessons Learned

John Fergus, *Ph.D*
City of Satellite Beach, FL, USA

Satellite Beach encompasses about 11,000 residents on three square miles spanning a barrier island midway along Florida's Atlantic coastline. The lowest road elevations are 3 feet above sea level. The City's highest elevation is slightly over 20 feet. The first building was built in 1951. Today the City is 98% built-out.

In 2009 the City used EPA Climate Ready Estuary funds to provide technical expertise upon which to base discussion and decision-making concerning the proper response to sea level rise. A year later the City's local planning authority, a committee of residents, produced a list of recommended amendments to the City's comprehensive development plan. In early 2011 City Council began considering those recommendations.

The City's experience provides lessons learned for other communities addressing the proper response to sea level rise. These include the critical role of high-resolution elevation data, consideration of local geology and hydrology, proper choice of how to present the result of sea level rise, and the nature and distribution of development in the community. The lessons also include the need to avoid hot button issues such as the cause of sea level rise, to avoid providing fodder for sensationalized reporting by the media, and to present the technical results in a manner meaningful to those lacking a strong scientific background. A final lesson is that the relationships among local, regional, and state government agencies can have a strong, if not overwhelming, influence on the viability of whatever planning results arise from the technical data.

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Southwest Florida Plans for Climate Change

James W. Beever III[1], ***Whitney Gray***[1], *Daniel Trescott*[1], *Jason Utley*[1], *David Hutchinson*[1], *Tim Walker*[1], *Dan Cobb*[1] and *Lisa Beever*[2]
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Effectively managing climate change risk begins with identifying vulnerabilities to the effects of climate change expected for a particular area specific to its local climate, position in the landscape, topography and biogeography. Any successful plan for managing risks must also be a partnership between the public, the planning community and local leadership. Recent projects (2008 -2010) funded by the US EPA and completed by the Southwest Florida Regional Planning Council, in cooperation with the Charlotte Harbor National Estuary Program demonstrate this methodology: *Southwest Florida/Charlotte Harbor Regional Climate Change Vulnerability Assessment*; *City of Punta Gorda Adaptation Plan*; *Lee County Climate Change Vulnerability Assessment* and *Lee County Climate Change Resiliency Strategy*. An overview of these projects, with emphasis on the public participation aspects will be presented.

These projects ranged in scope from region-wide to city-level and utilized a variety of input-gathering mechanisms including public participation games, online surveys and one-on-one interviews. These dynamic processes resulted in comprehensive syntheses of potential climate change effects, vulnerabilities, resilience strategies and adaptation options.

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Climate Change Projections and Adaptation Strategies for Multi-Objective Resource Management at Kennedy Space Center, Florida

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Kennedy Space Center (KSC), the world's premier launch site for manned space exploration, occupies 147,000 acres (57,000 ha) of estuarine lagoon, wetlands, pine flatwoods, scrub, coastal strand and beach on the Merritt Island/Cape Canaveral Barrier Island Complex of east central Florida. Soils are sandy and elevations range between -0.66 and 32 ft. (-0.2 and 10 m) with an average of 5.74 ft. (1.75 m) (NAVD88). The region is in the transition zone between the temperate and sub-tropical climatic and zoogeographic provinces of North America with high biodiversity. The KSC property is managed in part by the US Fish and Wildlife Service as Merritt Island National Wildlife Refuge (MINWR) and in part by the National Park Service as Canaveral National Seashore (CANA) making climate change adaption a multi-objective management issue. At KSC, climate change could impact: 1) NASA facilities that cover almost 5400 acres (2200 ha), 2) the workforce that numbers in the thousands, 3) KSC, MINWR and CANA operations, and 4) natural resources including estuarine lagoons, fresh and brackish wetlands, and extensive habitat for more than 100 protected plant and animal species. Initial downscaled climate forecasts, provided by the Goddard Institute of Space Science, indicate significant increases in the number of days with temperatures above 90° F (32° C), alterations in rainfall patterns, increasing CO_2 concentrations, and sea level rise of 3.3 to 4.0 ft. (1 to 1.2 m) in 60 to 90 years under a rapid ice melt scenario. Impacts are being assessed using LIDAR derived elevation data, facilities and infrastructure maps, and extensive GIS data on soils, contamination sites, archaeological resources, vegetation communities, and habitat for fish and wildlife. An initial assessment of marsh responses has been made with support of the EPA Indian River Lagoon National Estuaries Program. Analyses indicate seasonal flooding of low lying areas totaling 54, 000 acres (23,000 ha) impacting facilities (276 structures), roads (33%), and buried infrastructure, along with increases in open water habitat causing a transition to mangrove dominated wetlands, expansion of wetlands, and reductions in upland areas critical to NASA operations and maintenance of protected wildlife species. Adaptation strategies identified to date include optimization of KSC land use planning, incorporation of adaptive resource management for protected species habitat, and initiation of coastal erosion control studies.

<u>Contact Information</u>: Carlton Hall,

Thursday, May 26, 2011
3:30PM-5:00PM

Concurrent Panel Session 3
Land Use and Land Cover Changes

Anthropogenic Influence on Climate over the Southeast United States

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A considerable spatial heterogeneity is observed in the linear trends of monthly mean maximum and minimum temperatures (T_{max} and T_{min}) from station observations in in the Southeast United States (which includes Florida, Alabama, Georgia, South Carolina, and North Carolina). In majority of these station sites, the warming trends of the T_{min} display an acceleration with increase in urbanization while trends in T_{max} show reduced warming or increased cooling trends with irrigation. The spatial heterogeneity of these trends over the Southeast United States clearly indicates that local features such as irrigation and urbanization play an important role in conflating or deflating the influence of the large-scale low frequency temperature variations and global warming signal.

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Summary 2010 Heat in SE USA - Was It Really a Record?

John R. Christy
University of Alabama in Huntsville, Huntsville, AL, USA

In several locations in the SE USA, the mean (average of TMax and TMin) temperatures for June, July and August were the warmest on record. In this presentation we investigate the metrics that led to this result. In particular we find that the nighttime minimum temperatures (TMin) were the source of the record "mean" temperatures in several locations while the average TMax temperatures were not significantly remarkable. The causes for increases in TMin while not in TMax will be discussed and generally relate to human development of the surface environment which interacts with the boundary layer to increase the potential for warm nights, while not having much impact on daytime TMax. This asymmetric response is a key signature of surface development causing the temperature changes. In greenhouse gas simulations of the climate by general circulation models, both TMin and TMax are impacted very similarly.

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Modeling Sea Level Rise Impacts on Coastal Wetlands at Gulf of Mexico Estuaries

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Coastal communities across the Gulf of Mexico are becoming increasingly vulnerable to sea level rise (Rahmstorf et al. 2007; CCSP 2008; Overpeck et al. 2006, Mitrovica et al. 2009). More than 20,000 km^2 of the US Gulf Coast are below 1.5 m in elevation (Titus & Richman 2001) and these areas are becoming more vulnerable to sea level rise as coastal wetlands continue to be lost (Turner 1997). The Sea Level Affecting Marshes Model (SLAMM) is being used across the US and beyond to inform decision makers about how both their natural and human coastal communities will likely change in the future. Having this knowledge now enables coastal communities to identify, scale and implement strategies that will help both their human and natural systems to adapt to accelerated sea level rise changes. I will describe The Nature Conservancy's ongoing work to characterize changes in coastal wetland systems brought about by accelerated sea level rise using SLAMM at 7 estuarine systems across the Northern Gulf of Mexico. In addition, I will discuss impacts to vulnerable species and the process we will use to engage local and regional decision makers in the identification, selection and scaling of adaptation strategies appropriate for implementation in their communities.

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Feasibility Study of Biodiesel from Jatropha in Egypt

Guzine El Diwani[1], *Shadia Ragheb*[1], *Salwa Hawash*[1], *Nahed K.Atteya*[1] and *Ihab H. Farag*[2]
[1]Chem. Engineering and Pilot Plant Dept., Eng. Res. Division, National Research Centre, Cairo, Egypt
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Concern over greenhouse gas (GHG) emissions from fossil fuels, the volatility of oil prices, and the need for energy security have motivated research to find alternative energy sources. One possible approach is biodiesel.
Biodiesel is an alternative fuel made from renewable resources rather than petroleum. It drastically reduces most emissions from a diesel engine in comparison to petrodiesel. It is made by esterifying a vegetable oil or animal fat with an alcohol (methanol or ethanol) in the presence of a catalyst (sodium or potassium hydroxide). Glycerin is generated as a byproduct.

Jatropha crop is being used for biodiesel production in several countries. It is a valuable crop that may be used to green the desert or to alleviate soil degradation. It is a hardy plant that can withstand drought conditions producing seeds with a non-edible oil content of over 30%.It does not compete with resources or land used to produce food. Jatropha is expected to produce seeds and oil for over 30 years. The Jatropha oil can be transesterified to Biodiesel.

This paper presents a feasibility study of the production of biodiesel from planting Jatropha in Egypt. Jatropha is cultivated in the Egyptian desert using municipal wastewater primary treated. Based on data collected the seeds productivity per feddan is estimated. Samples from local plant seeds were gathered, dehulled, crushed and the oil was solvent extracted. Laboratory scale studies were followed by pilot scale studies to determine the optimum operating conditions for extraction and the maximum yield of oil. The leftover cake is tested as fertilizer.

The transesterification of Jatropha oil using methanol and homogeneous catalyst was investigated. The biodiesel produced was analyzed and tested to compare with the international standard of biodiesel fuel and petroleum diesel. This information was used to do a techno-economic evaluation of Jatropha biodiesel based on different production options and oil content.

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Poster Abstracts

Coastal and Urban Communities

Risk Quantification for Sustaining Coastal Military Installation Assets and Mission Capabilities

Kelly A. Burks-Copes and *Edmond J. Russo*
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Military installation operational risks are potential degradations or interruptions that can be attributed to internal or external forces and events, including coastal storms and sea-level rise. Coastal storms can cause damage to infrastructure and other assets that support missions at military installations. Sea-level rise will exacerbate the episodic effects of coastal storms, cause inundation of low-lying land areas, and induce sustained geomorphologic and environmental changes that may interfere with the fulfillment of military missions. Scientific uncertainty in the rate of future sea-level rise cannot be resolved into the long term, posing a non-stationary risk to National Security by threatening coastal military missions at installations where they cannot be moved inland away from coastal hazards. While commanders may be situationally aware of their coastal hazard installation vulnerabilities, there are no known comprehensively-integrated scientific and technological means available at present to quantify the operational risk in support of decision making at a systems level. For mission sustainability into the long term, installation commanders at the shore will need to leverage quantitative risk assessment as a strategic enabler to address the consequences of climate-change-influenced coastal hazards. Research under the current study is focused on gaining high fidelity event magnitude and frequency information about coastal wind, inundation, and sedimentation hazards for a range of sea-level rise scenarios, as they pertain to impacts on vulnerable mission, capability, and asset networks. Norfolk Naval Station in the Hampton Roads Region of Chesapeake Bay was identified through a tiered at-risk screening technique as an installation with relatively high potential to exercise the new approach under development. The intent is to demonstrate a new technical capability able to identify instances where coastal hazard installation impacts under sea-level rise scenarios transition from frequent and minor in a continuum to rare and catastrophic.

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Factors Facilitating Sea Level Rise Adaptation Planning

Kathryn I. Frank
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Coastal communities and regions exhibit varying degrees of attention to sea level rise adaptation in their planning. This ranges from denial of sea level rise to the creation of plans with explicit policies for sea level rise adaptation. This poster presents the extent of sea level rise adaptation planning among Florida coastal communities and regions, and the findings from comparative case studies of the social, political, and institutional factors facilitating sea level rise adaptation planning. The case study communities are located in central and southern Florida, and include Pinellas County, the City of Punta Gorda, Miami-Dade County, and others. Factors facilitating community sea level rise adaptation planning include the involvement of applied research centers, learning networks, local leadership, and governance planning capacity and flexibility. These findings point to the importance of continued funding of sea level rise research, outreach, and networking across all scales, as well as support for local planning.

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Regional Policies and Strategies for Climate Change Adaptation

Tara McCue and ***Keith Smith***
East Central Florida Regional Planning Council, Altamonte Springs, FL, USA

The East Central Florida Regional Planning Council, as part of its Central Florida 2060 Plan Strategic Policy Plan, has created regional strategies for addressing climate change, sustainability, and sea level rise impacts. By working with local governments and other regional agencies, these policies and strategies may assist with a regional approach to assessing impacts and response to climate change as well as implementing land use strategies to maintain a sustainable region.

Policies incorporated into the plan support climate change and sea level rise research, facilitating walkable and compact land use designs and patterns, increasing alternative modes of transportation and multimodal connectivity to decrease carbon footprints in order to create a more sustainable region. Incorporating these strategies into comprehensive plan reviews, Development of Regional Impact Reviews, as well as through projects with various local governments, the East Central Florida Regional Planning Council is working across the region to address climate change impacts. Examples of this work include the EPA Sea Level Rise Study in 2004, assessing critical infrastructure and development of the City of Satellite Beach, Florida to sea level rise in 2010 and working with the proposed DRI Restoration in Volusia County, Florida to create a more sustainable community available for those retreating from the coastline.

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Using Climate Risk Information in Assessing the Vulnerability of Coastal Areas in the Southeast: The Case of Louisiana and Mississippi

Edmund Merem, *Yaw Twumasi*, *Joan Wesley*, *Sudha Yeramilli*, *Chandra Richardson* and *B. Robinson*
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This research assesses the vulnerability of coastal areas in the Southeastern states of Mississippi and Louisiana using climate risk information. Emphasis is on the issues, and evaluation of the trends. In terms of methods, the paper uses GIS and descriptive statistics to map the trends. In the last several years, climate change impact continues to be felt in the Southeast especially the coastal zones. It has been predicted by scientists that many people could be affected by the impact of climate change risks in the Southeast coastal zones mostly from storms, high and extreme temperatures and others As one of the most sensitive and vulnerable systems, coastal zones' areas of concern include sea level rise, land loss, frequency of maritime storms, flooding and responses to sea level rise.

Addressing the challenges associated with the threats of climate change in coastal areas of Mississippi and Louisiana, requires periodic assessment of the risks using geographic information systems. Without access to sufficient climate risk information management tools to measure the precise vulnerability of coastal zones areas, the ability of emergency managers and cities to mitigate the dangers posed to infrastructure, human lives and the economy will be diminished. The preliminary results show a spatial diffusion and a growing risk in vulnerable coastal areas in the two states. Utilizing climate risk data and GIS techniques to analyze the dangers faced in coastal cities helps minimize their vulnerability. The paper suggests the need for continuous assessment and mapping of the risks.

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Using Surface Population Models to Improve Spatial Accuracy of Sea Level Rise Vulnerability Assessment

Diana Mitsova, *Ann-Margaret Esnard* and *Yanmei Li*
Florida Atlantic University, Boca Raton, Florida, USA

The availability of high resolution LiDAR data facilitated the delineation of high accuracy maps of potential inundation extents due to sea-level rise. Vulnerability assessments based on these high resolution high-accuracy maps have revealed the exposure of infrastructure and property to potential damage from sea-level rise. The assessment of population exposure, however, proved to be much more difficult due to lack of small-area data, privacy issues and discrepancies in the outcomes of various population disaggregation methods. This poster project reports on a pilot study that has been completed for Broward County, Florida. It presents a methodology for spatial interpolation of demographic data and examines its applicability in the context of sea-level rise. We employed dasymetric mapping techniques which tie the population spatial distributions to an underlying control variable such as land use derived from parcel data. One conclusion drawn so far is that the advantage of dasymetric mapping lies in its ability to disaggregate spatial data into finer units of analysis using ancillary data to help refine the population spatial distributions. We found that dasymetric mapping techniques are particularly useful for examining the impact of sea-level rise on coastal areas as high resolution surface population models derived from it are compatible with high resolution LiDAR and orthoimagery data. The results from this study indicate that coastal counties can benefit from high resolution surface population models to enhance the accuracy of hazard-related vulnerability assessments and develop relevant adaptation strategies.

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Poster Abstracts

Land Use and Land Cover Changes

Vegetation Change Detection Using Remote Sensing in the Florida Everglades

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Studies have shown that due to anthropogenic activities, the Earth surface is being significantly altered with impacts in various components of the various components of the natural environment (including water resources and vegetation). The Everglades region has been greatly impacted by urban and agricultural development pressures, and the construction of an extensive system of levees and canals that have caused major hydrological changes in the area. And hence it is necessary to understand vegetation change dynamics between the past and present time that will give understanding and support for policy and decision makers to make timely and appropriate actions. The present study aims at understanding the vegetation cover dynamics using available maps and imagery. The main objectives of this study are developing vegetation indices and spectral analysis that could be used to compare the dynamics in the past two decades with respect to analysis of historic data of the area. The ultimate goal is to analyze the changes in land use and vegetation cover pattern due to changes in climate and hydrological characteristics of the region. The study used SPOT imagery for two decades (1990’s and 2000’s) and ENVI, a remote sensing software’s. The images were atmospherically corrected using MODTRAN (MODerate resolution atmospheric TRANsmission) algorithm included in the FLAASH (Fast Line-of-sight Atmospheric Analysis of Spectral Hypercubes) atmospheric correction module. Detailed supervised classification is carried out to describe the spatiotemporal vegetation distribution. The results indicated that there are seasonal and interannual changes that may be produced by a combination of natural and human induced (anthropogenic) factors.

Key Words: Change Detection, Vegetation Dynamics, Land use, Remote Sensing, MODRTAN, ENVI

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Impact of *Biofuels* on the Propensity of Land-Use Conversion among Non-Industrial Private Forest Landowners in Florida

Nishita Pancholy[1], *Michael H. Thomas*[1], ***Daniel Solís***[2] and *Nicholas Stratis*[3]
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[2]University of Miami, Division of Marine Affairs and Policy, RSMAS, Miami, FL
[3]Department of Environmental Protection, and Florida State University, Tallahassee, FL

This study evaluates the propensity of non-industrial private forest (NIPF) landowners to rent their forested land to cultivate corn for biofuel production. A contingent valuation approach is used to estimate the forest owner's willingness to accept payments under alternative rent values, derived from hypothetical corn price scenarios. The empirical analysis uses data collected from 1,060 NIPF landowners in Florida. The results shows that 46% of the studied NIPF landowners are willing to accept payment to rent their land and the overall supply function is positive and inelastic. NIPF landowners who manage their woodlands for timber and those using any state or federally sponsored cost share programs have the highest probability of accepting payments. Opposite results are found for those owning their forest for beauty, hunting, or other recreational activities. Regional differences are also demonstrated with NIPF landowners in north Florida more likely to rent their land than those in central and south Florida.

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Poster Abstracts

Managing Risks to Agriculture

Agricultural Applications for a Linear Inverse Model Describing Midsummer Dry Spell Variability within the Intra-Americas Sea

Teddy Allen
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The annual rainfall pattern of the intra-Americas sea (IAS) reveals a bimodal feature with a minimum during the midsummer known as the midsummer dry spell (MSD). The hydrologic variability of the MSD affects both the timing and magnitude of its occurrence. This variability is seen at inter-annual time scales and causes the MSD to be more defined during some years and less so during others. The forcing behind the inter-annual variation is known to have both local (basin wide dynamics) and remote (ENSO) influences.

The MSD impacts local vegetation as seen by lagged variations in remotely sensed normalized difference vegetation index (NDVI) values. Tropical Rainfall Measuring Mission rainfall estimates and NDVI derived from the Terra Moderate Resolution Imaging Spectroradiometer highlight a consistent MSD feature in both rainfall and vegetation vigor. A linear inverse model (LIM) is used to forecast rainfall anomalies within the IAS that are identified with the MSD signature. The LIM is derived from the observed simultaneous and lagged covariance statistics of a set of MSD forced state variables.

Successful advanced lead time forecasting of the MSD allows for improvements in late summer vegetation conditions through targeted agricultural preparations. Resulting vegetation can have significant impacts on hydrological modeling and monthly and seasonal climate simulations of evapotranspiration and surface air temperature. Understanding the variability of intra-seasonal NDVI change can potentially reduce farming vulnerability as progress toward midsummer forecasting is improved.

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Climatic Elements Variability Affecting Maize Yield in Northern Minas Gerais, Brazil

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In semiarid region of Minas Gerais State, Brazil, there is a large deficit on corn supply, even for family livelihood. In spite of being considered one of the most efficient crops in converting solar radiant energy into biomass, rainfed maize production in that region is strongly affected by climate variability. Understanding factors that affect maize yield is crucial to develop appropriate crop management strategies. The study aimed at to identifying climatic factors that affect maize yield in Janaúba-MG, Brazil, simulated with CSM-CERES-Maize model. The model was used to simulate maize, cultivar BRS 1030, grain yield, sowed weekly throughout the year, under irrigated and rainfed conditions, from 1977 to 2008. Statistical analysis performed on simulated grain yield data indicated that the factors sowing date, year and irrigation (rainfed and irrigated) and their double interactions were significant at a 5% level. Rain availability accounted for the greatest amount of total maize yield variation in the study region (61.9%), followed by sowing date and its second order interactions (26.2%). Year was a lesser factor in total maize yield variation. Without water stress, the factors sowing date and year influenced yield mainly due to interannual and seasonal variations in air temperature and solar radiation. Low yield values were found when incident solar radiation was below average. Average grain yield of 2,300 kg ha^{-1} were obtained for average incident radiation of 15 MJ m^{-2} day^{-1}, compared to 6,300 kg ha^{-1} obtained for an average incident solar radiation of 20.2 MJ m^{-2} day^{-1}.

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Seasonal Rainfall Forecasts as an Adaptation Strategy for Climate Change

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Seasonal forecasts are critical for managing climate variability in agriculture. As the climate and the variability will change with future climate change, maximising returns from good seasons and minimising losses from poor seasons will become even more important. This study presents the first agricultural application of Australia's seasonal climate forecast model POAMA (Predictive Ocean Atmosphere Model for Australia). POAMA has demonstrable skill of >70% at predicting growing season rainfall in some regions of the wheat–belt of Western Australia. The POAMA rainfall forecasts were used to determine optimum nitrogen fertiliser rates based on a realistic conservative strategy that required a reasonable expected return on every dollar invested. Using the POAMA forecast resulted in a higher return of about A$60/ha/year compared to a constant fertiliser application. Improving seasonal and in-season forecasts is important now, but will become even more critical in adapting to future climate change.

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The Impact of Climate Change on Soybean Production in the Southeastern USA and Potential Adaptation Strategies

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This study developed an approach to determine the potential impact of climate change on soybean yield for Tifton, Georgia (31.48°N, 83.53°W) under the 2025 and 2050 projections. The Integrated Assessment Model (IAM) SimCLIM was used to downscale the outputs of General Circulation Models (GCMs). Three GCMs, GISS-EH, MRI-CGCM.3.2 and UKMO-HadCM3, were selected based on the closest correspondence to the projections for 1991 – 2008, the closest correspondence to the average projections for all 21 GCMs and the most commonly used GCM. Then, the response of rainfed and irrigated soybean yield to climate patterns based on three GCMs and six gas emission scenarios was studied using the Cropping System Model (CSM)-CROPGRO-Soybean. The increase in temperature caused a decrease in the number of days to maturity by 1.8 days for 2025 and by 2.3 days for 2050 compared to the reference years for both rainfed and irrigated conditions while the decrease was less for later planted soybeans. The increase in precipitation during the soybean growing season and the increase in CO_2 concentration resulted in an increase of 6% to 22% in yield for the 2025 projections and 8% to 35% for the 2050 projections for rainfed conditions; while irrigated soybean yield increased about 1% to 12% and was less than the response for rainfed conditions based on the three GCMs. Generally, farmers might have to shift the planting date after June 5 to avoid potential heat stress. The cultivars that are suitable for rainfed conditions include AG6702 and S80-P2, while for irrigated conditions the cultivars DP5634RR, DP5915RR, and AG6702 are more suitable. Overall, this study addressed the potential impact of climate change on soybean production at Tifton and options for adaptation using different cultivars, planting dates and irrigation management practices.

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Climate Decision Support Research to Foster Resilience in Agrosocioecosystems

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Change and crisis are part of the dynamic development of complex coevolving social-ecological systems. Resilience is a key property of sustainability. While ecological resilience is the magnitude of disturbance that can be experienced before a system moves into a different state and a different set of controls, social resilience is the ability of human communities to withstand external shocks to their social infrastructure, such as environmental variability. We posit that that resilience (to a point) can be built into agrosocioecosystems. An increase in social capital, including linkages and relationships of trust is key to this goal. To an initial goal of understanding which features will be more conducive to building resilience at the farm level; active, adaptation research as in the co-development of climate decision support systems to facilitate partnerships among stakeholders is added. Adaptation science in the form of decision support co-development adds to the capacity to absorb and adapt to change by aiding understanding of cycles of natural and unpredictable events, and by fostering stewardship and social-ecological management through playing a part to develop or increase social capital. We use cases studies from the Southeastern United States and Paraguay to highlight these processes. In Paraguay, academics, Ministry personnel, cooperative directors, producers, and technical assistants are being linked around a web-based decision support system to minimize climate risk. In Florida and Georgia, academics, farmers, extensionists, and environmental managers participated in workshops that used a proposed decision support tool for forage management as a boundary object for discussion.

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Climate Change and Agriculture: Perspectives from Michigan Farmers

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Field crop agriculture plays a key role in climate change. Growing and harvesting field crops both contributes to and can help mitigate greenhouse gas emissions. In addition, farmers stand to be greatly affected as a changing climate impacts plant growth, yields, and pest outbreaks. For agriculture to both adapt to and mitigate climate change, farmers need to be engaged in process. We held four focus groups with Michigan farmers to hear their perspectives on climate change and agriculture and their educational and outreach needs on this topic. Results indicate that while farmers believe environmental conditions have been changing, they are less certain about "climate change" and their ability to do anything about it. Farmers spoke of climate change adaptations they are doing, but that are not often discussed in the scientific literature. An example includes dealing with more variable weather patterns by buying larger equipment to complete field work faster. Farmers expressed frustration that they are being blamed for climate change when they are producing food to feed a growing population and are stewards of the land. They also expressed gratitude at the opportunity to discuss climate change and have their voices heard, and they listed climate change subject matter they would like more information on. Farmers raised issues and provided insights on topics that are not often discussed in the literature. Efforts should be made to include the experience, wisdom, and input from farmers in the discussion of agriculture's future in the face of a changing climate.

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FAWN: Providing Weather-related Information to a Wide Variety of Users since 1998

Brent Ferraro
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The Florida Automated Weather Network (FAWN) was established in 1998 in response to the discontinuation of the National Weather Service (NWS) agricultural weather forecast products. What began as a network of 11 Cooperative Extension Service sites in Lake and Orange counties is now a statewide system of 36 sites located from Homestead to Jay, near Pensacola. Data are collected from each site every 15 minutes, and along with several calculated products and weather-related tools, are delivered to the public by way of the Internet at http://myfawn.com. Data can also be retrieved via telephone voice message system. FAWN's mission is to "provide timely and accurate weather data to a wide variety of users," develop effective management tools to assist resource managers and those involved with protecting life and property; and subsequently generate a substantial positive financial impact on numerous economic segments of Florida.

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AgroClimate: Climate Information and Decision Support Tools for Reducing Risk in Agriculture

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The Southeast Climate Consortium (SECC, http://SEclimate.org) encompasses Alabama, Florida, Georgia, North Carolina, and South Carolina and has been at the forefront of research to forecast climate variability and predict consequences of such variability on agriculture, forestry, and water resources in most southeastern states. The SECC has also pioneered the use of innovative methods of extension, such as the web-based *AgroClimate* (www.AgroClimate.org), to reduce risks of climate variability for farmers, foresters, and others. *AgroClimate* is a response to the need for information and tools on proactive adaptations to inter-annual climate variability forecasts in the southeastern USA. Extension agents, agricultural producers, forest managers, and crop consultants may use AgroClimate to aid in decision making concerning management adjustments in light of climate forecasts. Adaptations include those that might mitigate potential losses as well as those with the potential to produce optimal yields. Information available includes climate forecasts combined with risk management tools for a range of crops, forestry, and forages. AgroClimate has been successful and Extension services from other states and countries have expressed interest in implementing local versions of the system. The process of transferring our know-how and decision support system can be much more effective under an open-source environment. Based on this an Open AgroClimate project has been established to facilitate the transference of tools to other institutions and agencies. A pilot project is being implemented in Paraguay in collaboration with farmer's cooperatives of that country. Challenges and opportunities created by developing, operating, and transferring AgroClimate will be presented and discussed.

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Spatial and Temporal Variability of the Agricultural Reference Index of Drought (ARID) in Florida

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Agriculture is an economic activity directly affected by drought. With the constant increase of food demand and the need of high efficiency in food production, drought effects gain importance. In order to quantify drought and better understand its effect in agriculture, the Agricultural Reference Index for Drought (ARID) was developed. ARID values range from 0 to 1 where zero is transpiration occurring at potential rate and one is full water deficit. El Niño Southern Oscillation (ENSO) phenomenon is the main factor of climate variability and has strong influence in Florida's climate. The main objectives of this study include investigating ARID's temporal and spatial variability in Florida and potential anomalies caused by ENSO. ARID was calculated using data obtained from the NWS Cooperative Observer Program (COOP) stations located in Florida, Georgia and Alabama. Due to lack of long-term data availability, evapotranspiration was calculated using Priestley and Taylor equation. The results of this study showed that typical ARID values for Florida vary during the year. During cold months, the combination of higher evapotranspiration and lower rainfall results in higher ARID values in the southern Florida. During warm months, ARID values are slightly lower for the southern region and slightly higher in the panhandle. ENSO showed strong influence during cold months; these variations were caused due to the higher amount of rainfall during El Niño and lower amount during La Niña. This study is important to determine historical ARID across the southeastern United States and help guide farmers making decisions regarding drought management.

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Climate Scenario Generation for the Agricultural Model Intercomparison and Improvement Project (AgMIP)

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The Agricultural Model Intercomparison and Improvement Project (AgMIP) is a distributed climate-scenario simulation exercise for historical model intercomparison and future climate change conditions with participation of multiple crop and world agricultural trade modeling groups around the world. The goals of AgMIP are to improve substantially the characterization of risk of hunger and world food security due to climate change and to enhance adaptation capacity in both developing and developed countries. Historical period results will spur model improvement and interaction among major modeling groups, while future period results will lead directly to tests of adaptation and mitigation strategies across a range of scales. AgMIP will consist of a multi-scale impact assessment utilizing the latest methods for climate and agricultural scenario generation. Scenarios and modeling protocols will be distributed on the web, and multi-model results will be collated and analyzed to ensure the widest possible coverage of agricultural crops and regions. AgMIP will place regional changes in agricultural production in a global context that reflects new trading opportunities, imbalances, and shortages in world markets resulting from climate change and other driving forces for food supply. Such projections are essential inputs from the Vulnerability, Impacts, and Adaptation (VIA) research community to the Intergovernmental Panel on Climate Change Fifth Assessment (AR5), now underway, and the UN Framework Convention on Climate Change. They will set the context for local-scale vulnerability and adaptation studies, supply test scenarios for national-scale development of trade policy instruments, provide critical information on changing supply and demand for water resources, and elucidate interactive effects of climate change and land use change. AgMIP will not only provide crucially-needed new global estimates of how climate change will affect food supply and hunger in the agricultural regions of the world, but it will also build the capabilities of developing countries to estimate how climate change will affect their supply and demand for food.

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Monitoring and Managing Effects of Climate Change on Rangeland Ecosystem Goods and Services

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Purpose and Scope: Risk, uncertainty, and vulnerability are key issues in discussions about climate change and managing its effects. Temperatures and precipitation will likely become more variable, depending upon location, which can profoundly affect rangelands. Informed adaptation offers an important tool for managing rangelands in an uncertain climate.

Methodological Premise: To develop adaptive management strategies and assess effects of changing climate on rangelands, standardized monitoring systems must characterize soils, water, plants, animals, and productive capacities. Data derived from monitoring indicators also must characterize social and economic outcomes and tradeoffs. Indicator selection is both art and science, with indicator data driving analyses, adaptations and decision-making for management and policy formulation.

Connectivity of ecological, social, and economic systems is embodied in rangeland ecosystem goods and services. To enhance understanding these interactions, the Sustainable Rangelands Roundtable (SRR) developed a conceptual framework to illustrate interrelationships among social, ecological, and economic concepts. Successful modification of land management strategies and/or implementation of mitigation mechanisms require that managers and policy-makers understand these interrelationships.

Conclusions, Results and Recommendations**:** Incorporating assessment into conservation, management, and business planning helps land managers identify and respond to change. Responses may include altered grazing season or rotation, reduction in stocking rate, creation of grass banks, and operation diversification.

The SRR framework facilitates evaluation of data across time and provides an analytical tool for managers and policy-makers. Requisite adaptation to changes in availability of rangeland ecosystem goods and services - food, fiber, or recreation opportunities - will enrich management and policy discussions.

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Monitoring and Modeling Leaf Wetness Duration for Optimizing Fungicide Use in Strawberry Production

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One of the main challenges in sustainable agriculture is to have a rational use of inputs. Disease-warning systems are tools that can optimize fungicide application and leaf wetness duration (LWD) is a variable often required for their use. However, LWD is not commonly measured in weather stations and sensors need special care related to their deployment, coating and calibration. The aim of this work was to compare LWD obtained through LW sensors and four models of LWD estimation. Those included a physical model, Penman-Monteith (P-M), and three empirical models: number of hours with relative humidity greater or equal than 90% (NHRH≥90%), dew point depression (DPD), and classification and regression tree (CART). The locations studied were Arcadia, Balm, Dover and Lake Alfred, in Florida. In Arcadia and Balm, the P-M model gave the best results, with R^2 of 0.6 and 0.8, "c" index of 0.7 and 0.8, respectively, and mean absolute error (MAE) under 2 hours. In Dover and Lake Alfred, the DPD model showed the best performance, with R^2 value of 0.7 and 0.6, "c" index of 0.8 and 0.7, and MAE of 2.1 h and 2.5 h, respectively. The CART and NHRH≥90% models indicated a systematic error for all locations with a similar mean error (ME) and MAE and a tendency to underestimate LWD. In Dover and Lake Alfred, where the P-M did not have satisfactory results, a systematic error was observed, which may indicate the necessity of correcting the aerodynamic resistance for different locations according to the wind profile on the P-M. In addition, the CART and NHRH≥90% models need to be calibrated according to site conditions.

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Financial Management of Beginning Farmers and the Use of Climate Information

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The objective of the proposed presentation is to share preliminary results of the analysis of a survey of the financial health of beginning farmers in the Southeast (Alabama) that relates financial performance to some important farm, and farmer, characteristics. Currently, there are two objectives of this study.

- One is finding out whether, and how, the new farmers utilize extension services and, in particular, agronomic forecasts based on long-term climate forecasts in crop and farm management.
- The other is identifying how the financial crisis of 2008 has affected farming operations as an indicator of a change in riskiness of farming.

Both questions are interesting mostly because young farmers presumably represent a more dynamic segment of the farm population and are the likely future users of climate and forecast-based management information.

Data Survey data on farmers in Alabama who started new farming activity since 2005. Questionnaires were sent to 1750 farmers identified by the NASS in October 2010 as the *population* of new farmers in Alabama; more than 400 responded. Data entry is in process.

The survey includes the following sections:

- Farm characteristics including production mix (share of crops, fruits, etc.), volume of sales by output, value of farm assets, location. Demographic characteristics.
- Detailed description of farm finances and financial management: changes in assets, debt, access to financing, government payments, insurance, and investment.
- Questions on climate information use including using *climate forecast information in crop management* planning and its impact on the decision to buy crop insurance.
- Questions on the *use of extension services*, in particular in obtaining forecast information.

Methodology The nature and source of these data allows analyzing some very interesting aspects of farm management. One is the relationship between financial management, in particular the use of climate forecasts, and farm characteristics, which is instrumental in identifying the likely users/clients. The other is the impact of debt (financial leverage) on the insurance purchases as a risk offsetting tool and hence on the importance of climate information in production decisions. The (statistical) methodology is dictated by the nature of the survey data (some of which are categorical) and includes a number of models (tobit/probit/multinomial logit).

Some preliminary results. The survey data entering is in process. Sub-sample data already available indicates that, for example, 17% of the new farmers in Alabama, out of which 47% are in crop production, use long-term (6-12 mo) climate forecasts in crop management planning, 31% of crop growing farmers (4 % of all), use long-term climate forecasts in crop insurance purchasing decisions. More results are on the way.

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Long-Term Climate Variability and Rainfall Index Insurance

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Problem statement A promising venue in agricultural insurance is index insurance that largely avoids the moral hazard issues and is especially applicable for crops and areas with limited/unreliable yield/revenue records. In particular, rainfall index insurance is relatively more efficient where agriculture is more rainfall dependent and reliable yield records are lacking (Skees, 2008). In the United States, rainfall index (RI) insurance and vegetation index insurance (VI) were offered as pilot programs starting 2007. The RI insurance started in 2007 as pasture, rangeland, and forage (PRF) crop insurance program in ten states and expanded to another six by 2011. The Rainfall Index uses NOAA data: insurance payments are based on the deviation of observed RI from normal precipitation within the grid.

Objectives Statistical analysis of cumulative rainfall, long-term climate variability (ENSO data), and forage yields is performed in order to estimate the risk-reducing effectiveness of the RI insurance in the Southeastern states. Of particular interest is the value to the farmer of climate forecast information in insurance pricing.

Methodology. Joint probability density of the index and the implicitly insured variable(s) is estimated using *copulas* - functions that combine marginal distributions of jointly distributed variables into their joint distributions. The usefulness of copulas comes from the fact that, once a copula has been estimated, it can be used to construct joint distributions by combining variables with different marginal distributions, which is handy in cases like farm revenue insurance where yields are typically modeled as Beta and prices as log-normal distributions (Tejeda and Goodwin, 2008). Copulas are also used for generating Monte Carlo series utilized in contract optimization (Vedenov, 2008). The primary advantage of the copula approach is that it allows for joint distributions with dependence structure other than linear correlation. It is particularly useful in the proposed analysis as the annual county level forage yield records are typically short (shorter than 30 years) and often *non-linearly* correlated with the rainfall.

Data. Rainfall: from CPC and RMA (USDA). Annual forage yield: plot yields from states' extension agencies. MEI & other ENOS indexes: NOAA.

Expected results. It is expected that the copula-based tri-variate density of MEI (ENSO index), RI (rainfall index), and forage yields will result in more accurate estimates of weather related risks and thus increase the efficiency of the RI insurance. Quantile regression of monthly rainfall in Alabama on the MEI index index and monthly dummies shows that lower quantiles are more dependent on the index. The coefficients are positive suggesting that stronger El Nino signal may cause more rainfall in the lower range of the rainfall distribution which may have direct implications in pricing the RI insurance. The Nino 3.4 impact declines considerably with the distance from the Gulf. Using only the winter months (highest ENSO impact according to climate research) increases the significance of the index.

Simulations using copula draws show that conditioning insurance premiums on forecast information available in late Fall increases producer welfare.

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ENSO and Corn Aflatoxin Contamination in the Southeastern U.S.

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Understanding the relation between El Niño Southern Oscillation (ENSO) and corn aflatoxin is important to forecast contamination risk and to identify corn management strategies that minimize risk. Previous studies have found that ENSO has a strong impact on June rainfall which coincides with corn tasseling and silking, the growing stage with the highest water demand. Drought stress during these critical growth phases might increase the risk for aflatoxin contamination. This study evaluated the changes in aflatoxin risk according to ENSO phases and the goodness of two monthly ENSO indices, Nino 3.4 and Multivariate ENSO index (MEI), for predicting aflatoxin risk. Aflatoxin contamination records collected from a county survey in the Coastal Plain of south Georgia between 1977 and 2004 were used for this study. The relationship between corn aflatoxin and the Nino 3.4 and MEI indices was tested through logistic regression. Based on the analysis, both ENSO indices showed significant relationship with aflatoxin contamination and the aflatoxin risk changed by ENSO phase. For the Nino 3.4 index, four out of six months during the corn growing season were significant in explaining aflatoxin contamination whereas three out of six months were significant using the MEI index. For Nino 3.4, only the index values for the month of May showed no significant relation to aflatoxin contamination while for MEI, the months of March, July, and August are the ones that showed significance. Aflatoxin contamination was explained a 70% by using either monthly values of Nino 3.4 index the MEI index. Results from this study will be used to develop an aflatoxin risk decision support tool

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Soil Temperature: Indicator of Earlier Shifts in Planting Season for Agronomic and Horticulture Crops

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Seeds require optimum soil temperatures to initiate germination and sustain early development, irrespective of the climate zone or year. Farmers who plant before the soil reaches optimum temperatures assume a higher risk of yield loss. Knowing when, an area reaches the minimum soil temperature for plant germination can aid in scheduling planting. Recent increase in temperature would also impact the time of planting. Potential shift in planting window was assessed by comparing soil temperature maps from last two decades.

Soil temperature data were obtained from the High Plains Regional Climate Center 29 stations (www.hprcc.unl.edu) for Nebraska. The date on which average soil temperature reaches select temperatures were averaged and compared for last two decades. Recent decade average was used as a general guide for planting whereas comparison between last two decades was made to assess the indication of shifts in planting dates.

The general trend showed that the spring planting season has been approaching earlier in the year for warmer season crops, like corn, soybean and sorghum. If climatic conditions are closely monitored and farmers can plant earlier, the benefit would be that a longer season hybrid could be selected with a corresponding higher yield potential.

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Risk Mapping to Support Decision Making on Plant Disease Management in Brazil

Presented by: ***Clyde Frasisse***

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Fusarium head blight (FHB) outbreaks increased considerably in many countries in the last two decades. In Brazil, FHB epidemics have become more frequent and often resulting in significant yield losses. The main causal agent of the disease in Brazil is the fungus Gibberella zeae that survives in host debris. FHB is best known as a disease of flowering stage but evidences suggest that wheat may be susceptible at later stages of kernel development. In temperate climates, it has been reported that monoculture, reduced tillage, and maize-wheat rotations have greatly increased inoculum levels. In southern Brazil, inoculum is available year round because of the abundant crop residues from other hosts, widespread no-till and the absence of freezing temperatures or dry seasons impairing fungal development. Economic losses result from decreased grain yield and quality because of contamination by toxins produced by the fungus, mainly deoxynivalenol (DON). Wheat varieties resistant to the disease or tolerant to the toxin are not available and chemical control is limited by cost, efficacy and an incomplete understanding of factors that influence disease development. Continued global warming is likely to exacerbate FHB problems. Therefore, efforts need to be made for better understanding the potential geographical limits of new diseases. In absence of large amount of quantitative data exploratory simulation models can be used for risk evaluation. A FHB simulation model was developed. Model output was used for producing risk maps for a large geographical region.

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Some Edaf- Climatic Effect on Variability of S and B in an Argentine Republic Soil

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The objective of this study was to assess the effect of some soil and climate factors like pH, organic matter (OM), rainfall and temperature in the variability of the availability of sulfur (S) and boron (B) in soil. In San Andres de Giles, Buenos Aires, a soil classified as Vertic Argiudoll was sampled in two different years (2008 and 2009) before soybean sowing under no tillage system.

A plot of a hectare was sampled with a 25 cell grid, collecting compound samples in two depths (0-5 and 5-20 cm) and the availability of the nutrient from 0-20 cm was estimated on a weighted average of data for the other depths. Chemical determinations were made using the standard laboratory methods routine of the INTA Institute of Soils. Climate data were provided by the INTA Climate Institute.

The results showed that in 2009: The increase on the precipitations influenced B leaching to deeper layers and in most cells deficiencies of B were found because of it. On the other hand, S as a semi-mobile nutrient was probably not as leached as B by rainfall. Moreover, the increase in pH and OM could have mineralized an amount of S that could have compensated the nutrient leached. Finally, the variability for both elements was lower this year and corresponds to the rainiest spring.

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Edafo- climate Factors in the Variability of Nutrients in an Argentine Republic Soil

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The objective of this study was to evaluate the effect of some soil and climate factors on the variability of phosphorus (P), potassium (K), manganese (Mn), zinc (Zn) availability in a soil of the Argentine Pampas.

In Paraná, Entre Rios Province a soil classified as Vertic Argiudoll was sampled in two different seasons, spring (2006) and autumn (2007). A plot of a hectare was sampled with a 25 cell grid, collecting compound samples in two depths (0-5 and 5-20 cm) around the centre of each cell prior to sowing and after harvest. The availability of nutrients from 0-20 cm was estimated based on a weighted average of data for the other depths. Chemical determination were made using the standard routine methods of the laboratory of the INTA Institute of Soils. Rainfall and temperature data sets were provided by INTA Climate Institute from Paraná.

The results showed that: 1) The spatial variability of available P was classified very high for both seasons. 2) The availability of P could be incremented by the fertilization and in spite of the rainfall occurred in autumn, P was not leached because of its lower mobility. 3) The spatial variability of available Zn varied from very high in spring to medium in autumn. 4) The decrease in the variability of Zn in the second sampling would be related to the contribution of the organic matter which equalized the levels between cells.

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Assessing the Value of Climate Information in Agriculture Using the Stochastic Production Frontier Approach

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The goal of this study is to analyze the economic impact of climate information on the technical efficiency of the US agricultural sector. To reach our goal we employ a Stochastic Production Frontier (SPF) framework. The geographical region select for this study is the Southeast U.S. (i.e., Alabama, Florida, Georgia, North Carolina and South Carolina). This area is ideal for studying the interaction of climate variability and agricultural production due to the strong influence ENSO in the regional climate. To implement our SPF model we use a balanced panel data, including the economic, production and climate information over approximately a 50-year period from 1960 to 2007. The economic and production data was collected from the USDA Economic Research Service and the USDA National Statistical Service. The climate information was collected from the South East Regional Climate Service.

Preliminary results indicate that variations in climatic conditions affect, directly and indirectly, agricultural production and productivity through interactions, mean output elasticities, economies to scale and technical efficiencies. The included climate variables are not only statistically significant in all estimated models but that their omission could also generate significant inconsistencies on TE scores. These results have significant policy implications. Specifically, if the effects of uncontrollable agro-climatic factors on TE are significant, but not accounted for, then agricultural strategies seeking corrective measures to improve productivity would have little impact since the real source of technical inefficiency is the uncontrollable agro-climatic conditions. Lastly, the effect of climate information on the level of technical efficiency of this sector is also positive and significant. Suggesting the use of climate information is a good mean for improving agricultural performance.

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Carbon Footprint Calculator

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Climate change and agriculture are interrelated processes agriculture has been shown to produce significant effects on climate change, primarily through the production and release of greenhouse gases such as carbon dioxide, methane, and nitrous oxide.

Certain farming practices can reduce greenhouse gases emissions and sequester carbon dioxide (CO2) from the atmosphere. The challenge is to identify these possible reductions which may not affect much productivity and cost of the product. Taking into account that these days a climate change, as the primary issue, likely to impact business reputation - farmers' education is crucial.

The indicator of how much carbon dioxide is being produced and released is Carbon footprint. We are developing a Carbon Footprint Calculator for agriculture commodities. With this tool we can help to organize and plan farmers' activity, set realistic carbon reduction targets and meet them. It is a user friendly web tool based on our study and USEPA Methodology for estimating CO2 and N20 Emissions.

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An Approach for Encapsulating Fortran Coded Models into a R Package

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Computer crop simulations have been successfully used around the world to increase agricultural yield and reduce costs. However it is getting more difficult to use, maintain, expand and improve these models due to their increasing complexity and level of detail. Most of them were written in Fortran, a well-established computer language specially suited for mathematics and statistics. However Fortran has severe limitations about its integration, interoperability and data visualization. In this study an approach for wrapping Fortran coded models into a R package is presented using only free software. With the simulation encapsulated inside the package, the user can freely manipulate both input and output of the simulation as any other regular variable without needing to deal with tabulated text files; which are default input and output in Fortran models. Running the model becomes as easy as running any other R package. With the tools provided by R, several new data sources can be used such as databases, web services and even data from other simulations. R language is also known for its powerful Application Programing Interface to generate reports and graphical displays. Two case studies are presented to illustrate the approach and discuss its advantages on realistic crop modeling applications. These case studies are applications of this technique to the Decision Support System for Agrotechnology Transfer (DSSAT) Cropgro-Soybean model and demonstrate its successful integration with R.

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Poster Abstracts

Water Resource Management

Drought Forecasts for Managing Water Resources in the Face of Climate Variability

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Drought is one of the most damaging natural forces associated with climate variability, and also likely strengthened by climate change. Lower than normal levels of rainfall lead to increased water demand by urban areas and agriculture to keep lawns and crops alive. Understanding the potential strength of an impending drought months in advance can help water resource managers make better decisions regarding the allocation and protection of water.

Presented here are preliminary results and validation of a drought forecast model. This model uses three month climate outlooks produced by the National Oceanic and Atmospheric Administration’s Climate Prediction Center (NOAA CPC). These outlooks are used to sample weather from past seasons which correspond to the predicted probabilities of temperature and precipitation anomalies. The Agricultural Reference Index for Drought (ARID) is calculated for each of the selected ensemble seasons to provide a range of possible drought values. If this procedure is applied to past events where the actual drought outcome is known, the forecast reliability can be verified. Several verification methods are shown including ranked probability skill score, reliability diagram, and relative operating characteristics. Results indicate that this may be a useful tool for decision making. This and other probabilistic prediction tools can help users understand the range of possible weather patterns that may occur in the following season and plan accordingly.

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Effects of Sea Level Rise and Other Climate Change Impacts on Southeast Florida's Water Resources

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Southeast Florida is among the ten coastal metropolitan areas in the world most vulnerable to climate change and is especially susceptible to sea level rise and expected changes in local weather patterns. Recent reports suggest that global average sea level may rise by 2 to 4 feet or more by 2100, with similar expectations for Southeast Florida.

Southeast Florida's vulnerability derives from its geographic location, low elevation, porous geology, unusual ground and surface water hydrology, subtropical weather patterns, and proximity to the Atlantic Ocean and Gulf of Mexico. Its highly engineered water infrastructure and flood control systems play an essential role in assuring the region's habitability.

Increased hydrostatic backpressure due to sea level rise on the Biscayne Aquifer, the region's primary source of municipal water, is likely to increase saltwater intrusion. Furthermore, sea level rise of as little as 3 to 9 inches within the next 10 to 30 years could decrease the capacity of existing coastal flood control structures and may significantly compromise the region's stormwater drainage system and increase the risk of flooding during heavy rainfall events. The intensity of torrential rain events and hurricanes, severe drought, and heat waves are expected to increase.

This paper addresses how sea level rise and other climate change impacts are likely to influence Southeast Florida's water resources.

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Assessing Perceptions, Uses, and Needs for Climate Information among Water Managers in the ACF River Basin

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Challenges, including multi-year droughts, floods, and associated water management decisions have long concerned water managers in Western states. Similar concerns are now facing water managers in Eastern states, including those in Georgia, Florida, and Alabama. Specifically, water resource management concerns have been increasing in the Apalachicola-Chattahoochee-Flint (ACF) River Basin where the three states share water resources. Despite recent advances in seasonal climate forecasts, which have been shown to have potential benefits for management of impacts from seasonal climate variability, water managers have been slow to incorporate forecasts into decision making. A number of factors have been attributed to the slow rate of forecast adoption, including limited relevance of forecasts, lack of awareness of and access to forecasts, perceptions of poor reliability, and institutional constraints. The context of water management decision making is critically important to the development of relevant scientific products and therefore regional assessment of potential users of information is essential to the provision of tailored information and decision support tools. The goal of this assessment is to improve our understanding of the current uses of, needs for, and perceptions of weather and climate information. This will allow us to identify gaps in diagnostic and forecast information currently available and to characterize the barriers to integrating forecasts into decision making. This work represents the first phase of the research project, the results from a survey of water resource managers in the ACF region. Survey responses are analyzed both qualitatively and quantitatively and will be used to organize and prepare in-depth interviews. Ultimately this information will be used to inform the development of evaporation forecast products and drought monitoring tools, and to enhance interactions between scientists of the Southeast Climate Consortium (SECC) and end-users of the decision support products they develop.

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ENSO Impacts on Heavy Rain Events in the Southeast

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This study addresses variations of local risk of heavy rainfall events in the Southeast as related to ENSO phase. It provides information regarding climatological expectations during a particular ENSO phase.

A heavy rainfall event is defined as two or more inches of rain observed within a two-day period. A two-day period is chosen because most heavy rainfall events begin and end within this period. Further, warm, cold and neutral ENSO phases are defined via the rank of the Multivariate ENSO Index (MEI) during the period 1950-2009. Occurrences of two or more inches of rainfall within a two-day period were tabulated for each month and ENSO phase during 1950-2009. Event occurrences are considered as Poisson variables. Relative risk of a heavy rainfall event is then expressed via Poisson exceedance probabilities of the number of occurrences of heavy rainfall events. Such probabilities are calculated for each month and ENSO phase at stations throughout the states of Alabama, Florida, Georgia, North Carolina and South Carolina.

The probability of more/fewer events is valuable to water managers and irrigation planners. Also, results of this study address the field-scale variability of rainfall that is important in crop modeling.

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Optimized Climatic Indicators to Provide Probability of Exceedance Streamflow Forecasts

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Improvement of surface water supply forecasts may be obtained through the incorporation of climatic influences. Previous research has shown that climate indices are known to have significant correlations with streamflows, for example, the Niño 3 and Niño 3.4 indices are associated with streamflows in the southeastern United States. These established relationships were used to guide an analysis to find optimal climatic influences in the Tampa Bay area. Climatic variables, including sea surface temperatures and established climate indices, were incorporated as inputs. This analysis was performed using a program modeled after the Non-Parametric Seasonal Forecast Model, but altered to account for multiple input datasets over various seasons and lags and which incorporates a weighting scheme to identify the optimal combination of climatic data for forecasting. Model output provides streamflow forecasts in the form of probability of exceedance plots and error scores that evaluate model skill. In addition, the general ENSO indices used provide input data that tends to be spatially static. Therefore, through the use of singular value decomposition (SVD) methods it is speculated that an optimal spatial distribution of a global climatic variable time series could be identified to replace the static indices for various seasons and lags. Results from this study will provide Tampa Bay Water with streamflow forecasts in the form of probability of exceedance plots for short-term source allocation decisions and a template that can assist water resource managers of any geographic region with improved streamflow forecasts.

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Assessment of Precipitation Reforecast Analogs in the Tampa Bay Region

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Reforecasts are retrospective weather forecasts generated with a fixed numerical model. Large reforecast datasets allow for the correction of systematic model error, thus improving upon the raw forecast. In this study, 1-14 day lead-time precipitation forecasts were evaluated in the Tampa Bay region using a two-step analog technique and the 30-year reforecast dataset developed by the Climate Diagnostic Center (CDC) of the National Oceanic and Atmospheric Administration (NOAA) using the Global Forecasting System (GFS) Model. The two-step analog technique consisted of finding historical forecast analogs within a +/-45 day search window followed by retrieving an ensemble of observed precipitation on the analog dates. Different lead days, number of analogs, precipitation thresholds and predictors were evaluated with respect to different months in the year using multiple verification methods. Results of this study will determine the potential use of a reforecast analog technique for surface water supply decision making and management by Tampa Bay Water, the largest public water supplier in the region.

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ADDENDUM

Thursday, May 26, 2011
8:30AM-10:00AM

Concurrent Panel Session 3
Scenarios for Planning

Impact on Local Community Infrastructure from Sea Level Rise: One Community's Response

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Southeast Florida, with a combined population of 5.5 million (U.S. Census, 2008), is among the coastal metropolitan areas most vulnerable to climate change (Nicholls and OECD, 2008). Southeast Florida's vulnerability derives from its geographic location, low elevation, porous geology, unusual ground and surface water hydrology, subtropical weather patterns, and proximity to the Atlantic Ocean. Recent reports (Karl, *et al.*, 2009; IARU, 2009) indicate that global average sea level may rise by 2 to 4 feet or more by 2100.

Sea level rise is likely to: 1) threaten the integrity and availability of fresh water supplies and 2) increase the risk of flooding, not only in the low-lying coastal areas, but also in Southeast Florida's interior flood plains. Local government infrastructure managers will be faced with challenges to preserve the region's water supply and ecological systems. These will include: 1) maintaining adequate water supplies during periods of extended drought in the face of exacerbated saltwater intrusion, 2) preventing devastating urban flooding during torrential rain events of increasing intensity in the face of compromised stormwater drainage, 3) protecting the transportation infrastructure and 4) moderating the impacts of saltwater incursion on Everglades ecological systems. The water supply is in jeopardy because: 1) the likelihood of flooding may bring drainage proposals that increase saltwater intrusion likelihood with sea level rise, 2) prolonged droughts may contribute to water shortages, and 3) heavier rains during the rainy season and hurricane storm surge may increase the risk of contamination of the Biscayne Aquifer due to flooding (Heimlich *et al.*, 2009). Drainage issues result from: 1) saturated soils, 2) higher groundwater levels and 3) higher ocean heads. The results will compromise transportation routes, contaminate water supplies, submerge roadways and damage public and private property.

New approaches will be required to improve the resilience and prolong the sustainability of the region's water resources. The City of Dania Beach developed a strategy for the evaluation of potential climate change impacts and design of possible response strategies. This project included:

- Evaluation of the City's vulnerability to the impacts of climate change, especially as is related to long-term sea level rise
- The timelines for anticipated impacts
- Summary of the City's current condition and potential future risks, to be used in discussion with staff to identify opportunities for increasing the City's climate resiliency
- Development of a matrix of potential policy initiatives that should be evaluated further and potentially developed
- A toolbox of infrastructure needs that should be evaluated further

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Notes

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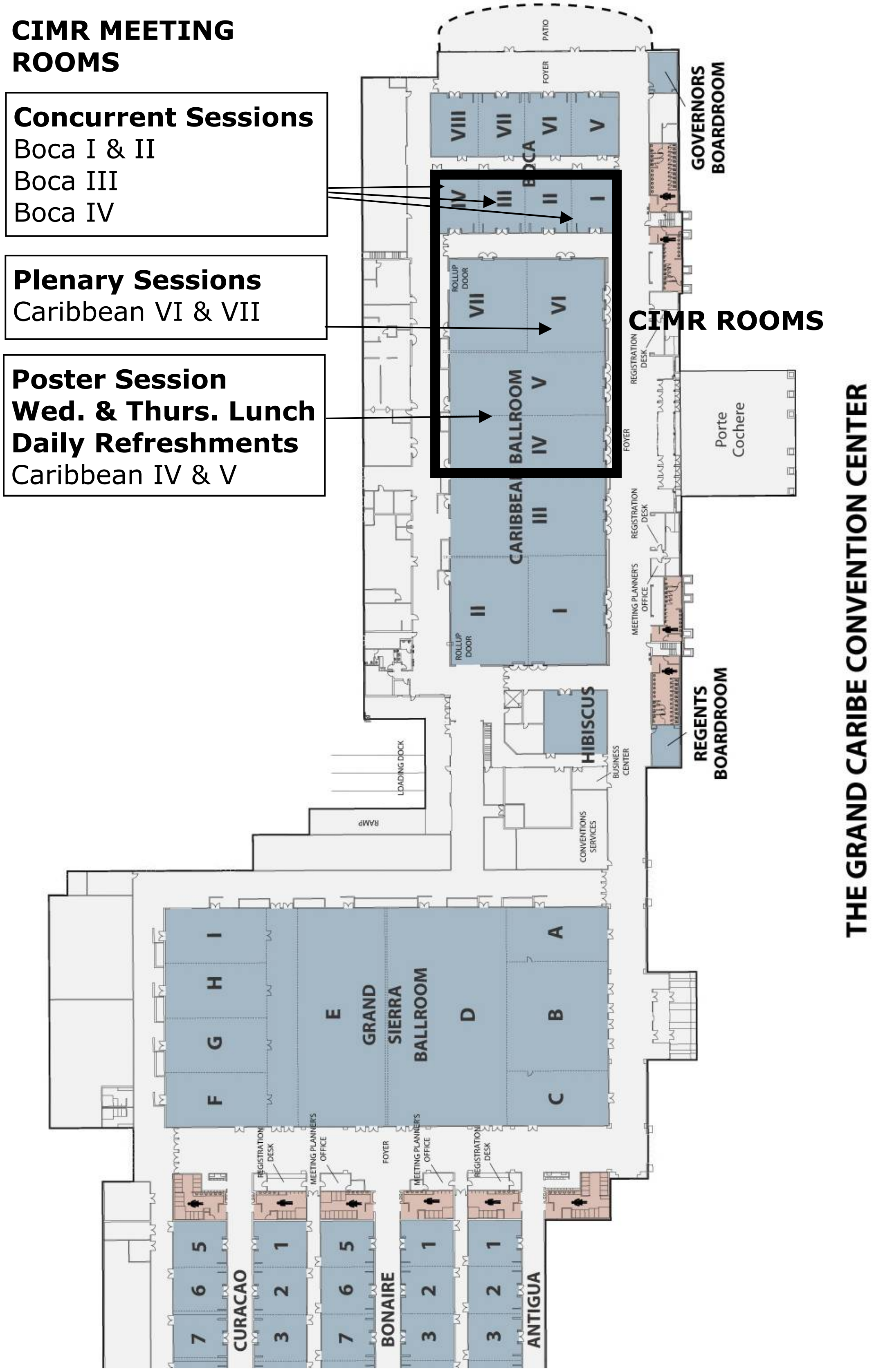
Meeting Rooms Diagram



CIMR MEETING ROOMS

Concurrent Sessions
Boca I & II
Boca III
Boca IV

Plenary Sessions
Caribbean VI & VII

Poster Session
Wed. & Thurs. Lunch
Daily Refreshments
Caribbean IV & V