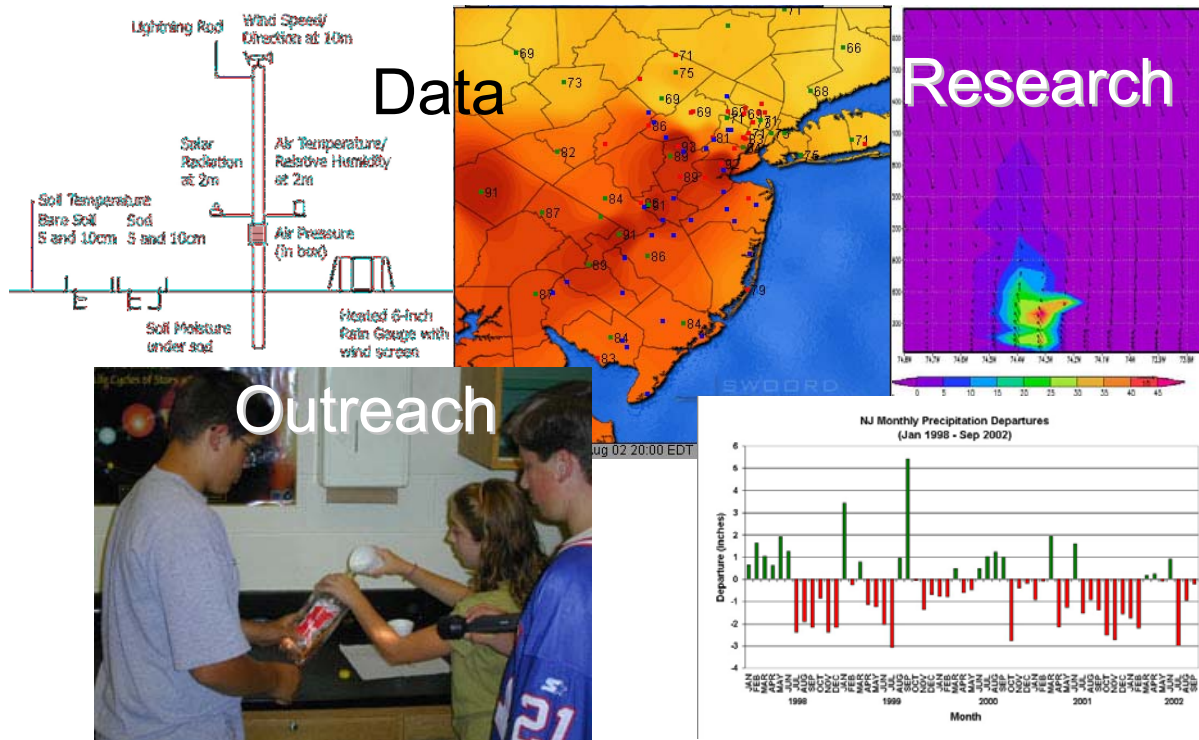


THE STATE CLIMATOLOGIST

2003 Annual Summary
Volume 22, Issue 1



***The State Climatologist* is a publication of the
American Association of State Climatologists**

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WORDS FROM THE PRESIDENT

Welcome to the latest issue of *The State Climatologist*, the publication for all members of the AASC. I would like to express tremendous gratitude to Mark Shafer for editing this banner edition. Thanks also to all who contributed articles, and especially to Jim Zandlo for his excellent Portland business meeting minutes!

It is an exciting time to participate in the public spectrum of climate services. Kudos to those who continue to work overtime contributing their expertise to the cause, and a warm welcome to renewed state climate offices and to new state climatologists in these and other states.

There is an impressive array of climate services being provided by those of us in the public sector to citizens and decision makers on local to national levels. Talented teams within state climate offices, the National Climatic Data Center, Regional Climate Centers, the National Weather Service, and the USDA-Natural Resources Conservation Service are building, maintaining and improving observational networks and archives, producing a wealth of innovative products, and continuing to provide expert insights into a myriad of climate-related issues. The benefits towards supporting and promoting the personal and economic health of the United States are innumerable. They far exceed the costs of supporting these state, regional and national programs.

Those of us involved with public climate services realize the value of our efforts, exhibit a remarkable level of dedication, and simply love what we are doing. We also realize how much more we could be doing were sufficient monetary resources available. We spend countless hours writing letters to deans and agency heads, preparing proposals and knocking on numerous doors in efforts to secure adequate funds. Successes occur to be sure, but not nearly often enough. Our level of frustration can be.....need I say more?

While we often recognize the shortsightedness of those who do not appreciate the full value of our services, we cannot always be held blameless for our failed resource quests. We must work with economists and those using our services to determine firm numbers and demonstrate the benefits accrued by investing in our programs. It behooves us to speak up and participate more than ever in state and national climate-related efforts, be they associated with drought and water resources in general, observational networks, transportation, agriculture, range management, public safety, education, or any other area.

To be most effective and to reach new levels of success, those of us in the AASC must demonstrate unity. I encourage everyone reading this newsletter to continue building upon existing partnerships and continue building new ones. Reach out to those providing services within the private sector to explore cooperative endeavors. Those state climate offices yet to have achieved ARSCO recognition, please contact Jim Angel <jimangel@uiuc.edu> or myself <drobins@rci.rutgers.edu> and we will assist you in the proposal process. A full slate of ARSCOs will better demonstrate to our constituents that state climate offices are a united force. Finally, retain the enthusiasm and awe you have for everything in and about the climate system. If Brazil can experience a hurricane, can Montana be far behind?

I look forward to seeing all of you in Ithaca. Keep visiting the meeting web site to see the evolving program <http://www.nrcc.cornell.edu/aasc_2004.html>, and if you have yet to register, please do so today.

ABOUT THE AASC

The American Association of State Climatologists is a professional scientific organization composed of state climatologists (one per state), directors of the six Regional Climate Centers and associate members who are persons interested in the goals and activities of the Association. State Climatologists are individuals who have been identified by a state entity as the state's climatologist and who are also recognized by the Director of the National Climatic Data Center of the National Oceanic and Atmospheric Administration as the state climatologist of a particular state.

State Climatologists currently exist in 42 states and Puerto Rico. They are typically either employees of state agencies or are staff members of state-supported universities. Associate members may be assistant state climatologists or other climatologists under the employ of the state climatologist, representatives of federal climate agencies retired state climatologists, or others interested in climate services. The total membership of the Association is approximately 150. For more info, see <http://lwf.ncdc.noaa.gov/oa/climate/stateclimatologists.html>.

ARSCO

A state climate office may gain status as the AASC-Recognized State Climate Office (ARSCO) by providing:

1. A document detailing current and planned activities meeting ARSCO requirements;
2. A letter of support from the state's Regional Climate Center Director;
3. A letter of support from at least one National Weather Service Forecast Office serving the state.

Candidate offices must demonstrate the following capabilities:

- Communication capabilities – the office must be able to communicate with its clientele via multiple media, including telephone, Internet, mail, E-mail, and fax;
- Information services – the office must be capable of providing a range of data and information;
- Research – the office must conduct research on climate and human activities;
- Outreach – the office should design products and services for education, climate information, awareness, and the media;
- Monitoring and assessments – monitoring climate conditions, evaluating future impacts, and providing historical context to events are activities conducted by ARSCOs.

Upon receipt of the materials and approval of the AASC Executive Board, a Memorandum of Agreement (MOA) with the National Climatic Data Center shall be issued.

Comments Submitted on the Climate Change Science Program Strategic Plan on behalf of AASC 1/17/2003

I. Background Information

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Organization: American Association of State Climatologists

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Area of Expertise: Climate research and services

The comments of the AASC were adopted unanimously for submission to the Strategic Plan for the Climate Change Science Program.

II. General Comments on the Strategic Plan:

The American Association of State Climatologists (AASC) is a professional scientific and service organization composed of state climatologists (one per state), representatives of the six Regional Climate Centers, and associate members who are persons interested in the goals and activities of the Association. State Climatologists are individuals who have been identified by a state entity as the state's climatologists and who are also recognized by the Director of the National Climate Data Center of the National Oceanic and Atmospheric Administration as the state climatologist of a particular state.

These comments provide the perspective of the AASC on the Strategic Plan for the Climate Change Science Program. Since the AASC members work directly with users of climate information at the local, state, and regional levels, the AASC is uniquely able to place climate issues into the local perspective needed by the users of climate information. These comments were voted on and approved by the AASC.

Our perspective, based in part on the 2001 AASC Policy Statement on Climate Variability and Change (<http://lwf.ncdc.noaa.gov/oa/climate/aasc.html>), are summarized as follows:

- Climate prediction is difficult because it involves complex, nonlinear interactions among all components of the earth's environmental system. These components include the oceans, land, lakes, and continental ice sheets, and involve physical, biological, and chemical processes. The complicated feedbacks and forcings within the climate system are the reasons for the difficulty in accurately predicting the future climate.
- Climate prediction is complex with many uncertainties, and the AASC recognizes climate prediction is an extremely difficult undertaking. For time scales of a decade or more,

understanding the empirical accuracy of such predictions – called “verification” – is simply impossible, since we have to wait a decade or longer to assess the accuracy of the forecasts.

- Human activities have an influence on the climate system. Such activities, however, are not limited to greenhouse gas forcing and include changing land cover and aerosol emissions, which further complicated the issue of climate prediction. Furthermore, climate predictions associated with human disturbance of the climate system have not demonstrated skill in projecting future variability and changes in such important climate conditions as growing season, drought, flood-producing rainfall, heat waves, tropical cyclones and winter storms. These types of events have a more significant impact on the United States than annual global temperature trends.
- General circulation models which have been applied to project changes in global and regional climate for periods of decades into the future need to be viewed as hypotheses about the behavior of the atmosphere in response to human disturbance. The validity of such models is uncertain because our understanding of all relevant climate factors (and their relationships and interactions) is incomplete. New research should be based only upon hypotheses that can be verified by observed data. This underscores the need to continue (and, in fact, enhance) the long-term climate monitoring system in the United States so that, for example, climate models can be properly tested.

Our recommendations for the Strategic Plan are as follows:

- Research on long-term climate should not be based on specific projections, but instead focus on policy alternatives that make sense for the range of plausible regional and local climate variations.
- By focusing on society’s vulnerabilities to climate change rather than on climate projections, the scientific community can provide more comprehensive and useful information to local, state, and national decision makers. A lack of an ability to generate accurate projections should not be used as a justification to ignore the policy challenges presented by climate variability and change. Research must be directed to better identify and quantify these vulnerabilities.
- The use of historical scenarios such as the 1930s Dust Bowl years, or more recently the 1988 and 2001 droughts and the 1993 flood, can improve climate scenario development. Not only are these physically plausible scenarios, they provide the opportunity to examine how society and the environment actually responded. Research should be completed to assess how society would respond today to these climate events.
- State and regional climatologists can provide analysis tools and climate data, some of it unique (e.g. soil moisture or mesonet observations) in the context of the assessment of the vulnerability of local and regional areas to climate variability and change.
- More emphasis should be placed on two-way communications with stakeholders as part of the research process. By involving stakeholders with varied and competing interests early in the process, climate researchers can focus on the important climate parameters, and stakeholders will understand the limits of the information provided to them. Since the impacts of climate variability and change vary widely across regions within the United

States, state and regional climatologists, and other local experts, who are most familiar with the stakeholders and the potential impacts at this scale should be involved in the research.

- Peer review judgment from a handful of experts should not be the final test following release of climate projection publications. Independent climate groups and organizations such as the AASC should be provided an opportunity to periodically evaluate the accomplishments of the US Climate Change Science Program.
- Financial resources should focus on the assessment of local and regional vulnerabilities and possible responses rather than the generation of projections of future climate from general circulation and regional numerical forecast models.

Finally, as an overarching goal, the AASC recommends we concentrate on reducing our vulnerability to paleo, historical and current weather extremes, for this would allow us to better protect ourselves from problems associated with the spectrum of future weather extremes.

III. Overview Comments on Chapter 3: Climate Quality Observations, Monitoring, and Data Management

The AASC has a strong interest and considerable expertise in the issues discussed in Chapter 3 including the US climate network (particularly the Cooperative Observer Network), data quality, climate monitoring, and making the climate record accessible to users. Some examples of this include active involvement with the Climate Database Modernization Project at NCDC, reconstructing climate extremes from historical accounts, developing and applying quality-control procedures to climate data, and working extensively at the state and regional level with users of climate information. Rather than building a new infrastructure to address the issues discussed in this chapter, it would be more effective to build on the existing network of climate expertise of the state and regional climate centers.

IV. Overview Comments on Chapter 6: Climate Change and Variability

The AASC has experience in addressing a number of issues related to climate change and variability, as outlined in Chapter 6. Our activities include evaluating and assisting decision-makers in using seasonal weather predictions, monitoring climate extremes including their impact on society and the environment, and providing climate information to a wide range of users. The mix of users and their needs vary from region to region (for example, New England has different requirements for climate information than the southwest US). As a result, the interaction with these users has to be at the state and regional level. It would be more effective to support the existing infrastructure of state and regional climate expertise rather than start from scratch. By using the existing local, state and regional expertise, several of the “products and payoffs” in Chapter 6 with a 5-15 year time horizon, particularly on page 78, could be accomplished much sooner.

Letter to Department of Commerce regarding Cooperative Observer Network modernization 8/20/2003



American Association of State Climatologists

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August 20, 2003

Secretary Donald L. Evans
Office of the Secretary
HCHB, Room 5516
U. S. Department of Commerce
14th & Constitution Avenue, N.W.
Washington, D. C. 20230

Dear Secretary Evans:

As the President and immediate Past-President of the American Association of State Climatologists (AASC), we write to strongly endorse plans by the National Weather Service to lead the modernization of NOAA's Cooperative Observer Network (COOP). We ask that you personally review these newly revised and visionary plans. We trust that they will gain your full support when they move into NOAA and the DOC for consideration as a budget initiative.

This strategic initiative provides the nation with a framework for the real-time measurement and mitigation of the effects of weather and climate on the economy of the United States. The nation faces many critical weather and climate-induced challenges, such as drought monitoring and mitigation, air quality assessment, estimates of agricultural production, energy management, homeland security, the effects of weather extremes on society, and the detection of changes in weather patterns over time. This plan moves an aging and overtaxed climate network into the 21st century by automating and integrating climate stations nationwide to meet hundreds of thousands of user needs.

Let us provide a bit of history. The modernization of the COOP network has been proposed as a new initiative within NOAA for more than a decade, but the progress has been minimal. Without the required investment, the program is in danger of becoming unreliable for local climate monitoring, a

key strategy for assessing climate impacts and risks, and for making society less vulnerable to extreme weather conditions.

Today, the stations have antiquated equipment, maintenance is unable to keep pace, and the observations are becoming more questionable by all users. With more than a 100-year legacy and recommendations for a fully modernized network by many groups (including our own National Research Council), the nation cannot afford to squander this national treasure. Maintaining the old network is in serious jeopardy, and is now going past the stage of no return where climate records will soon be irrevocably lost due to an antiquated observing system. This situation is most unfortunate and represents a potential national embarrassment.

At our annual meeting during the first week of August, we were briefed on the revised COOP modernization plan about to surface within the National Weather Service. We believe the new vision is a technologically wise and economically sound investment for the nation. Our attachment lists a few of the many economic dividends that will accrue as a result of COOP modernization.

We strongly endorse these new modernization plans and trust that they will gain your full support as well.

Sincerely,



Professor David A. Robinson
New Jersey State Climatologist
President of the AASC
Center for Environmental Prediction
Rutgers University

Professor Roger A. Pielke, Sr.
Colorado State Climatologist
Immediate Past President of the AASC
Department of Atmospheric Science
Colorado State University

Attachment

Cc:

Deputy Secretary Samuel W. Bodman
VADM Conrad C. Lautenbacher, Jr., US Navy (Ret.)
Brigadier General John J. Kelly, USAF (Ret.)

Dividends From the COOP Modernization

Utility Industry

- “*One degree of improvement in temperature [forecasts] is worth one billion dollars.*” (Roger Krenenburg, Director of Business Development at Edison Electric Institute; presentation at a COOP Partners’ Forum in September 2002)
- “The Tennessee Valley Authority [TVA] generates 4.8% of the nation’s electricity. Forecasts over its 80,000 square miles have been wrong by an average of 2.35 degrees these last 2 years, fairly typical of forecasts nationwide. Improving that to within 1.35 degrees would save TVA as much as \$100,000 a day, perhaps more.” (*USA Today*; June 19, 2001)
- Weather forecasts introduce 1% of additional error [known technically as ‘MAPE’] in load forecasts (Khotanzad et al. 1998) [such that] a conservative estimate is that a 1% reduction in [load] forecasting error [MAPE] can save [one utility] up to \$1.6 million annually (Hobbs et al. 1999).
- The value of understanding the interrelationships between weather variables and electric load can save a small utility at least \$0.5M annually through improved temperature forecasts (Tribble 2003).
- [There is] “a municipality in the southwestern United States that wants to protect itself in the case of too little rainfall. Under such circumstances, they must buy extra power from the [power] grid. COOP stations are very important, but there are gaps in the data. Consequently, these data are not good enough for us to price a product.” (Lynda Clemmons, President of Weather Risk Management Association; presentation at a COOP Partners’ Forum in September 2002)
- “By effectively using accurate rainfall forecasts in our hydro operations, Duke Power can save several million dollars annually in preventing ‘wasted’ water — water moved past the hydro station but not used for hydroelectric generation.” (Bill Coley, President of Duke Power; comments at The First AMS Presidential Policy Forum in January 2001)

Emergency Management

- [The Oklahoma] “Mesonet is without a doubt among the most important data sets we use at the National Weather Service Forecast Office [in Norman, OK]. In addition to routine forecast and warning operations, the Mesonet is invaluable for handling various disaster support situations including wildfires, chemical spills, and catastrophes like the Oklahoma City Murrah Building bombing.” (David Andra, WFO Norman; quote from NRC 2003)

Agriculture

- “Monthly precipitation data was *the key to determining the outcome of a \$2 billion lawsuit* brought by several southwest Indian tribes against the U.S. Government concerning the overgrazing of reservation rangeland.” (NRC 1998)
- “*The dispensation of \$500 million in federal drought insurance was decided by precipitation records from COOP stations during the 1988 drought in the Midwest.* In one case, \$6 million was paid on the basis of records from one station.” (NRC 1998)
- “One precipitation observation that was wrongly keyed during the summer of 1988 almost cost a farmer his drought insurance claim of \$70,000. A rainfall of 0.07 inches was keyed as 0.17 inches, putting the seasonal total above the threshold for collecting on the policy. Only when the records were rechecked was the error noticed.” (NRC 1998)
- “There are 600,000 irrigated acres across Oklahoma. It costs \$4 to put one inch of irrigated water on each acre. If more scientific irrigation strategies were adopted based on reliable local data, it is likely that one acre-inch of irrigated water could be saved each year. As a result, the agriculture industry in Oklahoma would realize an annual savings of \$2.4 million.” (Professor Ron Elliott, Oklahoma State University)

- “The [OK] Mesonet has proven to be one of the most valuable production and marketing tools available to Oklahoma producers. For example, in April 1997, a late freeze had potentially affected over 6 million acres of Oklahoma wheat. Producers were faced with the economic decision of leaving the crop for grain production or salvaging it for hay. Mesonet data helped producers and agronomists to quickly and accurately assess the damage and make the most informed decisions possible.” (Mark Hodges, Executive Director of the Oklahoma Wheat Commission)
- The USDA used COOP data to develop a plant hardiness map that is printed on almost every packet of seeds.
- “The USDA uses timely weather and crop information as part of its key indicators used by the world commodity markets.” (Dr. Gerald A. Bange, Chair of USDA’s World Agricultural Outlook Board)

Water Management

- “An important part of the COOP network is the high-resolution precipitation data needed to evaluate flooding, stream-bed erosion, and surface runoff.” (Dr. Tom Karl, Director of the National Climatic Data Center)
- “Observations from the COOP network are indispensable inputs to the *Drought Monitor*, a product that is widely used by policy makers, the media, and others.” (Dr. Gerald A. Bange, Chair of USDA’s World Agricultural Outlook Board)
- “Total storm rainfall amounts and associated short-duration intensities reported by COOP stations provided the basic information used by engineers and meteorological consultants to assist the courts in determining the reasons and legal responsibilities for the washout of a major bridge span in Puerto Rico that resulted in 27 deaths and a \$65 million lawsuit.” (NRC 1998)

General Commerce

- The National Homebuilders Association used COOP data to change their standards for the foundation footing of new homes. The estimated annual savings is \$200 million.
- “The COOP network is a gold mine of data that has been used in millions of decisions. In the United States, there is \$13 billion in property damage and 80 deaths per year related to drought and flood. The modernized COOP will provide data that will help manage these extreme events.” (Samuel W. Bodman, Deputy Secretary of Commerce; presentation at a COOP Partners’ Forum in September 2002)



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
1325 East-West Highway
Silver Spring, Maryland 20910-3283

SEP 23 2008

David A. Robinson, President
American Association of State Climatologists
Center for Environmental Prediction Rutgers University
54 Joyce Kilmer Avenue
Piscataway, New Jersey 08854-8054

Dear Professor Robinson:

Thank you for your letter to Secretary Evans supporting NOAA's Cooperative Observer Network. I have been asked to respond.

We agree with your Association's assessment of the dividends a modernized network can provide to the nation's economy and greater understanding of climate variability and change. Our commitment to invest in high-quality, long-term climate observations will support future climate assessments and forecasts. Through a greater understanding we can work better with you to conduct research on climate variability and change. We are confident that increased use and effectiveness of climate observations from networks such as the NOAA's Cooperative Observer Network will improve climate, weather, and water predictions.

We appreciate your Association's strong endorsement for this initiative and look forward to working with your association and others who share similar views for this initiative. Your support will assist us in building on recent accomplishments and help in accelerating modernization implementation.

Sincerely,

Gregory C. Mandt
Director, Office of Climate, Water,
and Weather Services



Partner Summary: NOAA's National Climatic Data Center <http://www.ncdc.noaa.gov/oa/ncdc.html>

Accomplishments in 2003: NOAA's National Climatic Data Center (NCDC) continues its commitment to provide the public with quality climate information and service. In 2003, the following were accomplished:

- Monumental strides developing the Remote Sensing and Applications Division and initiating a vital program in Scientific Data Stewardship;
- Increased climate data access;
- Improved data quality control;
- Continued effort related to the Comprehensive Large Array-data Stewardship System (CLASS);
- Continued progress to image and digitize a wide variety of historical climatological data through the Climate Database Modernization program (CDMP);
- Deployment and commissioning of several dozen U.S. Climate Reference Network stations;
- Deployment of the NOAA Operational Model Archive and Distribution System (NOMADS);
- Continued excellence by NOAA's Paleoclimate Program;
- Improved climate monitoring capabilities and completion of State-of-the-Climature Reports;
- Expanded data product and reference data set holdings in archive;
- Commencement of web site reorganization.

Building on past success and looking to the future, NCDC aims to be the world's most comprehensive source and recognized authority for weather and climate information, official assessments of the climate in support of societal and economic needs, and as a leader in observing the climate. To attain this stature, we continue to build successful partnerships with the private sector, academia, and other government agencies.

In 2003, the focus was on improving weather and climate services. NCDC reported regularly on the state of the Nation's climate, and issued important announcements on the climate trends of the atmosphere. Expanded on-line capabilities continued to satisfy a record number of Internet users with an exhaustive amount of archived data that can be readily accessed and downloaded. The contributions of NOAA's six Regional Climate Centers (RCCs) and our partners in the American Association of State Climatologists (AASC) were critical to these successes.

Looking Ahead: NCDC's traditional weather and climate services are increasingly being leveraged to support disaster mitigation and relief efforts. NCDC is a critical and integral part of the NOAA team and continues to play a major role in NOAA's Climate Services Program. NCDC expects more involvement in these and other activities within NOAA and the National Environmental Satellite, Data, and Information Service (NESDIS).



Partner Summary: NOAA's Regional Climate Centers
<http://www.ncdc.noaa.gov/oa/climate/regionalclimatecenters.html>

Unique intergovernmental program: NOAA's Regional Climate Centers (RCCs) Program developed in response to the mandate of the National Climate Program Act of 1978 (PL 95-367) to improve the use and dissemination of climatic data and information for the economic benefit and well-being of the United States. The RCCs provide a highly responsive, human feedback to user requests. This feedback mechanism produces increased understanding among the end users and guides the RCCs in product development. The end result has been explosive growth in climate information requests and new products.

Crucial services not available elsewhere:

Even though climate is driven by global scale forces, the impacts of climate are experienced on regional and local scales. Federal support of the RCC program, which is locally administered by state agencies, provides all users equal access to information pertinent to their locale and interests. Increasingly, meteorologists in the private sector are turning to the RCCs for timely and reliable climate data with which to create value-added products for their clients. Private sector meteorologists also have acknowledged the need for unbiased and timely climate information from a source without commercial interests. The RCCs meet the regional informational needs of thousands of large and small businesses, legal and insurance firms, local and state government agencies, agricultural producers, utilities, engineering, planning, and consulting firms, federal resource management agencies, teachers, educators, students and private citizens. The ability to meet the needs of this wide spectrum of constituents results from a dynamic process to constantly improve the use of climatic information in decision making.

Leveraging Federal funding:

Each center derives a substantial portion of its total support from the state institution in which it is located, as well as receiving additional support from participating states in the region. Total institutional, state, and private contributions to the RCC program in 2003 amounted to approximately \$1.5 million, or about one dollar for every two Federal dollars invested. This program also leverages several million dollars in competitive research funding.

Program integration:

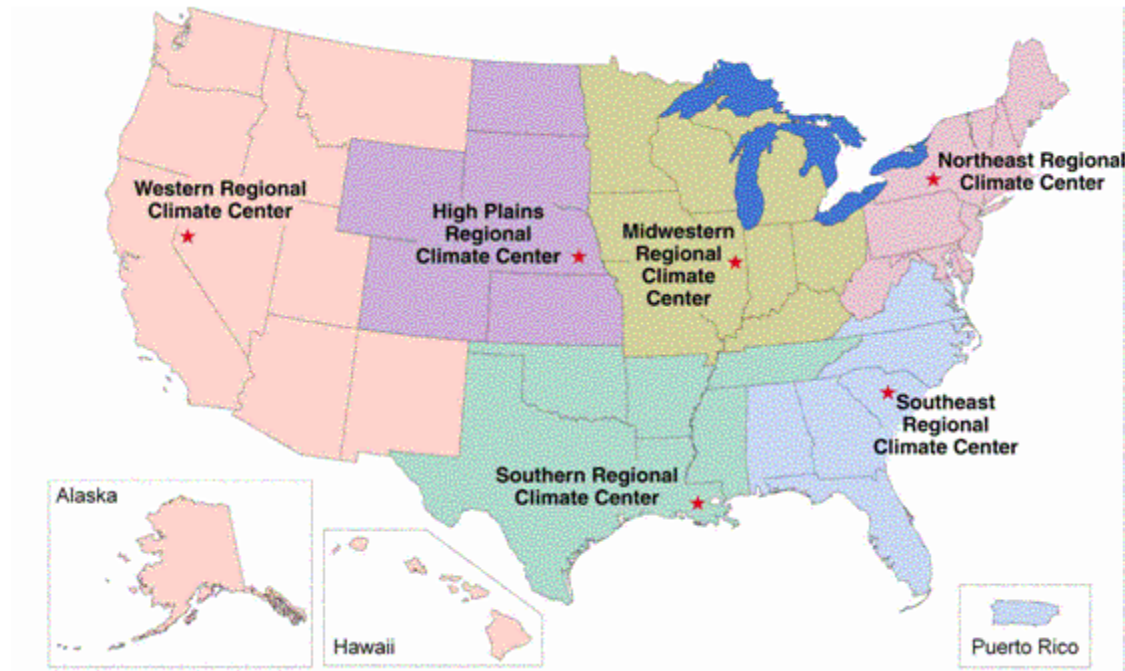
The integration of the regional centers into NOAA's National Climatic Data Center in 1997 has enabled the development of a three-tiered national program of climate services that encompass cost efficient, effective programs at the state, regional, and national levels. This program is now embracing the developing activities of the NWS Climate Services Division to provide even better support to the country.

Major Activities for 2004:

-Applied Climate Information System (ACIS):

Phenomenal growth has occurred in the demand for Internet-distributed climate information products. To meet this demand, the RCCs have developed an Internet-based software technology, ACIS. It provides seamless, distributed, and secure access to nationwide climate information and derived products. The RCCs are prepared to extend ACIS to National Weather Service offices across the nation by offering an XMClimate package. A similar interface is being developed for USDA Natural Resources Conservation Service offices. These interfaces will provide access to consistent, quality controlled, real-time climate data for these climate sensitive agencies.

-Drought Mitigation and Response: The U.S. economy is plagued by natural hazards such as drought, wildfire, floods, and frost. The widespread drought of the last few years created severe economic distress across many sectors. The Western Governor's Association is working with NOAA to establish a National Integrated Drought Information system (NIDIS) to provide farmers, business people, and emergency response personnel with the information needed to anticipate and respond to drought. The RCCs are poised to provide this information by tailoring climate information products to meet NIDIS goals and needs.

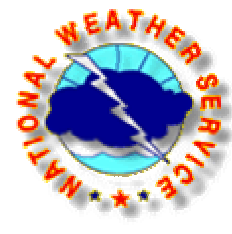




NOAA/National Weather Service Climate Services Division

1325 East-West Highway W/OS4
Silver Spring, MD 20910

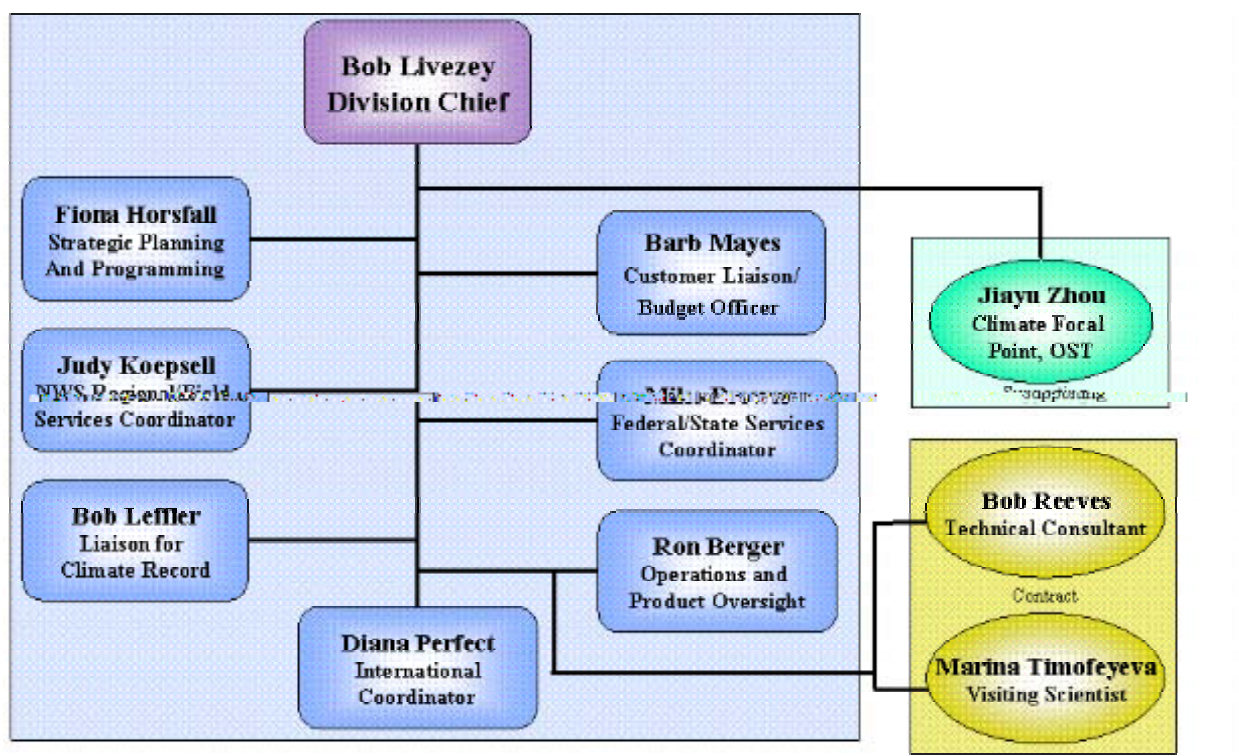
<http://www.nws.noaa.gov/om/csd/index.shtml>



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In response to an increased emphasis on climate by the National Oceanic and Atmospheric Administration (NOAA), as well as the National Weather Service (NWS), the Climate Services Division was officially established in October 2000 as part of the newly formed Office of Climate, Water, and Weather Services. Since its inception, the Climate Services Division (CSD) has been led by Robert Livezey. In May 2002, the division reached its fully staffed level of ten employees.



The roles of CSD are to:

- Produce guidelines and directives for NWS climate products and services.
- Ensure availability of training to NWS climate services staff as well as to the climate community.
- Coordinate requirements between NWS climate product users and providers of those products.
- Facilitate partnerships between NWS and other members of the climate community.
- Ensure adequate resources for NWS to support its climate services goals.

Mission and Vision

The mission of NWS Climate Services is to provide vision, direction, and resources to ensure that NWS climate services are easily accessible, well understood, optimally used, and reflect customer needs. In the NWS Climate Services Vision, this is accomplished by providing:

- Real-time monitoring of climate variability (including drought conditions) nationwide down to at least the county level.
- New forecast products that:
 - Link weather and climate on intraseasonal time scales.
 - Are downscaled to local levels.
 - Reflect new insight into warm season precipitation, drought, and the Southwest monsoon.
 - Extend beyond a year to a decade or more.
- User-friendly access for the private and academic sectors to NWS climate models, climate forecast model output, climate guidance products, and knowledge.
- Sustained capability to ensure the accuracy and continuity of the U.S. historical record.
- Fully mobilized regional and field offices for customer outreach, downscaling climate forecasts, product and information dissemination, and integration and quality control of surface observations.

Activities and Services

NWS regional and local climate services implementation

In 2003, following encouragement from its management, NWS began implementing a regional and local climate services infrastructure, designating Regional Climate Services Program Managers (CSPMs) at each of the six regional headquarters as well as a Climate Focal Point (CFP) at each River Forecast Center (RFC), Weather Forecast Office (WFO), and Weather Service Office (WSO). As NWS established its regional and local climate services, CSD conducted outreach to others in the climate community (including AASC, the Regional Climate Centers [RCCs], and NCDC) to gather feedback on the NWS plans for climate services as well as to provide information on how the regional and local climate services providers in NWS would fit into the overall climate community. In the first year of NWS regional and local climate services implementation, each region conducted workshops to gather its CFPs for guidance and to communicate with regional and local partners in climate services.

Each CFP is expected to:

- *Serve as the local conscience of the nation's climate record.*

Although the CFPs are not necessarily the on-site person responsible for maintaining the observation systems, they will monitor compliance with the "ten principles of climate monitoring" as well as work with NCDC and their RCCs and State Climatologists (SCs) to ensure metadata sharing, quality control, and performance monitoring. CSD is aggressively working to ensure the integrity of the climate record through development of national policy, training of field personnel, outreach activities, and strong partnerships with the climate community.

- *Enhance and extend the Climate Prediction Center's product suite to increase the use and effectiveness of regional and local climate information.*

CFP responsibilities for local climate products in their offices will include:

- Knowing the local climatology and impacts of climate variability.
 - Providing input to Climate Prediction Center (CPC) products, such as the drought monitor and the hazards assessment.
 - Conducting local climate studies and downscaling CPC products to the local area.
- *Conduct outreach to regional and local decision-makers and users of climate services products.*

CFPs will engage in activities with the local climate community as well as serve as a resource for local climate customers, and will be expected to:

- Assist local customers with interpreting, understanding, and using CPC products.
- Assist local media and customers in understanding and interpreting NOAA climate press releases and bulletins.
- Conduct outreach to local user groups on NWS climate services, as appropriate to each local area.
- Serve as a knowledgeable interface for climate data and information, including understanding where to refer customers for climate data (SC, RCCs, and NCDC or other NOAA agencies).

The foundation of providing climate services at all levels throughout NWS relies on strong partnerships with others in the climate community. The regional and local NWS offices are available to coordinate their climate services with our partners in climate services, especially the SCs and RCCs.

Training

CSD considers training of regional and field climate services personnel to be a top priority, allocating significant resources for the development of a competent professional cadre. The training program, called the NWS Climate Services Professional Development Series (PDS), is focused on developing understanding of:

- Climate services infrastructure
- Climate variability
- CPC products
- Application of CPC products at local level
- Use of historical local climate data and information to provide public outreach
- Timely, accurate, and consistent climate observations and their applications

The instructional components developed under the PDS include residence training, teletraining, reference websites, and webcasts. Many of these components are available for use by the climate community outside of NOAA, including webcasts delivered by recognized experts on topics of climate variability and prediction.

The NWS Climate Services PDS, including teletraining, webcasts, and website links, is publicly accessible at:

<http://www.nwstc.noaa.gov/nwstrn/d.ntp/meteor/clipds.html>

Outreach

CSD has sponsored workshops and other outreach activities throughout its existence, targeting specific audiences (such as the weather risk management industry) and products or services (such as excessive heat products and the Drought Outlook). CSD has initiated a quasi-annual series of workshops, the Climate Prediction Applications Science workshops, to identify new climate prediction applications research, promote interactions between climate-sensitive integrated research and service communities, and assess impacts of climate forecasts on environmental-societal interactions. For a list of past workshops sponsored by CSD, as well as links to select workshop summaries, please visit the CSD Workshops web page:

(<http://www.nws.noaa.gov/om/csd/workshop/>).

NWS has several planned outreach activities in 2004:

- NWS and NCDC are co-hosting two consecutive workshops on June 2-4, 2004, in Kansas City, MO. The NOAA Snowfall Network Observations Workshop (SNOW), on June 2, will provide outreach on good snow measurement techniques, deliver information on NOAA and other sources of snow information, and gather customer feedback on issues related to snowfall measurement. The NOAA Data Users' Forum, on June 3-4, is an opportunity for NWS and NCDC to improve NOAA's products and services through a seamless customer feedback process. The workshop will include brief updates on current data issues from both NWS and NCDC, but it will focus on gathering input from customers. NOAA invites all RCCs and SCs to attend both workshops.

Registration for both workshops is limited. For more information, including workshop goals, logistics, agenda, and registration, please visit our website at:

<http://www.ncdc.noaa.gov/oa/climate/research/2004/noaa-workshop/noaa-workshops-2003-06.html>

- NWS Climate Services Division is organizing a Climate Prediction Workshop to be held the day before the AASC Annual Meeting in Ithaca, NY (August 10, 2004). The workshop will provide insight from the Climate Prediction Center regarding all scales of prediction products (extended, monthly, and seasonal) as well as ENSO and drought monitoring and prediction. In addition, Holly Hartmann (University of Arizona CLIMAS) will give an interactive presentation on communicating climate forecasts, and particularly probabilistic forecasts, with means that are both correct and understandable to all audiences. For more information, please follow the link to this workshop from the AASC annual meeting website:
http://www.nrcc.cornell.edu/aasc_2004_wkshp.html.

Regional collaboration

The NOAA Climate Transition Program (NCTP) is a new competitive program to ensure the sustained delivery of user-driven climate research products to operations. The program supports the transition to operations of research that has been identified as valuable by decision-makers, operational information disseminators, and operational climate organizations. NCTP will distribute funds through open competitive grants to local, regional, or national groups, such as universities, RISAs, RCCs, SCs, private sector groups, or other federal agencies, that have a product for which there is a strong stakeholder requirement. Staffing for the program will begin in late 2004. A Federal Registry Notice will be published in 2004, with approvals and appropriations taking effect in early to mid-2005. Three or more projects will be funded in 2005.

NOAA also wishes to increase its collaboration with regional partners through the Cores concept. Regional Core meetings will bring together members of the regional and local climate communities to identify gaps in climate information and services. Meeting participants also will identify new resources for climate research and services, ensure that the NCTP process runs smoothly in their regions, and possibly provide a delivery mechanism for operational services. Meetings will initially be patterned after the Climate Prediction Assessment Science (CPAS) workshops.

NWS Region Reports

Alaska Region (AR)

NWS Alaska Region hosted a Climate Reference Network (CRN) meeting where over 100 users representing federal, state, and local agencies, as well as private industry, provided inputs on where CRN observational sites should be located and why they meet their climate information needs. In addition, AR has conducted some application research with Dr. James Simpson at Scripps Institution of Oceanography on the climate database in Alaska and has written and/or published two climate-related articles.¹

Central Region (CR)

NWS Central Region discussed the possibility of a partnership with the High Plains and Midwest Regional Climate Centers (RCCs) to supply a database for use with XMClimate. CR formed and met with a climate steering committee in order to put together a Regional Climate Plan. Also, CR has been working on plans for two sub-regional meetings/workshops with CR partners and customers, to include RCC, state climatologists and interested parties in surrounding academic institutions – one of these two meetings has been “penciled in” for August in Columbia, Missouri.

Eastern Region (ER)

NWS Eastern Region completed a climate services plan and established yearly goals and has begun the development of a brochure to be distributed as a part of outreach activities. ER has chosen four

¹Simpson, J.J., G.L. Hufford, M.D. Fleming, J.S. Berg, and J.B. Ashton (2002) Long-term climate patterns in Alaskan surface temperature and precipitation and their biological consequences. *IEEE Transactions Geoscience and Remote Sensing*, 40(5): m1164-1184 and Simpson, J.J., G.L. Hufford, C. Daly, J.S. Berg and M.D. Fleming (in press) Two views of Alaskan and western Canadian monthly temperature and precipitation. *Arctic* vol 57.

WFOs as Beta sites for Phase II of the New England Project, and sensors were deployed during December and January. These Beta sites (Albany, New York; Taunton, Massachusetts; Gray, Maine; and Upton, New York) will measure and transmit in real-time temperature and precipitation data for the NWS COOP program, plus dew point, pressure, soil temperature, and moisture data for the U. S. Department of Agriculture.

Pacific Region (PR)

NWS Pacific Region has been providing climate forecasts and services, training venues, and outreach activities since 1994 through the Pacific ENSO (El Niño/Southern Oscillation) Application Center (PEAC). PR has been at the forefront regionally, nationally, and internationally by providing climate forecasts and services, interacting with a multitude of users and stakeholders, and validating and seeking users' feedback because of the vital importance of climate change, climate variability, and extreme weather events to Pacific island environments.

Southern Region (SR)

NWS Southern Region has assisted in the creation of an ARSCO-certified state climatology program for the Commonwealth of Puerto Rico based at the University of Puerto Rico at Mayaguez. SR held an inaugural NWS SR Climate Conference in Baton Rouge, Louisiana, with the support and assistance of the Southern RCC. NWS Weather Forecast Offices (WFOs) in SR have developed experimental climate products; WFO Melbourne, Florida, has worked with a long-range dry season forecast for Florida based on ENSO trends, and WFO Tulsa, Oklahoma, has established a localized downscaling of NWS Climate Prediction Center temperature forecasts.

Western Region (WR)

NWS Western Region has completed a project to standardize the climate sections on their WFO web pages. The goal of this project is to make it easier for state and regional customers/partners to access WFO products used by the climate community. Suggested modifications will be added to the page after the initial implementation.

Regional Climate Services Program Managers

Alaska Region: Gary Hufford (Gary.Hufford@noaa.gov)

Central Region: Doug Kluck (Doug.Kluck@noaa.gov)

Eastern Region: Harvey Thurm (Harvey.Thurm@noaa.gov)

Pacific Region: Jim Weyman (James.Weyman@noaa.gov)

Southern Region: Victor Murphy (Victor.Murphy@noaa.gov)

Western Region: Andrea Bair (Andrea.Bair@noaa.gov)



Natural Resources Conservation Service

National Water and Climate Center

Water and Climate Services
United States Department of Agriculture
Natural Resources Conservation Service

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Overview

The National Water and Climate Center (NWCC) of the USDA-NRCS was created in 1995 to “lead the development and transfer of water and climate information and technology which support natural resource conservation.” The primary goal of the NWCC is to be “a globally recognized source for a top quality spatial snow, water, climate, and hydrologic network of information and technology.”

Located within the NWCC is the Water and Climate Services (WCS) Team. WCS has two main functions: Serve as the climate services focal point for the NRCS, and produce water supply forecasts for the western U.S. The climate services staff consists of the following individuals:

- Phil Pasteris Water and Climate Services Team Leader
Ppasteris@wcc.nrcs.usda.gov 503.414.3058
- Greg Johnson Applied Climatologist
Gjohnson@wcc.nrcs.usda.gov 503.414.3017
- Jim Marron Resource Conservationist
Jmarron@wcc.nrcs.usda.gov 503.414.3047

The climate services team at the NWCC enjoys a long and productive relationship with the State Climatologists, as well as the Regional Climate Centers (RCC’s) and NCDC. The WCS climate staff is the primary climate services functional unit within USDA, and thus serves a vital link between state and national climatology centers and the many agricultural and natural resource issues across every part of the United States.

Primary Projects

The NWCC climate team oversees a number of projects of vital interest to the USDA, and to their many partners. The following is a brief synopsis of these projects, many of which have direct relevance to state, regional and national climatologists.

Climate Mapping of the United States

The NRCS-NWCC has provided oversight, direction and substantial funding over the past 10 years to support climate mapping work at the Spatial Climate Analysis Service (SCAS) at Oregon State University (OSU). The USDA has many needs for new, digital and high resolution climate map products that can be utilized in Geographic Information Systems (GIS), which are now functional at nearly every NRCS field office. To fulfill these needs, gridded climate coverages have been produced by the SCAS using their PRISM climate mapping system. These products have become the

climate mapping standard for the U.S., and are now in NCDC's Climate Atlas of the United States. Primary map products include: new 30-year mean monthly and annual precipitation, temperature (maximum, minimum and average) and dewpoint for all 50 states, as well as Puerto Rico and the Pacific Basin islands; average first fall and last spring frost dates and growing season length for the continental U.S.; and other specialized products, such as a new mean annual extreme minimum temperature map (a.k.a. plant hardiness map). These products can be obtained from: <http://www.wcc.nrcs.usda.gov/climate/prism.html>

A new spatial quality control system for SNOTEL and other climatological data also is being developed by the SCAS for the NWCC, which should be ready for deployment by 2005.

GEM Weather Generator Development and Distribution

Primary support for the Generation of weather Elements for Multiple applications (GEM) stochastic weather generator model is provided by the climate team at the NWCC. A Weather Simulation Team, led by the WCS, includes several researchers in the USDA-Agricultural Research Service. More information on GEM is found at:

<http://www.wcc.nrcs.usda.gov/climate/gem.html>

SNOTEL and SCAN Data Collection Networks

The NWCC is the home of both the SNOTEL and SCAN climate networks. SNOTEL (Snow Telemetry network) is the premier high-elevation climate monitoring network in the western U.S. (including Alaska), with over 700 stations at key snow water locations now in operation; while SCAN (Soil Climate Analysis Network) is a network of more than 70 soil moisture and temperature (with above ground climate instrumentation, as well) stations across the U.S.

<http://www.wcc.nrcs.usda.gov/>

Support for USDA Climate-Related Activities

This includes providing climate data and analyses for a number of critical USDA activities, including water erosion (specialized climate database and products for both RUSLE2 and WEPP models); wind erosion (climate support for the WEPS model); climate narrative and tabular information specific for NRCS Soil Surveys; and oversight and support for precipitation frequency analyses of all parts of the U.S., in conjunction with both the National Weather Service's Hydrometeorological Design Studies Center, and the Illinois State Water Survey (ISWS). At present, the NWCC is collaborating with the ISWS in producing the first-ever precipitation frequency estimates for all U.S. possessions in the Pacific Basin.

Involvement in Other Climate-related Activities

The NWCC climate services team is integrally involved in a number of other projects and addressing several major climate-related issues. These include participation in: The Western Governors' Association Drought Core Team, the Climate Change Science Plan's Observations Working Group, NCDC's Climate Reference Network Science Ad-hoc Review Team, the Applied Climate Information System (ACIS) oversight committee, the American Association of State Climatologists (AASC), and leadership of the American Meteorological Society's Applied Climate Committee.

Workshop Report

AASC/NWS/NCDC/RCC Climate Services Partnership Workshop

National Weather Service Headquarters, Silver Spring, Maryland

April 15-16, 2003

Meeting Objective

A spring meeting was organized by the American Association of State Climatologists, in cooperation with the National Weather Service's Climate Services Division (NWS-CSD), and with additional participants from the NOAA Office of Climate, the National Climatic Data Center and Regional Climate Centers. The objective was to develop a working plan for coordinated climate services amongst the participatory parties/partners, and to work toward a formal agreement between AASC and NWS.

Meeting Summary

Following introductory remarks from Dave Robinson, which included special thanks to Fiona and Bob for securing the meeting facility, self-introductions took place from all in attendance (table 1). We then moved seamlessly through an agenda (cf. attached) that included discussions focusing on the development of symbiotic relationships amongst all participants. Following is a brief summary of our discussions, and a listing of important action items.

As Tim Owen, whose meticulous meeting notes form the framework of this report (thanks Tim!) states so well; "By all accounts, the meeting successfully established a dialogue about and basic understanding of the participants' areas of expertise and responsibility. From that understanding, we established a series of action items aimed at leveraging our strengths in a cohesive, comprehensive and effective manner."

Table 1: List of Attendees:

State Climatologists (AASC):

Jim Angel (State Climatologist, Illinois)
Ken Crawford (State Climatologist, Oklahoma; on assignment at NWS Headquarters)
Jay Grymes (State Climatologist, Louisiana)
David Robinson (State Climatologist, New Jersey)

National Weather Service (NWS):

Fiona Horsfall (Climate Services Division)
Jack Kelly (NWS Director) *offered brief remarks early afternoon of the 15th*
Judy Koepsell (Regional Climate Programs, NWS Climate Services Division)
Bob Livezey (Director, NWS Climate Services Division)
Victor Murphy (NWS Climate Services Program Manager, Southern Region)

National Climatic Data Center (NCDC):

Sharon LeDuc (NCDC Deputy Director)
Tim Owen (NCDC Regional/State Climate Program Manager)

Regional Climate Centers (RCC):

Art DeGaetano (Director, Northeast Regional Climate Center)
Dick Reinhardt (Director, Western Regional Climate Center)

NOAA:

Dave Goodrich (NOAA Office of Climate) *participated on the 15th*

Defining Climate Services:

Climate Services was defined to include data analyses, forecasting, education, and technology. The NWS climate forecasting includes 6-10 day (week 2) and beyond.

Bob Livezey announced the establishment of six Climate Service Program Managers at each NWS Regional Headquarters (table 2), and the effort to include a focal point for climate at each NWS Weather Forecast Office. Bob hopes that these focal point positions will have half-time FTE dedication within three years. The need for partnership is demonstrable. This infrastructure will help in climate data servicing, climate forecast interpretation, and climate-sensitive observational practices. The leveraging of NOAA/non-NOAA resource (i.e., mesonets) is valued by DOTs, State EPAs, utilities, basin commissions and the like. NWS-CSD would like to formally link with the AASC via memoranda of agreement, and have full voting membership in AASC.

Table 2. Regional Climate Service Program Managers (RCSPMs):

NWS Region	Name	Phone	E-mail	Fax (last 4)
Alaska Region	Gary Hufford	(907) 271-3886	Gary.Hufford@noaa.gov	3711
Central Region	Preston Leftwich	(816) 891-7734 x301	Preston.Leftwich@noaa.gov	7810
Eastern Region	Harvey Thurm	(631) 244-0124	Harvey.Thurm@noaa.gov	0167
Pacific Region	Jim Weyman	(808) 973-5272	James.Weyman@noaa.gov	5271
Southern Region	Victor Murphy	(817) 978-7777 x130	Victor.Murphy@noaa.gov	2020
Western Region	Andrea Bair	(801) 524-5137 x285	Andrea.Bair@noaa.gov	6767

From the RCC/SC standpoint, much of the climate servicing can be characterized as being archival, research, or outreach. Value-added customer servicing of climate data is often needed, as the provision of the appropriate climate data often requires associated climate information. Formalized customer servicing referrals amongst all partners should help reduce duplication of climate services.

Training is an essential part of making climate services work within NWS and beyond. NWS professional development is measured in professional competency units (PCUs) as stated on the NWS web page. Competencies will be developed for climate focal points, especially for week 2 (to replace 6-10 day) forecasts. Training also extends to assuring that observation practices are sensitive to climate community needs. Guidance will also be provided to focal points to serve as an interface for referencing climate inquiries to SCs/RCCs/NCDC. NWS will support CPC products training through an AASC meeting short course (summer 2004).

Ultimately, WFOs will be in a position to fully articulate CPC forecasts. NWS-CSD takes seriously its obligation to assure climate-sensitive observation practices by NWS WFOs, and improved timely sharing and transmission of data records to NCDC. Bob noted that WFOs should follow established agreements between NWS and NCDC to release only preliminary data for up to three months for their stations (and the same for official NCDC statistics like normals).

Sharon LeDuc mentioned that the NCDC relationship with RCCs and SCs. As both SCs and RCCs assist in providing value-added climate services to the public, NCDC can play an important role through the development of an easy-to-use web-based system that answers common inquiries (e.g., birthday weather). NCDC should play a lead role in assuring consistency and quality in data and metadata resources that are available through all partners.

Sharon also spoke of the value of the forthcoming Climate Reference Network (CRN), with 221 sites in the near term and an FY05 initiative to take the total to 296. These sites record the highest quality measurements of temperature and precipitation. NCDC looks to other line offices for partnership, including NWS/OAR/NOS. A big opportunity for partnership is the U.S. Drought Monitor. Given Ken Crawford's concerns regarding COOP modernization (\$150M price tag), FY04 drought legislation may help.

The group recognized that the climate community should develop standards and expect accountability from partners. The American Association of State Climatologists Recognized State Climate Office (ARSCO) certification process is an important means to this end.

Data Issues

All parties recognize the need for near real-time climate servicing that meets basic quality control/quality assurance standards. NCDC's Health of the Network project and adherence to the Data Quality Act were discussed. There was a broad understanding that NCDC is the official archive for a finite amount of data, and that NCDC should play a key role in assuring consistency and quality in data and metadata resources that are available through all partners. Non-NOAA data might be appropriate in some cases for QC/QA and monitoring. Ken Crawford offered his experience with the Oklahoma Climatological Survey's Mesonet as an example of integrated, automated quality control/quality assurance. This experience may inform the CRN QC development effort.

The group views QC/QA efforts as a three-tiered priority of surface data sets:

- 1) CRN
- 2) ASOS, COOP, Qualified Mesonets
- 3) AWOS, RAWS, Other

Between all participants, there is a desire to:

- Develop a regional model for real-time monitoring
- Identify data sources
- Identify best groups to QC/QA
- Ensure quality metadata
- Explore funding options/resource issues [quality-based support incentives]

Coordination of customer service/ Information dissemination

In discussing data dissemination, the need to establish guidelines for referral from WFO climate focal points to SCs/RCCs/NCDC was highlighted. WFOs are not supposed to do any value-added work for the public. Instead, they are encouraged to develop relationships with the SCs and RCCs, and to further referrals to NCDC as defined by guidelines to be developed by the group. The importance of considering backup in all customer servicing was articulated. The establishment of state-based listservs for NWS WFO climate focal points was suggested.

NCDC's domain in data dissemination was discussed in the context of traditional activities (e.g., certification, consultancy for NCDC data sets and products), and in the context of the broadened NCDC/RCC customer service partnering (COAST or NeS system). The group highlighted the need for an NCDC 'light' web page – one where casual users can access basic information (e.g., birthday weather, special day probabilities, frost/growing data, temp, precip extremes, etc.). This would allow partners to focus more on value-added activities.

Team activities

The group discussed team activities in the context of existing efforts, such as the U.S. Drought Monitor, NASS Agricultural Products, and the joint-agricultural forecasting relationship with RCCs.

Bringing the NWS into the AASC

The NWS-CSD would like to establish a formal relationship with AASC as a voting member. All appropriate RCC Directors and SCs will, in the future, be invited to NWS regional meetings.

ACTION ITEMS:

- **Catalog Current Collaborative Activities between NWS, RCCs and SCs**
(leads: Art DeGaetano, Judy Koepsell, Dave Robinson.)
Action: Consolidate list before AASC meeting.
- **Provide ARSCO Access to NWS Training Web Site**
(lead: Bob Livezey)
Action: Update CSD site with NWS training links.
- **Development of Service Web Sites**
(leads: Judy Koepsell, Tim Owen, Dick Reinhardt, Dave Robinson)
Action: 1) Develop a non-public reference web site for all partners, with information such as expertise and to whom customers with climate data requests should be referred. Effort to be geared toward WFO Climate Focal Points to foster relationships with state climatologists and regional climate centers; 2) Assist NWS in the enhancing climate components of WFO public web sites; 3) Discuss appropriate links to ARSCO sites and on ARSCO sites; 4) Tim Owen will lead an exploration of incorporating an ‘NCDC light’ feature for data dissemination through the NCDC web page.
- **Contacts between NWS WFOs/RFCs and SCs/RCCs**
(lead: Victor Murphy)
Action: NWS Regional Climate Service Program Managers will lead in fostering communications between parties.
- **Guidelines for Climate Services Referrals**
(leads: Bob Livezey (or his designee, Ron Berger), Tim Owen, Dick Reinhardt, Dave Robinson)
Action: Determine collaborative standards amongst all partners for data/information dissemination, including policies for charging data and guidelines for climate data request referrals. A draft of the standards will be reviewed by all partner organizations.
- **Common Infrastructure for Real-Time Quality Control/Assurance Team**
(Ken Crawford- Focal Point; team will perhaps include Jeff Arnfield, Ned Guttman, Ken Hubbard, Steve DelGreco, Tom Peterson)
The NWS/RCC/SC collaborations are reliant on improved quality control that 1) is near real-time, 2) is consistent with QC/QA practices within NOAA and the RCCs, 3) includes sufficient metadata resources, and 4) is automated with ‘trouble ticketing’.
Action: Draft a plan for a QC/QA data/metadata common infrastructure with the assistance of RCC/NWS/NCDC staff. Possible draft for presentation at AASC meeting in Portland
- **AASC Organizational History**
(lead: Tim Owen)

There are uncertainties about the organizational status of AASC, which is important to clarify as relationships are formalized between AASC and NWS.

Action: Research available NCDC records on AASC for organizational documents (*e.g.*, charters, etc.) and report to AASC executive committee.

- **Joint Project Agreement between NWS and AASC**
(leads: Fiona Horsfall, Dave Robinson)

Action: Develop agreement and present at AASC meeting

AGENDA

Tuesday, April 15

8:30 Coffee
9:00 Meeting welcome

Dave Robinson/Bob Livezey

9:10 What brought us all to the table, and what do we hope to accomplish?

Dave Robinson

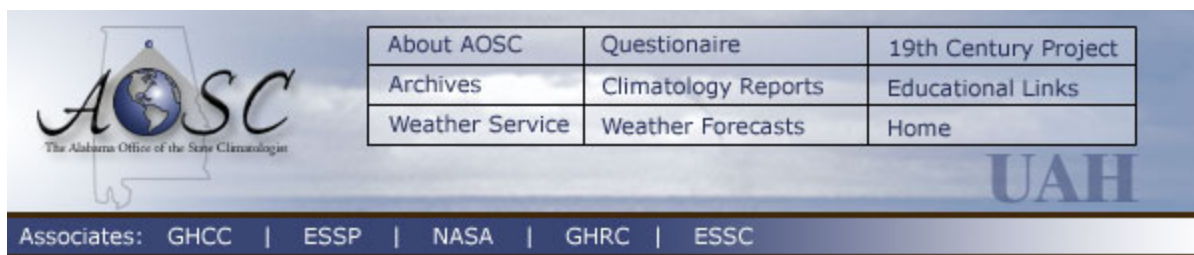
9:40 Discussion topics: Developing a symbiotic relationship

1. What do we mean by “climate” and “climate services?”
2. Data issue: data stewardship, metadata, mesonet integration
 - a. roles and responsibilities
 - b. limitations
 - c. sharing of information
3. Coordination of customer service
 - a. roles and responsibilities
4. Information dissemination
 - a. what types of information
 - b. roles and responsibilities
 - c. valued-added products and services
5. Helping individual customers access and understand, and add value to, NWS forecasts, national and downscaled
 - a. understanding NWS forecasts
 - b. adding value to NWS forecasts
6. Team activities, e.g., the drought monitor
7. Bringing the NWS into the AASC

10:20-10:40 Break
10:40-12:00 Discussion continued
12:00 Lunch
1:30-2:00 A few words from John J. Kelly, Jr., Director, National Weather Service
2:00-3:00 Discussion continued
3:00-3:30 Break
3:30-5:00 Discussion continued

Wednesday April 16

8:30-10:00 Review of yesterday’s discussions; continue process
10:00-10:30 Break
10:30-12:00 Finalize meeting notes
12:00 Meeting adjourned



Alabama Office of the State Climatologist
John Christy, Alabama State Climatologist
 Bob Clymer, Assistant State Climatologist
 University of Alabama in Huntsville

National Science Space & Technology Center
 Room 4082
 320 Sparkman Drive
 Huntsville, AL 35805
 Tel: 256.961.7752

It is the role of the Office of State Climatology to provide weather and climate information to public and private interests to improve decision-making activities that affect environmental quality and the economic efficiency of the State. Activities include providing specific weather data for the state and for the world, developing plans to mitigate the economic impacts of weather and climate variability and providing consultation on the use, interpretation and availability of weather and climate information. The Alabama Office of the State Climatologist also directly engages in important societal debates such as global warming through workshops, congressional testimony and educational activities.

National Weather Service Cooperation

The AOSC has worked with the new NWS WFO in Huntsville to generate longer “Periods Of Record” for stations within the CWA. The POR for the station at Huntsville, for example, currently begins in 1958. However, compatible stations were merged to extend the record back to 1893 for precipitation and 1907 for temperature. Original, hand written records were tediously examined to determine continuity and consistency. Thus today, the NWS climate reports for local stations are based on PORs of much longer extent than those found in the online climate databases and therefore provide a better perspective to judge current conditions.

Drought Indices

The AOSC has developed a Lawn and Garden Index, updated daily, based essentially on a tapered precipitation total for the past three weeks using the 4 km resolution gage-calibrated radar product. The high resolution has been quite useful in spotting small and large areas of distress.

http://vortex.nsstc.uah.edu/aosc/lawn_garden1.htm

Additionally, we have reformatted the Crop Moisture Index and Palmer Drought Severity Index for easy use by viewers, especially the Office of Water Resources which is charged with drought monitoring.

<http://vortex.nsstc.uah.edu/aosc/crop.htm>

<http://vortex.nsstc.uah.edu/aosc/palmer.htm>

Alaska Climate Research Center

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Staff: Dr. Martha Shulski, Climatologist; Dr. Gerd Wendler, Professor Emeritus; Brian Hartmann, Assistant Climatologist

The Alaska Climate Research Center is a service and research organization at the University of Alaska Fairbanks. Its primary mission is to respond to inquiries regarding the meteorology and climatology of Alaska at the request of public, private, and government organizations as well as researchers across the globe. Recently, the number of requests from the media has increased with greater coverage on recent temperature trends in Alaska. We are ideally located, with access to resources from the Geophysical Institute, the International Arctic Research Center, and the National Weather Service.

The Center maintains and operates a web site, which receives an average hit rate greater than 19,000 per day. The site features climate summary statistics, information regarding the observing network in Alaska, regional climate summaries updated monthly, links to weather and climate resources, information regarding past and present research, and a section for the many tourists that visit our state. Also online, users can see a display of current weather conditions from a station maintained and operated by the center.

An ongoing project for the center is an update to the Climate Atlas for Alaska that is in part online. The Atlas provides a valuable resource and a much-needed update to the latest Atlas published in 1968. The center also maintains an active climate summary page featured on the website that gives summary statistics for the different climate regions of Alaska. Summary graphics and narratives are also printed in newspapers around the state. In cooperation with the National Weather Service Fairbanks Forecast Office, the center writes a statewide summary that appears in Weatherwise magazine. In addition to regular summaries, the center also develops features on specialized topics relating to recent significant weather events around the state as needed.

Along with service responsibilities, the center also conducts research on a number of high latitude meteorological and climatological topics. Ongoing projects include climate trends and variability in Alaska since 1950, the effect of the Pacific Decadal Oscillation on Alaska's climatology, and contrail formation in the Subarctic. The center maintains and operates a suite of radiation instrumentation and observations include incoming shortwave, longwave, and ultraviolet radiation, which is one of the few locations in Alaska, as well as high latitudes, taking these types of observations. The center has also conducted research on such topics as the urban heat island effect in Fairbanks, snow melt in Alaska, and changes in sea ice concentration in the Beaufort Sea as related to the climate of the North Slope.

Colorado Climate Center
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The Colorado Climate Center (CCC) was established by the state in 1974, through the Colorado State University Agricultural Experiment Station, to provide information and expertise on Colorado's complex climate. Through its threefold program of Climate Monitoring (data acquisition, analysis, and archiving), Climate Research and Climate Services, the Center is responding to many climate related questions and problems affecting the state today.

The Colorado Climate Center monitors climatic conditions on both broad, regional scales and very local scales. By documenting climate variations in time and space, the relationships between climate, water supplies, other natural resources, agriculture and societal responses can be better understood and applied. Specific objectives of the Colorado Climate Center include: 1) Maintain the historic Fort Collins weather station. 2) Expand the Colorado Agricultural Meteorological Network (CoAgMet) to include dryland farming and grazing areas of Colorado. 3) Develop specialized applications of CoAgMet weather data in cooperation with agricultural researchers and practitioners in Colorado such as soil moisture monitoring and modeling. 4) Integrate the citizens of Colorado into climate monitoring activities through local volunteer Web-based rain and hail observing networks. 5) Preserve long-term statewide (100-year plus) climate monitoring activities in Colorado. 6) Coordinate climate monitoring and applications research with other scientists, other agencies and other disciplines. 7) Disseminate climate information, expertise and applications to users.

Recent publications are available from the CCC's web site at (<http://ccc.atmos.colostate.edu>) or Dr. Pielke's research site (<http://blue.atmos.colostate.edu/>)

Pielke Sr., R.A., T. Stohlgren, L. Schell, W. Parton, N. Doesken, K. Redmond, J. Moeny, T. McKee, and T.G.F. Kittel, 2002: Problems in evaluating regional and local trends in temperature: An example from eastern Colorado, USA. *Int. J. Climatol.*, 22, 421-434.

Pielke, R.A. Sr., N. Doesken, O. Bliss, T. Green, C. Chaffin, J.D. Salas, C. Woodhouse, J.L. Lukas, and K. Wolter, 2004: Drought 2002 in Colorado - An unprecedented drought or a routine drought? *Pure Appl. Geophys.*, Special Issue in honor of Prof. Singh, submitted.

Davey, C.A., and R.A. Pielke Sr., 2004: Microclimate exposures of surface-based weather stations - implications for the assessment of long-term temperature trends. *Bull. Amer. Meteor. Soc.*, submitted.

ARSCO Qualifications: CCC is designated by the AASC as the official state climate office for Colorado. The following describes ways in which CCC addresses each of the ARSCO qualifications:

Communication Capabilities:

Unusually severe drought continued over the entire state of Colorado in 2002 and part of 2003. Therefore, the state climatologist's office traveled to many parts of the state providing information on the drought and precipitation to local and state governments, public, agribusinesses, and other businesses. Many interviews were routinely given and featured in newspapers, radio and television. The Governor's water task force group was given monthly updates on the availability of water conditions. The monthly climate maps and drought presentations are at the following urls:

<http://ccc.atmos.colostate.edu/coloradoprecipitation.php>

<http://ccc.atmos.colostate.edu/droughtpresentations.php>

The National Drought Mitigation Center and NOAA have also used this information in their monthly updates.

The *Colorado Climate* magazine is another venue to communicate information across the state and nation and is published four times a year. Subscribe to the magazine at <http://ccc.atmos.colostate.edu/magazine.php>.

Information Services

The Colorado Climate Center website <http://ccc.atmos.colostate.edu> provides climate data and information to the public. Climatic elements such as temperature and precipitation data on a daily and monthly basis from NWS cooperative weather stations across Colorado are available for users to download. The Colorado Agricultural and Meteorology Network (CoAgMet) automated weather stations are used for agriculture purposes such as irrigation scheduling. An extensive list of web resources is available for users. Data requests from the general public continue to be answered by the staff of the Climate Center. Our schedule of fees for special data requests, internet data access and the Colorado Climate magazine are at the following url: <http://ccc.atmos.colostate.edu/datarequests.cfm>

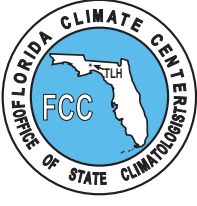

Research:

A rooftop temperature study, which compares school building rooftop data with NWS cooperative data, was completed and a refereed publication is in progress. A Standardized Temperature Index (STI) has been proposed to see if it can be used to complement the Standardized Precipitation Index (SPI) in a drought situation. Research with Dr. Klaus Wolter, CDC, was completed and listed on the web site at

<http://ccc.atmos.colostate.edu/coloradoaccumulated.php> .

Outreach:

The Drought Analysis and Management Laboratory was created as a cooperative program using the expertise of 100 researchers and 22 academic departments to monitor and research drought in Colorado and ultimately assist water managers manage water more wisely. Presentation on the history of climate on the High Plains was completed for the Limon Heritage Museum, Limon, Colorado. In addition to the public presentations on drought, the Community Collaborative Rain and Hail Study (CoCoRaHS) has continued to expand this past year. This project uses volunteer observers to collect rain, hail and snow data to verify ground truth to radar products and NWS forecasts.

	<p>The Florida Climate Center</p> <p>2035 E. Paul Dirac Dr. 232 R.M. Johnson Building The Florida State University Tallahassee, FL 32306-2840 (850) 644-3417 www.coaps.fsu.edu/climate_center</p> <p>James J. O'Brien, State Climatologist David F. Zierden, Assistant State Climatologist</p>	
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About the Office

The Florida Climate Center is housed at the Center for Ocean-Atmospheric Prediction Studies (COAPS) in the Fuqua Research Complex at Innovation Park. Though physically located off-campus, COAPS and the Florida Climate Center are part of the Department of Meteorology at Florida State University. The office space, facilities, and equipment are provided by COAPS, but the Climate Center receives ongoing state financial support that covers the salaries of 1.5 full-time employees. The Florida Climate Center staff currently consists of James J. O'Brien, the State Climatologist, David F. Zierden, Assistant State Climatologist, Melissa Griffin, research assistant, Amanda Barth, undergraduate assistant. Also contributing is Dr. Mort Winsberg, author of *Florida's Weather* and professor emeritus of geography at FSU. Additional financial support comes from involvement with various research projects and revenue generated from the climate services that we provide.

The Florida Climate is an AASC Recognized State Climate Office (ARSCO) and works in partnership with the National Climatic Data Center, Southeast Regional Climate Center, and National Weather Service to provide data and climate services to the citizens of the State of Florida. The State Climatologist is a noted expert in ocean modeling, El Niño and climate variability, and he uses this office to conduct further research and to educate the citizens and institutions of the state in the new science of climate prediction. To this end, we perform research developing downscaled climate forecasts and products tailored to specific user groups.

Information Services

One of the primary missions of the office is to provide routine climate data and services. In addition to the inquiries that come straight to the office, they are also referred to us from NCDC, the regional climate centers, and the National Weather Service Forecast Offices. The Florida Climate Center receives dozens of phone calls, emails and faxes each day requesting everything from answers to simple climate and weather questions to detailed data requests.

A wealth of climate information is distributed through the climate center's website. Information on normals, detailed monthly and daily data sets, and links to other climate resources are all available free of charge through our website (www.coaps.fsu.edu/climate_center). This year we have added a detailed wind climatology for the first-order stations, complete with wind roses for each month of the year. We are in the process of finalizing equally detailed heat index climatology. These new products were developed as a result of frequent requests.

More specific data requests are filled by the staff, drawing from data sets located in house, at the regional climate centers, and at NCDC. The Florida Climate Center does charge a fee for our services, with set prices for various types of data or at a set hourly rate for more unique requests. Fees are commonly waived for requests by private citizens, students, and other research facilities. The Florida Climate Center has embraced the opportunity to provide services to the legal community. Common services include certifying data, rendering expert opinions, and giving expert testimony in depositions and the court of law.

Research

The Florida Climate Center is a leading authority on climate variability in Florida, particularly as related to ENSO. The climate Center is involved with the Southeast Climate Consortium (formerly the Florida Consortium), one of the Regional Integrated Science and Assessment (RISA) teams funded by NOAA's Office of Global Programs. Through this involvement, we conduct research into downscaled and localized climate forecasts and their application to the sectors of agriculture, forestry, and water resources. Recent expansion of the consortium now includes the State Climate Offices of Georgia and Alabama, as well as agriculturist, hydrologists, and social scientists from the University of Florida, University of Miami, University of Georgia, University of Alabama Huntsville, Auburn University, and University of South Carolina. We also anticipate participation from the Southeast Regional Climate Center. We have produced detailed climate information that is prominently displayed on the Florida Automated Weather Network (FAWN) website, a color booklet entitled *El Niño, La Niña and Florida's Climate: Effects on Agriculture and Forestry*, a freeze forecast for the 2001-2002 winter season, and other climate products in extension publications. These materials are widely distributed through extension services.

The Florida Climate Center also developed a method of forecasting wildfire threat based on the Keetch-Byram Drought Index (KB DI). The experimental expressed wildfire threat in probabilistic terms and was used by the Florida Division of Forestry for planning management strategies and allocation of resources. We will continue research on climate and wildfires and include the coastal regions of Georgia and Alabama in the coming year.

Communication and Outreach

The Florida Climate Center provides outreach and education in several different ways. One is through our website, where users can learn about the different aspects of Florida's climate through a variety of climate maps, data tables, raw data sets, and links to other resources. We have cooperated with Mort Winsberg in the second edition of his book entitled *Florida Weather*, the definitive reference for climate and weather issues in Florida. The State Climatologist and staff are also active with community service groups, routinely giving presentation on various climate topics to such groups such as the Rotary Club, Alumni Association, The North Florida Gulf Fishing Club, Lion's Club, etc. The State Climatologist will also brief state agencies such as the Agriculture Commissioner's office, Public Service Association, Public Health Center on current climate issues. The State Climatologist also serves on Florida Commission on Hurricane Loss Projection Methodology, which advises the insurance commissioner and industry on coping with the hurricane threat.

Finally, the State Climatologist and staff are always available to the media for facts and opinions on current climate issues. Dr. O'Brien has written an opinion on global warming that was widely printed on the op-ed pages of newspapers across the state. We have a working relationship with such newspapers as the *USA today*, *Tampa Tribune*, *St. Petersburg Times*, *Tallahassee Democrat*, *Gainesville Sun*, *News-Press* to name a few, and television outlets such as the *Florida News Channel*. The State Climatologist and staff comment on such issues as global climate change, drought, El Niño, hurricanes, and damaging freezes.

Georgia State Climatology Office



Driftmier Engineering Center
University of Georgia
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Contact us at: 706-542-6067 or fax to 706-542-8806 or email climate@engr.uga.edu
Our website: <http://climate.engr.uga.edu>

The Georgia State Climatology Office is the officially recognized ARSCO office for Georgia.

Our Mission:

The purpose of the State Climatology Office is to provide climate information to all interested users of historic or long-term weather data, to monitor current climate conditions around the state, and to conduct research into topics related to Georgia's weather and climate. We provide outreach and service to private citizens, the media, educators, scientists, businesses, and government agencies throughout the state. We do not charge for our services unless there is a significant amount of analysis involved, but we may also refer some requests to other data vendors who do require payment for their work.

Our Staff:

Dr. David Stooksbury, 706-583-0156, stooks@engr.uga.edu

David Emory Stooksbury, the State Climatologist, is an assistant professor in Engineering and is the graduate coordinator of the Atmospheric Sciences Program on the UGA campus. He is also the Secretary-Treasurer for the American Association of State Climatologists (AASC).

Ms. Pam Knox, 706-542-6067, pknox@engr.uga.edu

Pam Knox, the Assistant State Climatologist, is the Program Coordinator for the Georgia SC Office and is a former State Climatologist for Wisconsin and past president of AASC.

Current activities:

The Georgia State Climatology Office currently engages in the following activities:

1. Coordination and collection of weather observations for the purpose of climate monitoring, and dissemination of this information to the user community.

While we do not maintain our own network of weather stations, we are actively involved in using both the NWS Coop network data and the automated environmental monitoring networks (45+ stations) that are run by the UGA engineering program. We help identify potential problems with the data and provide these data to the public, government agencies, and academic researchers in a variety of formats.

2. Demonstration of the value of climate information in the decision-making process.

Dr. Stooksbury is the chair of the state drought monitoring and prediction committee. He is also an advisor to the joint House/Senate Water Planning Committee. In addition, we are helping to identify potential mitigation strategies that could reduce the economic and ecological impacts of future droughts on the state. This includes the timely use of climate information to help identify impending drought conditions and trigger mitigation actions.

3. Assessment of climate impacts and evaluation of weather events.

We monitor ongoing weather and climate conditions around the state. When events warrant, we issue appropriate press releases and inform the public about the consequences of the current climate situation. We try to keep our web site updated with the most recent climate data and provide lists of topics of interest to our users.

4. Research on various climate topics.

The office is part of the Southeast Regional Climate Consortium and is undertaking joint projects on climate variability and its applications to crop and forest management with surrounding states under funding from the U.S. Department of Agriculture. In addition, we are also involved with SEACOOS in developing awareness of coastal meteorology issues among stakeholders along the Georgia coast and will be holding a summer workshop in 2004 to accomplish this.

**Pao-Shin Chu, State Climatologist**

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Staff: Pao-Shin Chu, State Climatologist; Amy Lucas, Graduate Assistant; Peng (Quentin) Wu, Graduate Assistant

Throughout time in the Hawaiian Islands, the State of Hawaii has collected climatic data records used not only to study weather and rainfall patterns, but also to serve the community. Our records date back to the late 1800s with data for over 1500 rain gauges in conjunction with temperature and wind devices throughout Hawaii. We also have records for past hurricane activity. Today various companies, students, government agencies, and individuals request the use of our current and historic records. Our main focus consists of climatological and statistical analysis including extreme rainfall events, severe storms, hurricanes, strong winds, and past hurricane activity and return periods.

The Hawaii State Climate Office is located in the lush Manoa Valley in eastern Honolulu and is affiliated with the University of Hawaii at Manoa, School of Ocean & Earth Science & Technology (SOEST). In 2000, the climate office changed hands from the Hawaii Department of Land and Natural Resources to the University under the direction of Dr. Pao-Shin Chu. In 2002, for the first time in Hawaiian history, the Hawaii State Climate Office officially became a part of the American Association of State Climatologist (AASC), which has led to the growth and awareness of its existence across all of the Hawaiian Islands and the country.

Over the past few years, we have developed a web site, which can be viewed at <http://lumahai.soest.hawaii.edu/Hsco/index.html>, and our own email account, hclimate@hawaii.edu. The use of these tools has increased the number of requests we receive immensely. From 2002 – August 15, 2003, we had 319 requests which can be broken down into the following categories: 31 % individual/personal, 24% business, 21% educational and research purposes, 14% government agencies, and 10% unknown. From these numbers, we concluded that there is a demand for our services and needed to expand it more. By the end of November 2003, we had a custom made flier which was sent to over 300 companies and individuals including lawyers, insurance agencies, real-estate companies, construction consultants, environmental engineers, and to all of our volunteer observers who helped to acquire the data we need so we can serve the community. These fliers were sent out in the middle of December 2003 and we have already seen a noticeable increase in requests.

Our most recent project, which is funded by the NCDC, consisted of digitizing all of our state rain gauge data, which can be traced back to the late 1800s. Our greatest concentration was focused

on the metadata and making sure this was as up-to-date with our monthly and annual data in our computer system.

Currently, we have received a mini-grant from the NCDC to go ahead and use our 1500 plus rain gauges in order to better determine the climate divisions for all six islands. Our proposal was entitled the *Re-Establishment of the Hawaiian Islands' Climatic Divisions in Support of NOAA's Efforts*. We will be performing statistical analysis of these stations to determine where the divisions occur. The NWS/Office of Hydrology Division has tentatively assigned 16 divisions, but they have yet to be verified.

Our future looks as bright as our beautiful sunny skies. After the completion of our current project, we hope to update the *Climatologic Stations in Hawaii* publication, which was published in 1973. We hope to soon be able to produce a historical summary of Hawaiian rainfall as well. We are continuing to make ourselves well known amongst the community and form a strong relationship with our volunteers, other state climate offices, regional climate centers, and the NCDC.



Idaho State Climate Services

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Clara Chaffin, Assistant Climatologist

Dr. Wenguang Zhao, Research Scientist

Climatic information is essential to every citizen of Idaho. To help people obtain the climatic and water data and information necessary to planning and every day work, the State Climatologist Program strives to acquire, archive, process and disseminate, in the most cost effect manner possible, all climate and weather information which is or could be of value to policy and decision makers in the state and to provide climatic services which are important to the people of Idaho.

The functions of the State Climatologist and State Climate Services are to:

- act as liaison between Idaho weather information users and the National Climatic Data Center
- maintain a data bank of climatological and hydrological data and information
- supply data in a form useful to users
- refer requests for complex analyses to the appropriate person, agency or consulting firm
- maintain contact with users of climatic and hydrological data in order to ascertain their needs for data and analyses
- maintain a bibliography of publication pertinent to Idaho and Pacific Northwest climate

In May, 1978, an agreement was concluded among the National Climatic Data Center, the National Weather Service and the University of Idaho to provide climate services which had been provided by a former National Weather Service program. ISCS became the AASC Recognized State Climate Office (ARSCO) for the State of Idaho in 2001.

Idaho State Climate Services is housed in the Department of Biological and Agricultural Engineering and is directed by the Idaho State Climatologist. It is supported by the Idaho Agricultural Experiment Station and the Idaho Cooperative Extension System in cooperation with the Idaho Water Resources Research Institute.

ARSCO Qualifications: ISCS is designated by the AASC as the official state climate office for Idaho. The following describes the ways in which ISCS addresses each of the ARSCO qualifications:

Communication Capabilities:

- ISCS maintains Internet, email, telephone, and fax communication links.

Information Services:

- Maintain an online archive of the complete period of record for all Idaho Cooperative Observer data sets in cooperation with the University of Idaho Library, which may be downloaded by user-selected station. <http://inside.uidaho.edu/asp/liststations.asp>
- Responded to more than 400 e-mail requests for climate data/information/services.
- Answered more than 200 telephone requests
- Interviewed by Idaho newspapers six times during 2003
- Maintain an automated weather station, a Cooperative Observer Station with over 110 years of data, and a recording precipitation gage, and partially fund a SNOTEL site.

Research:

- Analyzing historical temperature trends at climate stations across Idaho
- Developing algorithms and models to assimilate remotely sensed data for use in spatially distributed land surface-atmosphere exchange models
- Developing a meteorological downscaling model to apply global weather forecasts to small watersheds. Results will be used in snowmelt runoff modeling for reservoir operation

Outreach: Participation and collaboration of the following outreach activities:

- Climate Presentations to local elementary schools

Illinois State Climatologist Office

Illinois State Water Survey

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Email: jimangel@uiuc.edu Web: <http://www.sws.uiuc.edu/atmos/statecli/>

Dr. Jim Angel, State Climatologist

Maria Peters, Weather Observer and Assistant

The Illinois State Climatologist Office is located at the Illinois State Water Survey in Champaign Illinois on the campus of the University of Illinois. The Illinois State Water Survey supplies the salary for the state climatologist, as well as computer and communication support and office space. The office also operates the coop site for the Water Survey with a paid observer. The office is well established thanks to a long tradition of applied climate research and climate service to the citizens of Illinois.

ARSCO Qualifications: The AASC has designated the Illinois SCO as the state climate office for Illinois. The following describes the ways in which the office addresses each of the ARSCO qualifications:

Communication Capabilities – The Illinois State Climatologist Office has phone, fax, and email services with high-speed Internet service for the rapid transfer of data. The state climatologist maintains a web site devoted to climate data and information on a variety of climate topics.

Information Services – The Illinois State Climatologist Office receives numerous requests for climate data and information. In a typical year, the office handles about 1000 phone calls and email requests. The web site also receives 20-30k hits per month. The web site contains maps, plots, and tables of current climate conditions, historical data, and climate summaries. It also contains discussions of important climate topics in Illinois such as El Niño, droughts, winter storms, and heat waves. One benefit of a functional web site is that it can off-load many of the routine requests for climate information from the state climatologist. The office maintains a voicemail recording of the daily coop observations for the Water Survey site that gets about 20-30 calls per day. A monthly report of the coop observations is prepared by the observer and sent to about 200 subscribers.

Research – The Illinois State Climatologist Office has engaged in research on such topics as:

- climate trends in Illinois;
- quantifying storm characteristics across the U.S.;
- and defining the biases introduced in estimating maximum daily temperatures from 19th century records taken at 7 a.m., 2 p.m., and 9 p.m.

Outreach – The Illinois State Climatologist Office outreach activities include:

- making monthly contributions in the Illinois State Water Survey Water and Climate Summary;
- providing data and guidance to agencies and organizations in Illinois, including the Illinois Drought Task Force, the Illinois River Decision Support System, the Northeast Illinois Planning Commission, and the Illinois Emergency Management Agency;
- providing between 100 and 200 interviews with the media, also produces press releases on a regular basis on climate topics;
- serving as adjunct professor in the geography departments at both the University of Illinois and Northern Illinois University;
- working with local NWS offices and the Midwestern Regional Climate Center on issues related to cooperative observers including the quality and quantity of real-time data, as well as climate services and research topics of mutual interest;
- producing a comprehensive Illinois climate atlas with co-authors Stan Changnon and Ken Kunkel that will be released soon, aimed at the general audience,.

Monitoring and Impact Assessment:

- developed a series of web-based products for monitoring conditions in Illinois, a very popular site available to the public;
- provides input into the U.S. Drought Monitor;
- conducts ongoing research on significant climate events in Illinois as they occur, in the past this has included the 1988 drought, the 1993 flood, and the 1996 record rainfall in Aurora, Illinois.

Iowa State Climatologist Office

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Web: www.agriculture.state.ia.us/climatology.htm
Harry J. Hillaker, State Climatologist



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The State Climatologist Office (Iowa SC) is a bureau of the Iowa Dept. of Agriculture & Land Stewardship. The State Climatologist is appointed by the Iowa Secretary of Agriculture (an elected state official). The Iowa SC office was founded in Iowa City at the University of Iowa on October 1, 1875 and was initially known as the Iowa Weather Service. In 1890 the Iowa Weather Service operations were moved to Des Moines and came under the supervision of the Iowa Weather & Crop Service. At this same time its extensive statewide weather observation network was absorbed into the new U. S. Weather Bureau (now National Weather Service) cooperative observer network. The Iowa SC was co-located with the National Weather Service from 1890 until 2003 and has worked very closely with that agency since its inception. Finally, the Iowa SC was made a division of the newly created Iowa Department of Agriculture in 1923. The office operates under the authority of paragraphs 4, 5 and 6 of Chapter 159.5 of the Code of Iowa. Regular funding comes from a State appropriation of about \$100,000 annually.

Information Services:

The Iowa State Climate office maintains archives of daily NWS Coop and first order station data back to the beginning of records. This would include the regular NCDC reports such as *Iowa Climatological Data*, *Local Climatological Data*, *Hourly Precipitation Data* and *Storm Data*, as well as the original observations. Access to a multitude of federal, state and private weather and climate data archives are also maintained. The office is normally open from 8:00 a.m. to 4:30 p.m. weekdays to answer weather and climate related inquiries. With nearly 130 years of continuous operation the Iowa SC Office has an unusually large archive of original federal and state books, reports and manuscripts from the 19th and early 20th Century.

Research:

The Iowa SC office primarily is involved with the acquisition, processing, dissemination and archiving of weather and climate data. However, research activities are performed as funding permits and have been conducted in cooperation with agencies such as the National Climatic Data Center (NWS Coop network metadata), the Midwestern Regional Climate Center (pre-1948 data keying project), the National Science Foundation (crop-hail climatology), U. S. Army Corps of Engineers (evaporation, snow, short-duration precipitation studies) and the Iowa Dept. of Natural Resources (development of more timely temperature data resources).

In the past fiscal year an NCDC funded project, "A Detailed Station History for Selected Historical Climate Network Stations in Iowa, 1893-2002" was completed. This project involved collection of all available documentation of the Coop station history for 15 Iowa HCN locations. Field visits were made to each city and a total of 118 current and previous Coop observation sites were visited with detailed location and exposure data collected at each site. A 51 page report "Climate of Iowa Report

2002-1” details the results of this project. Numerous small, informal, non-published research activities are also conducted in response to customer requests.

Outreach:

The office maintains very open communication with the news media with a total of 463 news media contacts this past fiscal year. This, combined with preparation of Public Information Statements issued in cooperation with the National Weather Service, and weekly and monthly crop-weather summaries prepared for the USDA provides very wide dissemination of climate products and information. A total of 2,538 inquiries were answered during the past fiscal year. Most inquiries were received from the news media (18%), government agencies (17%), attorneys (10%), power companies (9%) and insurance (9%). Virtually every major branch of State government utilizes the Iowa SC Office data on a regular basis.

The office also prepares regular monthly climate reports, the *Preliminary Iowa Monthly Weather Summary* and the *Iowa Climate Review*. The Preliminary Monthly Weather Summary is issued within the first few work days of each month and provides a brief summary of Iowa’s weather conditions for the previous month. This report is available on-line and is also sent free of charge via regular mail. The Iowa Climate Review is a monthly report containing daily data for all official Iowa weather stations and is available by subscription. The Climate Review report is not currently made available on-line; however, the raw data are provided to Iowa State University’s Iowa Environmental Mesonet web site and made available at that site after publication of each month’s report.

The Iowa State Climate Office works closely with the National Weather Service in monitoring the Coop and ASOS data networks so as to improve the quantity, quality and timeliness of Iowa climate observations.

Monitoring and Impact Assessments:

The Iowa State Climate Office is a member of the Governor’s Drought Task Force and Flood Task Force. The office provides regular updates of monthly temperature and precipitation data to the USDA Farm Service Agency for their use in evaluating county-by-county eligibility for disaster relief programs. The office also assists the Iowa Emergency Management Division in their operations and occasionally provides guidance for county and regional emergency response offices. The office also provides near real-time rain event maps for the Iowa Dept. of Transportation for their use in evaluating where roadways may be in need of detailed examination of possible flood damage.

Improvements continued to be made to the web page to provide access to an increased quality and quantity of Iowa climate data. The most notable recent web page change was the addition of a climate monitoring site in conjunction with the Midwest Regional Climate Center in December 2002.

The Kentucky Climate Center

at WESTERN KENTUCKY UNIVERSITY 

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The Kentucky Climate Center was created in 1978 through the initiative of Mr. Glen Conner, State Climatologist Emeritus. Under his direction, the Center developed a reputation for providing personalized service to users of climate data across Kentucky. In 1998, it was one of five centers at Western Kentucky University that became charter members of the Applied Research and Technology Program (ARTP). The Kentucky Climate Center receives annual funding through the ARTP and strives

... to conduct research and disseminate information on environmental variability and change, influences of the natural environment upon human activity, and impacts of human activity upon the natural environment; to promote understanding and appreciation of the natural environment and its importance to society; and to work with the public and private sectors in an effort to promote sustainable development.

Consistent with its mission, the Kentucky Climate Center, under the direction of the State Climatologist, actively seeks to build partnerships and involve faculty and students. The Center has developed partnerships among the National Weather Service offices throughout Kentucky, the National Park Service at Mammoth Cave National Park, and Kentucky's Area Development District offices in conjunction with various applied research and service projects. In addition, the State Climatologist serves on the statewide Water Availability Advisory Group and the Mammoth Cave Area Biosphere Reserve Advisory Group. Several faculty at Western Kentucky University have chosen to affiliate with the Center and contribute substantially to its mission. The Kentucky Climate Center maintains an archive of historical climate data and related publications, computer facilities that support analysis using geographic information systems and advanced data analysis and visualization software, and a research lab where students gain hands-on experience working on applied research and service projects. Students have opportunities to develop and enhance skills in quantitative analysis and modeling, qualitative assessment of historical climate data and events, and field studies. In addition, both graduate and undergraduate students are encouraged to attend professional meetings and present their research.

The Kentucky Climate Center is recognized by the AASC as the official state climate office for Kentucky. A summary of activities at the Center includes:

Services

The Kentucky Climate Center provides services to meet the needs of Kentuckians in business and industry, education and research, government, and a range of other pursuits. A website offers weather and climate monitoring, along with historical climate data and events summarized in text and graphics. Links to various products from the National Weather Service, the Midwestern Regional Climate Center, the Climate Prediction Center, the Storm Prediction Center, and other sites are included. The Center accesses the online MICIS database through the Midwestern Regional Climate Center and has access to a variety of online publications and documents through the NCDC. Requests for data and advice on climate-related concerns are filled via telephone, fax, and e-mail. In addition, services in forensic meteorology and climatology are available.

Research

Faculty and students are involved in a range of applied research projects. Many of these projects have been funded through grants and contracts at the state and national level. Three major research initiatives are summarized below. The *GeoProfiles Initiative* involves a project with assistance from NWS offices in Kentucky to develop enhanced spatial metadata for climate stations using GIS technology. These metadata are then used in research to assess the effects of instrument exposures on climatic time series. The *Geohazards Initiative* includes an ongoing collaboration with the Barren River Area Development District to develop interactive, web-based graphics that provide detailed historical perspective on the occurrence of climate-related hazards. The *Hydroclimatic Studies Initiative* is a multifaceted effort to develop a better understanding of the variability of precipitation over a range of spatial and temporal scales, particularly in the context of drought and flash flooding in Kentucky. It includes ongoing studies with support through the NWS and Mammoth Cave National Park.

Outreach

The Kentucky Climate Center provides outreach in a variety of forms. Foremost, the Center regularly provides interviews through a variety of media outlets in Kentucky and adjacent areas. Most of these are newspaper outlets, including the Cincinnati Post, the Louisville Courier-Journal, the Lexington Herald-Leader, the Bowling Green Daily News, and other local newspapers around the state. Occasional interviews are provided through WBKO Television in Bowling Green. In addition to the state climatologist's position on advisory groups, an associate of the Kentucky Climate Center serves on Kentucky's Weather Preparedness Committee. The Kentucky Climate Center also periodically hosts elementary and middle school students from schools in south central Kentucky.



LOUISIANA OFFICE of STATE CLIMATOLOGY

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LOSC Staff:
Betty Wall, Administrative Assistant
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Michelle Russo, Graduate Assistant
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The LOSC is located on the campus of Louisiana State University (LSU) and is nested within the Department of Geography and Anthropology.

Mission

The mission of the Louisiana Office of State Climatology (LOSC) and the LA State Climatologist is to serve as the State focal point for activities pertaining to the climate of Louisiana. Responsibilities include:

1. to collect, archive, and make available climate data for the state,
2. to provide climate education and information to the citizens of the region through various outreach programs including the media
3. to maintain an active research program pertaining to the climate of Louisiana.

To achieve these goals, the LOSC cooperates with LSU, the National Weather Service (NWS), the Southern Regional Climate Center (SRCC), and the National Climatic Data Center (NCDC). LSU provides the infrastructure for the LOSC, and the National Weather Service Offices maintain the quality of weather observations in the region, with climate data exchanged between the LOSC, NWS, SRCC, and the NCDC.

ARSCO Qualifications

LOSC is designated by the AASC as the official state climate office for Louisiana. The following describes the ways in which LOSC addresses each of the ARSCO qualifications:

Communication Capabilities:

LOSC has full access to Internet, email, multiple phone lines, facsimile machines, and regular mail. We maintain a website which updates daily, weekly, and monthly summaries for the State.

Information Services:

A primary role of the LOSC is to collect and archive high quality climate data for Louisiana and then make these data available to the general public, often with some interpretation or forensic application. Users of these data include researchers, attorneys, construction companies, federal and state planning agencies, private consultants, power companies, insurance companies, teachers and students, among others.

The LOSC averages between 700-900 data requests annually which are sent out through fax, mail, and e-mail (these numbers are not inclusive of climate information provided over the phone).

We also maintain a list of approximately 50 subscribers that receive updated climate data monthly, which totals to ~600 additional data requests

Research

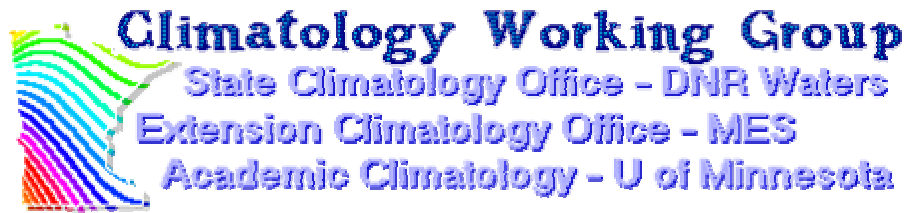
The LOSC maintains an active research agenda involving the State and region, and sometimes beyond. Over the past year, this research primarily focused on applied climatology involving Probable Maximum Precipitation (PMP), recurrence intervals of extreme events, and human dimensions of climatic change.

Outreach

The LOSC conducts frequent interviews with radio, newspaper, and magazine media. We cooperate and coordinate efforts closely with the NWS Offices in the region. We also remain primed and ready to work with Louisiana Office of Emergency Preparedness when needed.

Monitoring and Impact Assessments:

The LOSC has taken on the responsibility of producing a weekly summary of the State's weather and climate in the form of the *Louisiana Weekly Climate Review* available on the LOSC website at the following URL: <www.losc.lsu.edu>. This report is also e-mailed to over 100 recipients across Louisiana, including most television weather-casters in the State, concerned State Office Officials, as well as the National Weather Service Offices that oversee Louisiana. The Office also provides a weekly summary of Louisiana Climate Data to the National Agricultural Statistics Service (NASS) that is published weekly in the *Louisiana Crop Weather Summary*. In addition to these weekly products, the LOSC also produces monthly summaries of the State's Climate data, which is also available on the LOSC website. The office also produces event-based summaries for significant weather events that impact Louisiana. The LOSC is also active on the ad hoc committee of the *U.S. Drought Monitor*.



Jim Zandlo, State Climatologist

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The Minnesota State Climatology Office (MN_SCO) exists to manage, analyze, and disseminate climate information in service to the citizens of Minnesota. The MN_SCO is funded by the State of Minnesota Department of Natural Resources - Division of Waters, and housed at the University of Minnesota - Department of Soil, Water, and Climate. This partnership was formed in 1973.

The MN_SCO assists its customers in their investigations of the climate's impact on various components of the natural environment, and on socioeconomic activities. The MN_SCO uses its climate monitoring resources to quantify relevant weather conditions and to place these conditions within historical and geographical context. The MN_SCO also provides quantitative summaries of historical climate conditions, allowing users to make informed decisions about future activities.

In order to provide its services, the MN_SCO requires an extensive historical climate data set. The climate database managed by the MN_SCO consists of over 80 million numbers. The database features data collected by Minnesota's unique high spatial density precipitation monitoring program, formed in the early 1970's. This "network of networks" utilizes the efforts of water-oriented state and local agencies to assemble precipitation data from approximately 1400 observers each year. Additionally, the National Weather Service (formerly the U.S. Weather Bureau) has maintained a large scale, volunteer-based climate monitoring network in Minnesota since 1890. Other, smaller scale climate monitoring efforts extend the historical record earlier into the 19th century. The MN_SCO also archives multi-element hourly weather data gathered at Minnesota's airports.

The MN_SCO provides customers with free access to a comprehensive electronic climate database. The MN_SCO also serves its customers by offering a variety of value-added analyses of climate data in the form of maps, narratives, graphs, and tables. Customers access MN_SCO products and services via a Web site, e-mail, telephone, and office visits.

The customers of the MN_SCO are many and varied. Customers can be grouped in the following categories:

- Minnesota Department of Natural Resources (sponsoring agency)
- General Public
- State, Federal, and Local Agencies
- Private Sector Professionals
- Academic Community

ARSCO Qualifications: the MN_SCO is designated by the AASC as the official state climate office for Minnesota. The following describes the ways in which the MN_SCO addresses each of the ARSCO qualifications:

Communication Capabilities:

- full-featured web site
- fully staffed information line
- near-immediate response to e-mail inquiries

Information Services:

- Web site – the MN_SCO Web site receives visits from approximately 1200 users per day. The Web site offers users free access to nearly all of Minnesota’s digitized climate data, as well as a host of value-added products such as narratives, maps, and tabular summaries.
- phone – the MN_SCO answers approximately 75 phone calls per week from customers with climate questions.
- e-mail – the MN_SCO answers approximately 20 e-mails per week from customers with climate questions.

Research:

- a new study of snow along the north shore of Lake Superior has begun with a grant from the Minnesota Lake Superior Coastal Program. Volunteers will observe snowfall and snow depth in a high density pattern designed to better delineate patterns due to lake proximity and rapid elevation changes.
- an algorithm was developed to objectively “integerize” daily normals from monthly normals which minimizes the error of using the resultant daily values in recalculating the monthly values.

Outreach:

- staff are commonly requested to attend multi-agency, multi-disciplinary meetings where a climatological perspective is required.
- staff give frequent interviews to the state’s electronic and print media.

Monitoring and Impact Assessments:

- Web site offers a variety of routinely prepared summaries of weekly and monthly temperature, degree day, precipitation, and snow depth data.
- Web site offers a chronological journal of significant weather events, providing a description of the event, impacts, and historical context.
- The MN_SCO utilizes a list server to deliver a monthly electronic newsletter summarizing climate conditions observed during the previous month and the resulting impact on water resources (400 subscribers).



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Dr. Michael E. Brown, Assistant State Climatologist

The Mississippi State Climatologist was appointed in 1983 and was vested in the Department of Geosciences at Mississippi State University. The SC is not funded beyond one-quarter time release from teaching in the department, so it is mostly still a volunteer effort (that has gone on for over twenty years!!). The SC is involved in teaching, research, and service through the university, and has completed the application for ARSCO status, which is pending.

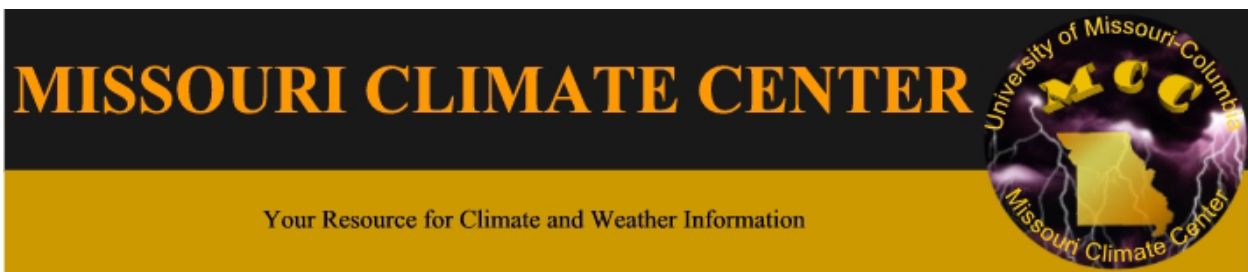
The Department of Geosciences has a Climatology Laboratory with access to all NWS products as well as several vendor products such as Baron Radar, Weather Services, Inc., Genesis (Weather Central), Galileo, Digital Atmosphere, and others, all of which provide a wide base of support for the SC to use in filling the climate needs of the people of Mississippi. Additionally, several databases are maintained in the SC program such as the CD ROM of Summary of the Day records purchased through Hydrosphere and some unique records resulting from research projects conducted over the years. Full access to the Southern Regional and Southeastern Regional Climate Centers has been granted in recent years, and has proved to be the most useful addition to the Mississippi SC program since its inception. These RCCs have made a significant difference in the level of services the SC can provide in a program like Mississippi's. This point should be emphasized strongly when the RCCs need help justifying their budgets.

Service activities of the SC this past year include handling hundreds of daily requests for data or information ranging from the simple (daily temperature and precipitation) to the sublime (hourly wind analyses). The same sort of climate data consumers are found in Mississippi as elsewhere—lawyers, engineers, professors, researchers of all types, businessmen, housewives, farmers, teachers, Mothers of the Bride (!!), students with science fair projects, and every other imaginable user and abuser. Annual synopses of the year's weather are provided for agencies such as MEMA and USDA upon request, but no routine publication of this sort is attempted. Presentations on weather and climate were given to such groups as the Mississippi Integrated Pest Management Conference, the Grenada County Farmer of the Year Program, Boy Scouts, various school classes and groups, and civic clubs, to name a few. The SC web page was also recently reconstructed to reflect a greater ability to provide services of a higher level and to be more interactive.

Research activities this past year included investigating the effects of weather on length of phenological periods in soybeans in Mississippi, modeling climatological influences on the potential for water supply reservoirs in the state (interestingly, in such a humid state, there are only three

municipalities that use surface water supplies, all others use groundwater), and developing of an evaporation dataset for the southern region. Upon completion of this evaporation project, I intend to share the results with each SC in the region as well as both the SRCC and the SERCC.

In summary, this past year was not much different from other years in terms of the types and level of activities carried out. The Mississippi SC has a small program, but a viable one that is fairly well-known in the state. It is recognized by a growing number of concerns, both public and private, as a source of weather and climate information. Given the level of support the program has, I'm not sure I want much more success!!



Adnan Akyüz, State Climatologist

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Historic Overview of the State Climatologist Program in Missouri

Under the imaginative leadership of Helmut Landsberg of the U.S. Weather Bureau's Central Office, a national program for climatological services was established in the early to mid-1950's. In 1956, James Mc Quigg was assigned to Columbia as the new State Climatologist. Originally Mc Quigg served a dual function as the Meteorologist-in-Charge of the Weather Bureau Airport Station and the State Climatologist. Then in 1973 the "death letter" was received from the Administrator of NOAA ending the nationwide program for State Climatologists.

Post 1973 Missouri State Climate Program

In the letter to the Governors of the states the Administrator of NOAA suggested that the service programs for climatology was really a "state function" and invited each state to develop their own programs. The invitation was received with the same enthusiasm as the proposal suggested to the Missouri Legislature by Professor Nipher ninety years earlier. In order to keep the issue alive, Dean Elmer Kiehl of the College of Agriculture of University of Missouri-Columbia requested that Dr. Wayne L. Decker be designated as the State Climatologist for Missouri. In spite of the failure of a climate center to gain recognition by the infrastructure of state government in Missouri there were several initiatives, which developed segments of a climate information service.

1. By 1989, a clientele was developed among the researchers in the Agricultural Experiment Station of University of Missouri-Columbia in support of climate information for individual research projects. With the help of Associate Director William Pfander a half-time position was established as Experiment Station Climatologist.
2. The Commercial Agriculture Program sponsored by University of Missouri Extension is a program to foster research and out-reach for the commercial farms in Missouri. Specialized weather stations with automated microprocessors have been established at locations where the commercial farm operations are conducted.
3. The Midwestern Climate Center, located in Champaign, Illinois, has provided assistance in development of some collaborative climate research and outreach programs in Missouri over the past several years.

The Missouri Climate Center

As the result of a recommendation in the final report of the Missouri Commission on Global Climate Change and Ozone Depletion, the Missouri Legislature in 1994 appropriated funds to establish a climate center at the University of Missouri-Columbia. In July 1995. Dr. "Steve" Qi Hu was

designated as the State Climatologist for Missouri and assigned in early 1996 as the Director of the Missouri Climate Center. In March 1999, Dr. Adnan Akyüz took those responsibilities.

ARSCO Qualifications: MCC is designated by the AASC as the official state climate office for Missouri. The following describes the ways in which MCC addresses each of the ARSCO qualifications:

Communication Capabilities:

- Nearly 1000 lines of data array from automated weather stations downloaded to the center's server daily.

Information Services:

- Quarterly Missouri Climate Bulletin <http://www.mcc.missouri.edu/bulletin.html>
- Monthly weather and its impact on agriculture <http://www.mcc.missouri.edu/agwx.html>
- Climate Monitoring <http://www.mcc.missouri.edu/monitoring/>
- Automated Weather Monitoring Network http://www.mcc.missouri.edu/mo_net.html
- Answered more than 500 e-mails requesting climate information or asking climate related questions.
- Answered to more than 200 telephone requests
- More than 150 media contacts

Research:

- Weather and climate monitoring at two LTEM sites associated with population dynamics of two federally endangered plants.
- Weather and climate monitoring at Ozark National Scenic Riverways in the context watershed control.
- Effects of prescribed fire on the federally threatened western prairie fringed orchid at Pipestone National Monument, Minnesota.
- Support graduate students researching on Missouri's climate.

Outreach: Following is the highlights of some of the outreach activities the MCC participated in:

- Missouri Science Olympiads Coaching Clinic
- Mizzou-Magic Science Day
- Ag Field Day
- FFA Career Day
- 5th Grade Friendly Career Day
- Crop Injury Diagnostic Clinic
- Hundley-Whaley Farm Field Day
- Ag-Lender's Seminar
- Missouri Drought Assessment



Office of the New Jersey State Climatologist

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Dr. David A. Robinson, NJ State Climatologist

Keith Arnesen, Assistant State Climatologist
Christopher Duvall, Meteorologist, Webmanager
John Parlagreco, Meteorologist, Research Assistant
Chad Shmukler, Technical Director

Founded in 1979, the Office of the New Jersey State Climatologist (ONJSC) resides within the Rutgers University Center for Environmental Prediction. The ONJSC mission is to serve the citizens of New Jersey by providing NJ weather and climate data, research, and outreach. This is accomplished through the dedicated efforts of part time staff. Over eight million New Jersey residents live within five distinct climate zones that experience four unique seasons. This makes weather and climate data and services of extreme value for a plethora of applications.

The ONJSC has established the New Jersey Weather and Climate Network, or NJWxNet. This unique network of new and existing stations will eventually consist of over 100 weather stations throughout the state. Our web site <<http://climate.rutgers.edu/njwxnet>> serves as a one-stop Internet resource for New Jersey weather and climate data. The NJWxNet is a network of networks, including NJDOT and NJ Turnpike RWIS networks, NWS ASOS stations and two networks operated by the ONJSC. Stations operated by ONJSC include 13 NJ Mesonet sites, monitoring a rich suite of atmospheric and surface variables, and 30 NJ SafetyNet stations, monitoring a subset of important variables primarily at public safety agencies. Hourly observations are collected and displayed in real time as colorful maps and tables on the NJWxNet web site.

In addition to the NJWxNet, the ONJSC maintains a comprehensive archive of historical data, metadata and climatologies from National Weather Service primary and cooperative stations. This is supplemented with data submitted by ONJSC volunteer observers. This information is manually processed and displayed in event, weekly and monthly maps and tables.

Research endeavors within the ONJSC range from student projects on topics such as regional heat islands and snow climatologies to collaborative efforts with Rutgers colleagues and state and federal agencies. An example is the establishment of the New Jersey Climate Report Card project, a joint effort with the Rutgers Center for Environmental Indicators and the NJ Department of Environmental Protection

Examples of ONJSC outreach activities include participation in the Liberty Science Center teacher training program, the creation of online weather training materials for NJ public safety officials, and a wealth of interviews and presentations. Over 500 media interviews were given in the drought year of 2002.

ARSCO Qualifications: The ONJSC is an American Association of State Climatologists (AASC) Recognized State Climate Office (ARSCO). As such, the office fulfills a number of qualifications outlined below.

Communication capabilities

- Ingest, process, archive and disseminate historic and real time climate data.
- Maintain numerous web sites related to the ONJSC mission.

Information Services

- More than 500 specific requests for data and products each year.
- More than 500 unique visits to ONJSC web sites each day.
- Weekly and monthly climate summaries in map and tubular form.
<<http://climate.rutgers.edu/stateclim/njclimdata.html>>

Research

- Collaborate with Rutgers colleagues, as well as state and federal agencies on projects associated with issues such as forest fire management, pest management, agriculture, transportation, water resources, public safety, homeland security.
- Student research on topics such as urban heat islands, state snow cover variability, ocean influences on state weather and climate.

Outreach

- Average 350 media interviews each year.
- Presentations to schools, civic organizations, Liberty Science Center, etc.
- Conference presentations to the NJ Mosquito Control Association, the NJ Emergency Preparedness Conference, the NJ Teachers Science Convention and others.
- The NJ State Climatologist is a member of the Consortium for Atlantic Regional Assessment advisory committee, the NWS StormReady Community Program advisory board, the U.S. Climate Reference Network ad hoc advisory committee, and several other committees.

Monitoring and impact assessment

- Operation of the NJWxNet. <<http://climate.rutgers.edu/njwxnet>>
- Maintain NJ DroughtWatch web site <<http://climate.rutgers.edu/stateclim/njdroughtwatch.html>>
- Web site updates for significant winter events.
- The NJ State Climatologist is a member of the NJ Drought advisory committee.
- Statewide climate variability and change is being assessed through the NJ Climate Report Card project. <http://climate.rutgers.edu/stateclim/climreportcard/climate_report_card.html>
- A shared regional database (with PA and NY in cooperation with the Northeast Regional Climate Center) is being developed, as well as products that bridge state borders.

State Climate Office of North Carolina



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Mark Brooks, Meteorologist
Robb Ellis, Climate Services Assistant
Bic Fort, Administrative Assistant

History of the State Climate Office of North Carolina

The Office of the State Climatologist for North Carolina was established within the University of North Carolina system in 1976. Until 1973 there had been a similar program within the federal National Weather Service. When that was disbanded, each state government was asked to support a state climatologist at the local level to provide the services eliminated by the NWS. The North Carolina Office was formally established by a joint agreement between the President of the University of North Carolina system and the Director of NOAA's National Climatic Data Center.

In 1976 the Office was opened in the Department of Geography at UNC-Chapel Hill with Dr. Peter Robinson as the first State Climatologist. In 1980, through a Memorandum of Agreement, the State Climate Office was moved to the Department of Marine, Earth, and Atmospheric Sciences at North Carolina State University. Dr. Jerry Davis, Professor of Atmospheric Sciences, was appointed as State Climatologist, and served in that role for the next 16 years.

In 1996, Dr. Sethu Raman, Professor of Atmospheric and Marine Sciences, was appointed State Climatologist. That year, the State Climate Office was moved to NCSU's Centennial Campus and co-located with the National Weather Service. Dr. Raman worked to expand the presence and visibility of the SCO, including developing a long-term vision and building a permanent infrastructure of staff and facilities. In 1997, the SCO was given responsibilities for the Agricultural Weather Network as part of an agreement with the College of Agriculture and Life Sciences and the NC Agricultural Research Service. In 1998, the State Climate Office was designated as a Public Service Center in the University of North Carolina system by the UNC Board of Governors and housed in the College of Physical and Mathematical Sciences.

Today, the State Climate Office of North Carolina is one of the most active and upcoming such offices in the nation, and was acknowledged by the American Association of State Climatologists as one of the first officially recognized State Climate Offices. The SCO is actively pursuing a wide range of research and outreach activities to improve understanding of the complex interactions between NC weather and climate and the environment. The State Climate Office continues to expand its services to the citizens of North Carolina.

ARSCO Qualifications: The SCO of NC is designated by the AASC as the official state climate office for North Carolina. The following describes the ways in which the SCO addresses each of the ARSCO qualifications:

Communication Capabilities:

- Provides telephone, fax and email communication with the public
- Provides a website with observations, analysis and educational material dealing with the weather and climate of North Carolina

Information Services:

- SCO web site continues to be a leading source of climate information for NC. The site was expanded significantly to improve navigation, information access, and user feedback. The SCO website is averaging over 4000 unique visitors and over 300,000 hits each month. Web traffic peaked during the landfall of Hurricane Isabel with 650,000 hits in September 2003.
- Public release of the NC CRONOS database now allows access to real-time and recent historical observations of hourly, daily, and monthly weather and climate data. Internal users have access to the complete database. Observations dating back to 1948 have recently been added.
- Developed website for real-time modeling applications. SCO staff run a high resolution regional weather model in real time. This will be of benefit to many applications including agriculture, emergency response, and air quality interests.

Research:

- Six graduate students (MEAS) worked at the SCO on topics related to weather and climate in NC. Examples include east coast cyclogenesis, severe weather, agriculture meteorology, tropical cyclones, mesoscale weather, flood warning, and air pollution. Results were presented in professional meetings and international journals.
- SCO was a sponsor of the American Meteorological Society's Regional Conference on the Inland Effects of Tropical Weather Systems, held in Raleigh in May 2003.
- SCO staff and students co-authored 24 professional meeting presentations, 10 invited presentations, published or communicated 17 papers for peer-reviewed journals, and 3 SCO reports in 2001-02.

Outreach and Education:

- Last year the SCO hosted seven undergraduate and four graduate students from NC State University and UNC-Chapel Hill.
- SCO annually hosts 4 eighth grade students from Centennial Campus Middle School. These students visit the SCO weekly to learn about NC weather and climate and to work on projects.
- Provided presentations to K-12 classes, museums, and community organizations on regular basis.
- SCO is a primary member of the NC Climate Change Education Partners, a group of educators whose focus is to educate the public on the science of climate change.

Monitoring and Impact Assessment:

- Operates the NC ECONet, a network of 25 real-time weather and climate stations with siting and sensors at international standards
- Operates the NC CRONOS database ingesting automated weather observations from 5 networks and nearly 200 stations in NC and surrounding states. Real-time and historical access to these observations is available through the SCO website.
- Provided hundreds of hours of service to federal, state, and local government agencies on the impacts of weather and climate. These agencies included NC Department of Transportation, US Environmental Protection Agency, NC Division of Air Quality, NC Division of Water Quality, NC Division of Water Resources, NC Division of Forest Resources, NC Division of Emergency Management, NC Department of Justice, NC Department of Agriculture and Consumer Services, US Geological Survey, NC Flood Warning Program, NC Flood Mapping Program, US Army Corps of Engineers, and county economic development agencies.

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Dr. Ken Crawford, State Climatologist
Mark Shafer, Director of Climate Information
Derek Arndt, Assistant State Climatologist
Gary McManus, Climatologist

Established in 1980 to provide climatological services to the people of Oklahoma, the Oklahoma Climatological Survey has a legislative mandate to acquire, process, and disseminate climate and weather data and information for use by the state's citizens and decision-makers. The survey maintains an extensive array of climatological information, serves as the support facility for the State Climatologist, operates the Oklahoma Mesonet, and hosts a wide variety of educational outreach and scientific research projects.

The Oklahoma Mesonet, a world-class network of environmental monitoring stations that was created jointly by the University of Oklahoma and Oklahoma State University, provides real-time weather observations in each of Oklahoma's 77 counties. The Mesonet reports observations of temperature, humidity, wind speed and direction, pressure, rainfall, solar radiation, soil temperature, and soil moisture. Observations are reported every 15 minutes, and archives contain five-minute resolution data. The network was commissioned in 1994. Mesonet data are used in a variety of applications, from real-time monitoring of weather conditions to drought monitoring to assessing wind power development opportunities.

Data archives maintained by OCS include: cooperative observer network data (1892-present); Oklahoma Mesonet data (1994-present); WSR-88D (NEXRAD) radar data for 15 sites in the south-central U.S. (1998-present); National Weather Service text products, including forecasts, watches, warnings, advisories, public information statements, and other text information from the NWS offices serving Oklahoma (2002-present); and governmental publications from the National Climatic Data Center (NCDC) and other sources (1896-present).

OCS hosts several outreach programs to more effectively communicate information to key stakeholder groups. Three formal outreach programs are: OK-FIRST, for public safety officials; EarthStorm, for K-12 science and mathematics teachers; and a program for state electric utilities. Each of the programs includes training and customized web sites that support decision-makers. OK-FIRST received the Innovations in American Government Award from Harvard University in 2001 for its ability to transform local emergency management operations.

To support the Mesonet and OCS outreach programs, a team of software developers have created customized visualization tools for displaying real-time and archived data. The software includes: the WeatherScope browser plugin, a new WeatherScope desktop application, and WeatherBuddy – a desktop application that monitors conditions at a single site. In addition to the desktop visualization tools, the software development group maintains the ingest for Mesonet and other data sources, develops new quality-assurance software, and writes new models for employing Mesonet data in agricultural applications.

Research at OCS focuses on land-atmosphere interaction, particularly on soil moisture processes and heat and moisture fluxes. Several recent publications have discussed findings concerning the feedback of vegetation and how it affects the mesoscale environment. OCS' research group mentors graduate and undergraduate students in the University of Oklahoma's School of Meteorology and participates with international scientists in field projects.

ARSCO Qualifications: The AASC has designated OCS as Oklahoma's state climate office. The following describes the ways in which OCS addresses each of the ARSCO qualifications:

Communication Capabilities:

- Maintain more than 1500 web accounts;
- Serve more than 200 GB of data annually;
- Develop specialized web sites and products for agriculture, emergency management, K-12 teachers and children, electric utilities, and drought monitoring;
- Most real-time Oklahoma Mesonet products are freely available to public.

Information Services:

- More than 600 detailed requests for information annually logged in OCS' data request database (not including general information provided over telephone or web visitors);
- More than 3000 unique visitors each month to OCS web sites;
- Monthly, seasonal, and annual climate summaries;
- Specialized application software for visualizing and manipulating data.

Research:

- Collaboration with federal agencies in field projects in Oklahoma, including Joint Urban 2003 Dispersion Experiment, International H2O Project (IHOP), and Soil Moisture Experiment 2003 (SMEX03);
- Collaborating with Oklahoma Water Resources Board on evaluation of state's weather modification program;
- Support graduate students doing research with the Oklahoma Mesonet.

Outreach:

- Offer formal training and decision-support tools for public safety officials, K-12 teachers, and electric cooperatives;
- Trained more than 640 individuals in OCS workshops in 2003;
- Developed materials for the Magic School Bus weather exhibit;
- Hosted Mesonet 2002 Institute and helped other states plan for automated networks.

Monitoring and Impact Assessment:

- Operate the Oklahoma Mesonet, a statewide network of 115 automated weather stations with at least one station in every county;
- Event Summaries for any declared weather-related disaster in Oklahoma.
- National model drought-monitoring web site for state officials and the public.

Oregon Climate Service

George H. Taylor, State Climatologist

Oregon State University

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The Oregon Climate Service (OCS), located on the Oregon State University (OSU) campus in Corvallis, Oregon, is the state repository for weather and climate information. OCS is affiliated with OSU's College of Oceanic and Atmospheric Sciences (COAS)

Mission:

To collect, manage and maintain Oregon weather and climate data.

To provide weather and climate information to those within and outside the state of Oregon.

To educate the people of Oregon on current and emerging climate issues.

To perform independent research related to weather and climate issues.

OCS Staff

George Taylor, State Climatologist
Christopher Daly, Research Professor
Wayne Gibson, Programmer/GIS Manager
Matt Doggett, Research Assistant
Mandy Matzke, Research Assistant

Joseph Smith, Research Assistant
Wolf Read, Undergraduate Assistant
Melanie Mitchell, Undergraduate Assistant
Cadee Hale, Undergraduate Assistant
Kelsey Kuykendall, Undergraduate Assistant

Linkages

OCS acts as the liaison with:

National Climatic Data Center
Western Regional Climate Center
National Weather Service
USDA Natural Resources Conservation Service

Climate Prediction Center
American Association of State Climatologists
Other state climate offices

Climate Data

OCS maintains the most complete set of state weather and climate records in Oregon. A large amount of the data is stored in a computer-accessible format for easy retrieval and manipulation. To permit flexibility and efficiency, OCS provides data in a variety of formats, including hard copy and electronic forms.

Services

On average, OCS handles about 6,000 telephone or mail data requests per year. OCS' Web site averages about 80,000 "hits" per week. OCS provides a full range of climate-related services to both the public and private sectors. Services/products include, but are not restricted to:

Site-specific climate reports/summaries.	Climate tables/inventories.
Various statistical analyses, such as means, extremes, probabilities, percentiles, threshold exceedances, etc.	Precipitation maps. Customized research. Current climate data and information

Spatial Climate Analysis Service (SCAS)

SCAS was established at Oregon State University (OSU) to provide spatial climate research, education, analysis and mapping services for public, private, and educational institutions in the United States and abroad. Starting as a research program aligned with the Oregon Climate Service (OCS) in 1993, SCAS was formally established in 1999. SCAS and OCS continue to operate as sister agencies. Dr. Christopher Daly, OSU Professor, is Director of SCAS, which shares office space and staff with OCS.

SCAS is committed to producing the most innovative and sophisticated climate maps available anywhere. Many of SCAS' mapping activities involve use of the PRISM model, developed by Daly. PRISM is a knowledge-based system that uses point measurements of precipitation, temperature, and other climate elements to produce continuous, digital coverages. PRISM is unique in that it incorporates expert knowledge of rain shadows, temperature inversions, coastal effects, and more. PRISM coverages are used with Geographic Information Systems (GIS) to construct maps and perform many types of analysis.

Applications of SCAS products are wide-ranging, and include climatology, agriculture, forestry, hydrology, engineering, recreation, natural resources, global climate change, land use, planning, relocation, education, and geography. SCAS is responsible for nearly all major climate mapping efforts at the federal level in the United States. It is also engaged in international modeling and analysis projects. Recent and current projects include:

- Climate Atlas of the United States, for the National Climatic Data Center
- Precipitation and temperature maps for all 50 US states and possessions, for USDA Natural Resources Conservation Service
- 103 years of monthly temperature and precipitation maps for the lower 48 states, for NASA/NOAA Office of Global Programs
- Climate and grass adaptation modeling for China and the US, for Oregon Seed Council and USDA
- First comprehensive maps of precipitation for the European Alps, for Swiss Federal Institute of Technology
- Maps of precipitation frequency for the U.S., for the National Weather Service
- Climate maps for western Canada, for Environment Canada

**Paul Knight, Pennsylvania State Climatologist**

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After a 21 year hiatus, the Pennsylvania State Climate (PASC) Office was re-established in 1994 with a memorandum of understanding between Penn State's College of Earth and Mineral Sciences, the Eastern Region of the National Weather Service and the National Climatic Data Center (NCDC). In cooperation with the National Weather Service's Central Pennsylvania Forecast Office and NCDC, the Pennsylvania State Climatologist (PASC) began providing climatic information to the citizens of Pennsylvania early in 1995. In 2000, the College of Agricultural Sciences began an investment in the extensions of the climate office that have greatly increased its services. Several grants from COMET (the Cooperative Program for Operational Meteorology, Education, and Training) and a grant from the Pennsylvania Department of Environmental Protection have supported the expansion of services for the Commonwealth. Recently, NCDC has encouraged the State Climate Office's collaboration with the Northeast Regional Climate Center through several related grants.

The Pennsylvania State Climate Office maintains an expansive database (> 20 GB), which includes over 150 daily observations from the cooperative network and nearly 150 hourly reports from the newly stitched Mesonet. Precipitation reports are gathered from over 400 automated rain gauges around the Commonwealth. Data archives maintained by PASC include the Pennsylvania Mesonet and the cooperative observer network data. The cooperative observer network, accessible through the Interactive Data Archive (IDA), currently contains climatic data, daily weather archives and summaries for 111 stations around the state, a quarter of which have digitized observations before 1930. Hourly observations and evapotranspiration data are available for 30 sites. Archived visualizations products are also available. Hourly composite radar, infrared, and visible satellite imagery are available from February 19, 2002 to the present. Water vapor satellite imagery is available from December 24, 2002 to the present. In addition, hourly data time series, Pennsylvania daily weather graphics, experimental multisensor precipitation estimates for the state.

The Pennsylvania Mesonet maintains an archive of hourly weather observations for stations within the state and near state borders by utilizing existing hourly reporting weather stations operated by various state and federal agencies. Currently the FAA, Pennsylvania Department of Transportation (Penn DOT) and Pennsylvania Department of Environmental Protection provide data to the PA State Climate Office from their respective weather networks to allow for a higher density of observations and level of quality control than each network would by itself. Penn DOT currently has more than 82 sites across the Commonwealth that report of temperature, wind data, relative humidity, dew point, visibility, precipitation occurrence and roadway temperature every 30 to 60 minutes. Measurements

of air pollution concentrations, solar radiation, as well as ambient temperature and wind are also provided for 48 locations by the Pennsylvania Department of Environmental Protection. The FAA airports provide atmospheric observations for another 33 stations.

Several members of the Penn State Department of Meteorology staff the Pennsylvania State Climate Office. The office is also maintained with the able assistance of up to a dozen students during the academic year who contribute to a wide variety of scientific research projects.

Information Technology and Communication Capabilities:

- A recent upgrade and reorganization of the PASC computer infrastructure has allowed the PASC to more efficiently deploy equipment to meet the ever expanding user base and data archive through several web servers.

Information Services:

- A variety of tailored user applications make a host of services available to the citizens of Pennsylvania. From the Interactive Data Archives for daily observations to the Mesonet for hourly reports, the state climate office provides users value added services.

Data Quality Control/Assurance:

- A multi-tiered quality assurance system is being developed to process and test the increasing volumes of environmental observations. Standards established by other ARSCO's are being adapted for uniformity of data quality control.

Climate Office Projects:

- An extensive metadata profile of all observation sites will be completed within a year. Application of on-line data to specific user needs is under design. A shared regional database (with New York and New Jersey) is being developed.

Special Projects:

- Collaboration with experts in the College of Agricultural Sciences has led to the development of environmental data monitoring systems for Wheat Scab, Corn Rust, Gypsy Moths and the European Corn Boer. A real-time water budget for a local watershed is also being developed in collaboration with Pennsylvania's DEP.

User Base Growth:

- During the past year a sophisticated web statistics package was installed to track users of the PASC web interface. In July 2003, the PASC website was viewed by 1200 unique visitors. This user base has continued to grow each month and as of January 2004 the website had 4000 unique visitors. Most of the 4000 unique visitors were from US educational institutions, commercial sites and US government sites but there were also visitors from over 25 countries.

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**South Carolina
Office of Climatology**

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Staff: Hope Mizzell, State Climatologist; Sam Baker, Associate State Climatologist;
Wes Tyler, Assistant State Climatologist for Service; Jason Caldwell, Severe Weather Program Liaison;
Dorothy Phillips, Administrative Assistant (Part-time)

The Office of State Climatology (SCO) as mandated by the South Carolina General Assembly (Sections 49-25-10 et seq., Code of Laws of South Carolina, 1976, as amended) has represented the State in all climatological and meteorological matters within and outside South Carolina since its creation in 1986. Hazard mitigation for severe weather events, such as hurricanes, droughts, tornadoes, floods, and ice/snow storms, is a critical area of responsibility for the office. The SCO serves as liaison between the National Weather Service and State agencies, such as the Governor's Office, SC Department of Natural Resources (SCDNR), SC Public Safety, and the SC Emergency Management Division. The SCO assists other State and Federal agencies in data acquisition and interpretation before, during, and after periods of severe weather.

The Office provides a unique service to the state by archiving and distributing climatological and meteorological data, reports and research that date back to the early 1700s. The SCO also has the sole responsibility in the State for serving as a witness in civil and criminal litigation involving weather and climate, averaging 12-24 cases per year. Staff provides meteorological information for approximately 100 forensic investigations annually by a variety of organizations including SLED, solicitors' offices, Federal law enforcement agencies, and the National Transportation Safety Board.

The SCO administers the *South Carolina Drought Response Act*, passed in 1986 and amended in 2000, which requires the office to formulate, coordinate, and execute a comprehensive drought response program. When drought occurs, as it has several times in the past 20 years (1986, 1988, 1998-2002), we have reduced its impact by working together with Federal, local, and other State agencies to ameliorate impacts to agriculture and water supply.

Another important service provided by the SCO is the interpretation and supplementation of National Oceanic and Atmospheric Administration (NOAA) short and long-term forecasts. Example requests for forecast interpretation range from daily requests from media, farmers, and builders to longer-term planning needs by lake-reservoir operators.

The SCO maintains a network of climatological observers throughout the State that supports the National Weather Service's Cooperative Observer Network Program. These observers provide important information that fills gaps in the National Weather Service's network. The data the SCO receives from these observers support SCO records as well as hydrologic research interests.

ARSCO Qualifications: SCO has submitted required information for ARSCO designation and is awaiting approval by the AASC. The following describes the ways in which SCO addresses each of the ARSCO qualifications:

Communication Capabilities:

- Maintains and updates SCO Web site, adding new products based on recent studies and unusual weather events.
- Maintains and updates Drought Information Web site that serves as a clearinghouse for information needed for state drought mitigation, declaration, and response.
- Maintains an email notification system focused on severe weather notification and disseminating long-range climate projections.
- Develops specialized products primarily focused on hydrology-drought related topics and extreme event analysis.

Information Services:

- Average 70 monthly phone and email requests for climate data and 20,000 information retrievals from the SCO web site. During significant weather events such as the record drought of 1998-2002 these numbers triple with 64,000 information web retrievals and 300 email and phone monthly requests.
- Media inquiries average 20 per month and triple during periods of severe weather.
- As a function of the Drought Response Program regular correspondence occurs with over 2,000 water systems. Correspondence includes drought projections, official declarations, and suggested response.
- Weekly and Annual Climate Summaries including a weekly summary provided to the USDA SC Agricultural Statistics Service (500 user subscription base).

Research:

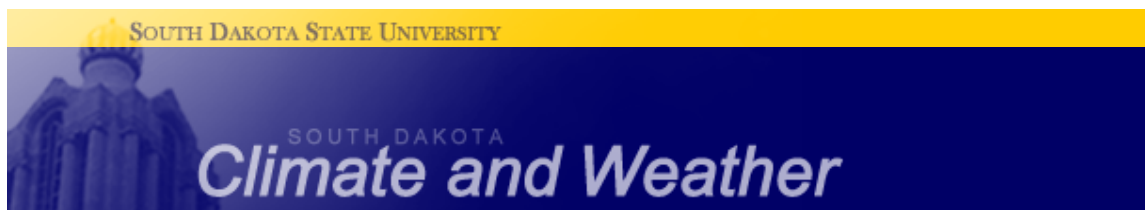
- Cooperating institution in the Carolinas Integrated Sciences and Assessments (CISA) project focused on integrating climate science and water management in North and South Carolina.
- Beginning a multi-year project to develop a climate-hydrology-atmosphere model prediction system (CHAMPS).

Outreach:

- Staff member serves as commissioned law enforcement officer to assist SCDNR during weather emergencies.
- Developed model drought management plan and response ordinance for public water systems. Assisted 310 water systems during their adoption and implementation of the model.
- Provide approximately 50 annual presentations to various governmental, private sector, and civic organizations.

Monitoring and Impact Assessment:

- Maintains a network of climatological observers throughout the State that supports the National Weather Service's Cooperative Observer Network Program.
- Prepares event summaries for any significant weather-related event.



South Dakota State Climate Office
Dennis Todey, State Climatologist

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Dr. Dennis Todey moved to South Dakota in January to take over the head of the South Dakota Office of Weather and Climate at South Dakota State University in Brookings. This ended an absence of a state climatologist for over a year. With additional university and external funds, a data manager, Mr. Chirag Shukla, was hired as a database manager to automate data acquisition and distribution. A link with UNIDATA was established during the summer to allow access to more current weather data.

The first major effort of the new office was to completely revamp the state climate page to allow user-driven access to many of the climate and weather databases. The site featured a redesign of format, new logo, and current news page. The new web site also presents many daily and hourly maps of weather information that were unavailable previously.

Most of South Dakota is poorly represented for current data. As in many states, the cooperative data is delayed in reaching the climate office. Thus, poor temporal and spatial resolution exists throughout most of the state. To overcome some of the resolution issues, data is being collected from all available stations within the state directly or in cooperation with the Iowa Environmental Mesonet at Iowa State University. Despite access to the variety of station, much of the state is still far from a recording station. In December the state climate office was awarded a grant of \$139,600 to purchase 20 new weather stations and to upgrade the 13 existing stations controlled by the state climate office. These stations are being deployed to fill holes in the observing network.

Plans for 2004 include deployment of the new weather stations and development of cooperative ventures to assist in station maintenance. Deployment of soil moisture sensors to supplement information gathered from the weather stations will be occurring. The state climate office will also be submitting paperwork for ARSCO certification.

office of the
state climatologist



TEXAS CLIMATIC BULLETIN

Office of the Texas State Climatologist
College of Geosciences
Department of Atmospheric Sciences
Texas A&M University

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Dr. John W. Nielsen-Gammon, Texas State Climatologist
Andrew Odins, Graduate Assistant
Kelsey Curtiss, Undergraduate Assistant
Michael Hammer, Undergraduate Assistant

Annual Report 2003

Physical Location and Funding:

The Office of the State Climatologist is housed in the Department of Atmospheric Sciences, Texas A&M University. Within the office complex of John Nielsen-Gammon in the Eller Oceanography and Meteorology Building is an office (1015) devoted specifically to State Climatologist activities. The office includes a library, 2 computers, printer, and telephone. The other resources of the Department of Atmospheric Sciences, including Unix and Linux workstations, real-time NOAA data feeds, and a data archive, are available for use by Office staff.

Funding for each fiscal year includes: assistance from the Texas A&M Vice President for Research and Graduate Studies, the half-time services of a graduate student during the fall and spring semesters, and an administrative supplement for the State Climatologist. Office space is provided free of charge by the University. The largest expense for the Office is hourly wages for two part-time undergraduate assistants.

Communication Capabilities:

The Office of the Texas State Climatologist utilizes all mainstream forms of communication. The Office has access to facsimile machines, telephones, regular mail, electronic mail, and allows people to come directly to the office. It also operates a website and updates it weekly.

On a daily basis electronic mail and telephones are used to communicate with a variety of individuals, ranging from those doing research, to keeping record books, to handling legal matters. On a regular basis the Office uses facsimiles and regular mail to disseminate larger amounts of information to clients that would be impractical to send over the phone or through electronic mail. Large climate requests that are quite time consuming are charged a service fee. During the fall and spring semesters the Office is staffed 40 hours a week, and is staffed at least 25 hours a week during other periods.

Information Services:

The Office generates and disseminates information to individuals and companies in both public and private sectors through several different channels of communication. The Office's information services can be broken into two parts: personalized information services and general information services.

The personalized information services are conducted using all of the previously mentioned forms of communication with outside individuals. These information services consist of a client requesting data from our Office and the Office finding, recovering, and processing the information in a way that is easily understood by the client, and attached in Microsoft Excel format. In the year 2003 about 1000 electronic climate requests were received, and sent the same amount. The Office has also sent nearly 100 facsimiles, and sent numerous mailings through the postal services as well.

The general information services consist of regularly produced documents that are made available in publications such as the Texas Almanac, and summaries and forecasts on the office's website. In the Texas Almanac the Office provides and verifies a significant amount of climatological data for the publication. On

the Office website, <http://www.met.tamu.edu/met/osc/osc.html>, there are weekly and monthly climate summaries for the State and the Bryan/College Station area, and weekly weather forecasts for Texas. The Texas Monthly summary includes a crop report, precipitation and temperature deviations from normal for the major cities in Texas, and a summary of the previous month's weather. The monthly Bryan/College Station area summaries contain all of the ASOS information recorded at the local station, a summary explaining any extreme weather for the previous month, and any records or near records set. The weekly summary and forecast for the state includes a general summary of the previous week's weather and significant weather events, if any, and a forecast of the coming week's precipitation and temperatures.

Research:

The Office of the State Climatologist conducts a limited amount of research itself and collaborates with other groups and agencies on campus. Present research activities include an investigation of the ability of an adjoint model to determine sensitivity of extreme weather events to initial conditions, and the use of radar-estimated precipitation and cooperative data for statewide agricultural models at high (1 km) resolution. The Office is also developing techniques for monitoring the development of meteorological drought across Texas using animation and innovative accumulated precipitation measures.

The Office collaborates with outside groups by providing local knowledge and expertise. Two current examples of these activities are peer-review of precipitation frequency climatologies for NOAA and collaboration in the search for appropriate Texas sites for the Climate Reference Network. The State Climatologist is also an active researcher in the areas of synoptic meteorology, mesoscale meteorology, and air pollution meteorology.

Outreach:

Locally, Office workers have spoken to children at schools and other interested people in the community to educate them on certain weather and climate related phenomena. Our Office also has assisted media members on weather and climate issues in the news. During the past year we have provided information for stories in newspapers in Texas, such as the Dallas Morning News. The State Climatologist also writes a monthly column on weather and climate issues for The Cattleman, a monthly magazine published by the Texas and Southwestern Cattle Raisers Association.

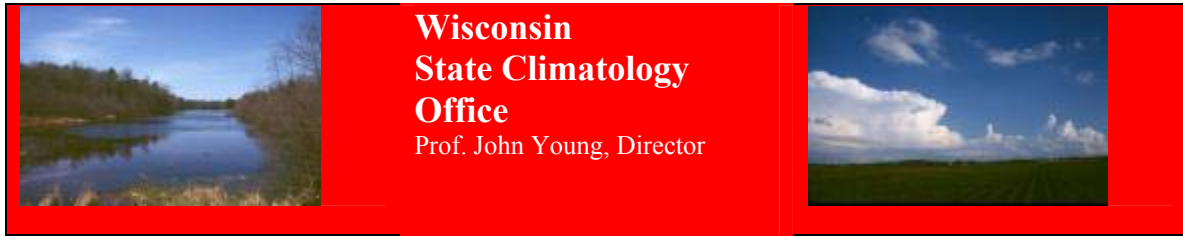
Monitoring and Impact Assessments:

The State Climatologist is an appointed member of the Texas Drought Preparedness Council, a statewide interagency committee created by the Texas Legislature in 1998 to monitor drought conditions and coordinate drought mitigation activities. The Council meets monthly in Austin. The State Climatologist is also an active participant in the U.S. Drought Monitor mailing list.

In December of 2003 the Office of the State Climatologist conducted a probability study for the athletic department at Texas A&M University to better determine appropriate days for scheduling outdoor activities and events. This study interpreted three different warning parameters: flood, tornado, and severe thunderstorm, to infer the best time of day for activities.

Future Plans

The Office of the State Climatologist intends to expand its activities in the future, particularly in the areas of information services, research, and monitoring. We plan to request additional funding from the State of Texas that would permit us to hire a Ph.D. level research scientist to conduct monitoring and research activities and produce publications of benefit to the State of Texas.



Contact Information

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The Wisconsin State Climatology Office is located within the Department of Atmospheric and Oceanic Sciences at the University of Wisconsin-Madison. As a partner with the Midwestern Regional Climate Center, the state climatologist collects data and information for climate monitoring, provides climate information to residents of Wisconsin, demonstrates the value of climate information in the decision making process to the user community, and conducts applied climate research.

OFFICE AND STAFF – The State Climatology Office is administratively part of the Department of Atmospheric and Oceanic Sciences at the University of Wisconsin-Madison, which is internationally recognized for research in weather and climate. The Office consists of Professor John Young, the State Climatologist and departmental Chair, Dr. Edward J. Hopkins, Assistant State Climatologist, and Lyle Anderson, Data Services/Office Manager.

The office contains an extensive collection of original manuscript records for Wisconsin weather stations, some dating back to the 19th century.

The mission of the SCO includes:

- acquisition and archiving weather observations from the nearly 200 weather stations throughout the state.
- summarization and dissemination of the information to users and for climate monitoring.
- demonstration of the value of climate information in the decision making process.
- conduct applied climate research.

INFORMATION SERVICES

Website: The SCO maintains and continues to expand its website <http://www.aos.wisc.edu/~sco> which provides a variety of climate information and data to the citizens of Wisconsin, scientists and

various interested parties. The SCO Website underwent major restructuring during 2003, with an emphasis placed upon expanding the focus and making it more user-friendly to more residents of Wisconsin. Visits to the website increased dramatically. Some of the special features that have been added include:

- Pages for each season. For example, the summer 2003 drought page focused on many aspects of statewide and regional drought that provided links to maps, graphs and other information pertaining to the drought.
- Expanded Climate Watch: A section with extensive graphics of contemporary conditions.
- Climate History: many graphics for observed climate variability by year and locations.

Data Services

The staff at the Office provides advice on web links to climate data and maps from regional and national centers. In addition, they also answer questions and fill data requests made by telephone, fax, email and office visits. Data requests during 2003 were made from the public, the media, industry (e.g., legal, insurance), and governmental agencies.

While most of the requests made by the public are answered without charge, a minimal service charge plus costs is assessed for special data requests that require significant time, labor or photocopying.

OUTREACH – The SCO has been attempting to make its presence more widely known to the residents of the state of Wisconsin. The staff has provided interviews with the electronic and print media in the state, and given lectures at universities and business conferences.

FUTURE –

- Establish ARSCO status
- Make contact and develop partnerships with local, state and federal government agencies
- Continued improvement of the website with expansion of the information content.
- Continued contacts with media and issue timely press releases.
- Develop small applied research projects.
- Research the history of the 19th century forts and first order stations in Wisconsin for the Climate Database Modernization Program.

Wyoming Climate Office - Water Resources Data System

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<http://www.wrds.uwyo.edu/wrds/wsc/wsc.html>



Background: In September 2001, the Water Resources Data System (WRDS) and the Wyoming State Climate Office (WSCO) sponsored by the Wyoming Water Development Commission, and a division under the Civil and Architectural Engineering, Department in the College of Engineering at the University of Wyoming were merged. Prior to this period, the state climatologist position was essentially managed by a professor on a pro bono basis. The establishment of a full time state climatologist coincided with a developing drought that would prove to be the worst to hit Wyoming in over 50 years. Combining water resources and climatology proved to be a perfect marriage of disciplines that enabled the state climatologist to provide additional support to numerous stakeholders across the state. These services are provided for free to all Wyoming State Agencies and at a minimal cost to others. In this ever-expanding service, we identify and fulfill all data requirements and requests as they relate to research, education (outreach), industry, public relations, and security issues. The WSCO also owns and manages a library that contains over 18,000 volumes of water and climate related books, magazines, theses, etc. (<http://library.wrds.uwyo.edu/>).

Staff: Members serve on various state and national committees and associations in the capacity of technical experts or advisors. As a service organization, WSCO-WRDS (with a staff of five full-time benefited, one part-time non benefited, and up to six part time student hires) processes, collates, inventories, digitizes, distributes, and correct all Wyoming water and climate data resources. Additionally, one staff member manages a local coop weather station (Laramie 2 NW). With a biennium budget exceeding \$0.5M and with \$60K received annually in grants, we process over 500 email and phone requests each year and over 0.1TB or two million data files (*excluding* images and internal accesses) from our internet servers per year. These servers also support other federal and state agencies (<http://www.wrds.uwyo.edu/wrds/coop.html>).

ARSCO Qualifications: WSCO is designated by the AASC as the official state climate office for Wyoming. The following describes the ways in which WSCO addresses each of the ARSCO qualifications:

Communication Capabilities:

- Direct access to Wyoming public radio and TV;
- Networking through all Wyoming newspapers and newsletter organizations;
- Develop specialized web site capabilities using the latest GIS-IMS techniques;
- Maintain direct open communication to all state agencies by providing routine status updates;
- Use of our list server RAPIDS (<http://www.wrds.uwyo.edu/RAPIDS/rapids.html>) to provide timely news.

Research: Recent projects have included efforts to include specialized data sets such as Aquatic Ecology into the WRDS' databases or to include scans of Water Well Completion Reports for online display. Additionally, WSCO-WRDS has produced digital versions of Landslide Maps generated by the Wyoming State Geological Survey and is serving them online in a cooperative effort. Interactive, three-dimensional representations of landslides in the western part of the state are also available online (<http://www.wrds.uwyo.edu/wrds/wsgs/hazards/landslides/ls-3d.html>). Recent efforts have focused on providing Pocket PCs to the County Emergency Managers allowing them to view and add to/refine GIS coverage's in the field and the revision to the Wyoming Climate Atlas (http://www.wrds.uwyo.edu/wrds/wsc/climateatlas/title_page.html).

Outreach: WRDS and the WSCO provide outreach across a spectrum of stakeholders. A prolonged statewide drought has sparked community interest to a level that has the state climatologist traveling across the state several times a month. Our staff's computer expert has been actively involved with Wyoming Homeland Security in supporting and developing data display applications for hand held Pocket PCs for use by County Emergency Managers. As mandated by the state legislature, a development and maintenance of this state's River Basin Plans (<http://waterplan.state.wy.us/>) requires the WRDS staff to travel several times a year to interface with the public. This outreach, unlike typical university efforts, is scheduled with constantly changing agendas. Community requirements drive our outreach efforts. Also, we attend and sponsor the annual Wyoming Children's Water Festival in Casper. Public schools attend this function with the motivation of getting students involved with natural resource sciences at an early age. In cooperation with the Colorado State Climate Office, Wyoming is embarking on expanding CoCoRaHS (<http://www.cocorahs.org/>). This **CO**mmunity **CO**llaborative **R**ain and **H**ail Study is envisioned to expand the weather observation network across Wyoming's sparsely populated region.

2003 Annual Meeting Agenda & Minutes (Summary)

American Association of State Climatologists (AASC)
AGENDA
Wednesday-Friday, August 6-8, 2003
Portland Hilton, Portland, OR

- Tues, Aug. 5: 6:00pm Registration and Icebreaker
Wed, Aug. 6: 8:30am President's Welcome and Report, Roger Pielke, Sr., CO

Roger Pielke (Chair)

- 8:45am Committee Reports (~25 minutes each)
Jim Angel, IL -- Climate data trends
John Christy, AL -- Climate projection model skill
Ken Crawford, OK -- COOP-Modernization Plan
Dave Robinson, NJ -- Drought Monitoring Core Group
- 10:30am break (15 minute)
- 10:45am Jim Angel, IL – ARSCO Status; Potential New State Climate Offices (MT, WA)
- 11:15am Doug Gifford, NWS -- New ASOS Gauge
- Noon – 1:30 pm Lunch (on your own)

Jim Angel (Chair)

- 1:30pm Dave Robinson - Partnership meeting and action items in progress or planned
- 2:00pm Tim Owen - NCDC/AASC Partnering for better climate services
- 2:30pm Bob Livezey, NWS Climate Services Division – NWS Regional and Local Climate Services: Progress, Roles, Partnerships.
- 3:00pm Andrea Bair and Kelly Redmond -- Western CSFP activities and plans
- 3:30pm Fiona Horsfall -- NCTP and Cores; ARSCO Workshop
- 4:00pm Roy Jenne, UCAR – Reanalysis Update; also Climate, Energy and Kyoto
- 4:30pm Adjourn meeting
- 5:00pm Bus will transport attendees at 5:10 and 5:30pm
- 5:45pm Evening dinner cruise on the Portland Spirit

- Thurs, Aug. 7: 8:30am Updates on State Climate and Regional Climate Offices (15 minute presentations)

Roger Pielke (Chair)

- 8:30am George Taylor, Oregon
8:45am Jim O'Brien, Florida
9:00am Jan Curtis, Wyoming
9:15am Mark Shafer, Oklahoma
9:30am Dave Robinson, New Jersey
9:45am Greg Zielinski, Maine
10:00am Charlie Wax, Mississippi
10:15am Stu Foster, Kentucky
10:30am John Nielsen-Gammon, Texas

10:45am Sethu Raman, North Carolina
11:00am Adnan Akyuz, Missouri
11:15am Roger Pielke, Colorado
11:30am Dave Robinson, Ken Crawford, Phil Pasteris, and Kelly Redmond. Further discussions on the Western Governor Association efforts to develop a national drought monitoring and information system.

Noon-1:30pm Lunch (on your own)

Dave Robinson (Chair)

1:30pm Ken Hubbard, HPCC, and Kevin Robbins, SRCC -- Regional Climate Center Update

2:00pm Bob Livezey, NWS Climate Services Division -- CPC Forecasts

2:15pm Klaus Wolter, CPC -- Monitoring the Drought and Predicting Climate with New Climate Divisions in Colorado and Elsewhere

2:45pm Geoffrey Bonnin, NWS -- Precipitation Frequency Updates

3:15pm Rainer Dombrowsky - Addressing Quality Snow Observations at LCD locations

3:45pm Open Dialog

4:30pm Adjourn meeting

6:00pm Banquet, Heathman Hotel, Dinner speaker: Bill Lang, Portland State University -- The Lewis and Clark Expedition; Approaching the Bicentennial Anniversary

Fri, Aug. 8: Business Meeting

Roger Pielke (Chair)

8:30am Minutes from AASC 2002

Old Business

New Business: Recommendation for the Conversion of terms of President to two years

AASC Journal

AASC Statement on the COOP Modernization Plan

Election of new Officers

11:30am Adjourn by 11:30 am

NOAA/NCDC PROGRAM WORKSHOP
AGENDA
Saturday, August 9, 2003
Oregon Museum of Science and Industry
Portland, Oregon

Goal: To acquaint State Climatologists with

- i.) the details of the major modernization tasks that are being supported by the Climate Database Modernization Program (CDMP) at NOAA;
- ii.) an overview of the Climate Reference Network Program (CRN) at NOAA and opportunities for collaborations with NOAA and the Regional Climate Centers.

Morning Session: CLIMATE DATABASE MODERNIZATION PROGRAM

The major tasks currently being supported by CDMP are emphasized, with a look to future collaborative efforts. This session is intended to be relatively informal with ample opportunities for questions and interaction. CDMP is providing us all with a great opportunity to develop access to the Nation's historical climate records.

Provisional Agenda

8:30 - 9:00 a.m.	CDMP Overview
9:00 - 10:00 a.m.	WSSRD & other tools - Introduction, applications, and access
10:00 a.m.	Break
10:15 - 10:45 a.m.	CDMP - other NOAA sponsored projects
10:45 - 11:30 a.m.	Regional Climate Center CDMP projects, Forts project, SAO keying, Coop QC, Hourly Precipitation Data, Climate Reference Books
11:30 - Noon	Opportunities for CDMP funded partnerships/projects in cooperation with the RCCs. Question and answer period.

Afternoon Session: CLIMATE REFERENCE NETWORK PROGRAM

The major research efforts associated with CRN are presented, with a look to future collaborative efforts with both NOAA and the Regional Climate Centers. As with the morning session, this session is intended to be informal with ample opportunities for questions and interaction.

Provisional Agenda

1:30 - 2:00 p.m.	CRN Overview
2:00 - 3:15 p.m.	Review of CRN site selection procedures and experiences
3:15 p.m.	Break
3:30 - 4:30 p.m.	Opportunities for CRN funded partnerships/projects in cooperation with the RCCs. Question and answer period.
4:30 p.m.	Workshop Ends.

American Association of State Climatologists (AASC) Annual Meeting August 5-8, 2003 Portland, Oregon

Minutes of the AASC Business Meeting, provided by Jim Zandlo (MN State Climatologist)

The AASC business meeting was held on the Morning of the third day.

Roger Pielke (CO, President of AASC) presided over the meeting.

Old Business

Roger indicated that the minutes of the last meeting will have to be presented electronically since David Stookesbury (GA, Sec-Tres of AASC) was not present.

On money... Roger said that George Taylor (meeting host and planner) indicates that the AASC is about even for the meeting. A guess was made that about \$4000 would be in the account after the meeting. A comment was made that nobody asks consistently for dues payment.

New Business

A desire to increase term lengths for AASC executives was expressed. A brief discussion led to the following motion:

The Secretary-Treasurer will be elected to a two-year term in odd years. The President-elect will be elected to a two-year term in even years. The president will also serve a two-year term.

Further discussion clarified that effective involvement would then be 4 years (2 as Pres-elect then 2 as Pres.). Someone asked if this was the same as a vice-President role. There was some discussion of the role of past-President role as 'vice-President to fill-in as needed (in extreme cases). More miscellaneous discussion followed. It was decided to vote on the motion in-hand before doing anything else. A vote taken by the raising of hands unanimously approved the motion.

John Young's added motion to clarify the role of past-Presidents

The past-President will serve if the President and the President-elect are unable to serve.

Was not acted on.

Mark Shafer [this discussion line actually was started during the previous topic] suggested that an annual newsletter with annual meeting minutes, state reports/program descriptions/ARSCO state, major issue statements, and other notes could be distributed electronically. O'Brien indicated that a 1-page annual ARSCO report was in some cases too little space in which to describe activities. The answer that a web link could be made seemed satisfactory. It was also asked 'why ARSCO only?'. A suggestion was made that a target date would be useful. It was pointed out that linking to other reports borders on a 'journal' and its not peer-reviewed. The following motion was made and seconded

A State Climatology Newsletter would be published by the end of the year following the Annual Meeting of the AASC. The editor is to be appointed by the President of the AASC.

A vote taken by the raising of hands unanimously approved the motion.

A question about whether a quorum was present was raised. A quick count of members present confirmed that the requirement was met.

Ken Crawford showed a draft letter in support of the COOP Modernization Plan from the AASC to head of NOAA vice-Admiral Lautenbacher. Ken indicated that lobbying was/is not being done. The proposed letter was written by Ken to be signed by the President-to-be as well as by the past and current Presidents. A motion was made to

Approve the sense of the discussed letter and ask the AASC executives to modify it as appropriate and to send it.

In discussions Livezey asked just who should be contacted and pointed out that current efforts for '05 should be mentioned. Ken clarified that it is a new plan. O'Brien suggested that action should be placed in the first paragraph. Other miscellaneous discussion about the letter structure ensued. Someone suggested that a reference to climate monitoring principles should be made. A vote taken by the raising of hands unanimously approved the motion. Ken's work over the recent months on the issue was applauded.

Election of Officers and new members

Ken Crawford was nominated as President-elect. Paul Knight was nominated as Secretary-Treasurer. A motion was made to accept the nominations by acclamation. A vote was actually taken by the raising of hands which unanimously approved the candidates.

The following individuals were nominated as associate members

Jay Grymes (LA)
Klaus Wolter (CIRES)
Keith Eggleston (NY)
Tom Pagano (NRCS)
Carlos Pabon-Ortiz (Puerto Rico)
Gary McManus (OK)
Derek Arndt (OK)
Ed Hopkins (WI)

A vote taken by the raising of hands unanimously approved the new members.

Other business

John Young made two motions [both shown below in final form after various modifications following discussion]. First

The AASC endorses an informal review of observed climate trends according to guidelines determined by the AASC by each office to be reviewed at the annual meeting.

And second

The AASC endorses and requests a policy of free access to regional scale subsets of model data used for national assessments and IPCC for analyses of predictive trends, hindcasts, trends, and variability. [Final, exact wording is pending receipt from John Young.]

Livezey indicated that hindcast trends were wanted. Taylor asked ‘what specific models?’. On the first motion, O’Brien says that we’re not ready for it, its not easy to do, it costs money and recommends that a voluntary subset of members work on this. Zandlo pointed out that non-homogeneities in data still confound the analyses. Robbins asks ‘how about a committee’ rather than each working independently. Christie asks ‘how can we make our individual observations visible?’. An email thread to make hints as to approach might help to work through common methods. Livezey commented that there is ‘no need for everyone to rediscover the wheel’. Mike Palecki (MW RCC) says that SCs, RCCs have been excluded from the National assessment and Leslie-Ann Dupigny-Giroux (VT) suggests involvement should be required. A vote taken by the raising of hands yields ‘11 opposed’ and ‘8 in favor’ so that the first motion does NOT pass. Palecki picks up his thread with a suggestion to amend the second motion to include ‘... and officers of AASC will act to ensure that members of AASC are included in the next national assessment’ which is not acted on. O’Brien says ‘facts’: Gore did regional assessment; 18 areas were assigned by agency people – some got money, some got nothing. Those with nothing did nothing and were not listened to. As for data, it IS available. Christie counters but not to use freely. Livezey adds that old results are not worth looking at since the models are changing. If AASC wants it, it can be done. A vote taken by the raising of hands yields ‘1 opposed’ and ‘all others in favor’ so that the second motion DOES pass.

A motion was made that Roger and Dave (Pres. And Pres-elect) will draft a letter on drought bills and submit to AASC membership for review. A vote taken by the raising of hands unanimously approved the motion.

Changes to voting membership

Hubbard points out that the NWS has shown excellent vision on climate. Robinson mentions a letter of intent from the NWS and from NCDC to join if asked. He says that we need their intimate involvement. Christie asks how can NWS get approval to vote as a U.S. government representative. Robinson points out their memberships in AMS. O’Brien points out that memberships can be personal and not professional status. Who exactly in NWS would represent NWS? Pasteris (NRCS) suggests that they don’t need to be a voting member. Livezey says it is legal for an NWS representative to vote in AASC. That membership can be claimed as ‘involvement’. More discussion ensued on the possibility of independence of ‘feds’. Pielke pointed out that all SC/RCC members are ‘corporate’ members. Redmond pointed out that there are no feds now and that the RCCs are more like the status of state members. Scott Archer (USDI) states that the definition of ‘ex-officio’ that ‘you’re a member because you’re an employee’ is useful in this context; i.e. it’s not the individual but rather the position that holds membership. O’Brien moves to table the discussion until the next meeting. A vote taken by the raising of hands unanimously approved the motion.

Carlos Pabon-Ortiz, attending an AASC meeting for the first time, asked ‘what is the purpose of AASC?’. Roger Pielke answers by having AASC objectives read.

Al Dutcher comments that some aspects of the climate extremes assessment relative to the recent large hail in Nebraska were not well handled. He wants to know the exact process for the assessment. Pielke and Robinson ask Al to work on it over the next year and report back.

Mark Shafer suggests that ‘by proxy’ voting would be useful for SCs in a fashion similar to the proxy allowed for RCC directors. O’Brien makes the motion that

An SC can designate a voting proxy for annual meetings. The designee should be an associate member.

Discussion starts with Mary Knapp (KS) stating there should not be a requirement that the voting designate must be an associate member. As an aside, the comment is made that identifying full members as corporate members might make it easier to have membership dues paid by host organizations. After further discussion as to the actual wording in the constitution, the motion to amend is simplified to

Add the phrase ‘or their designate’ to the reference to State Climatologist in the language which defines voting members.

A vote taken by the raising of hands unanimously approved the motion.

Location of next meeting.

Nominations for the location of the next meeting were called for. Keith Eggleston (NY) suggested Ithaca , NY (Cornell). No other places were suggested. A vote taken by the raising of hands unanimously approved the meeting location for 2004 as Ithaca. It was further pointed out that there are tentative plans to run the 2005 AASC annual meeting concurrently with the AMS Applied Climate meeting in June 2005 in Savanna, Georgia. That arrangement may need a MOU between the AASC and AMS. O’Brien offered that future meetings could be held in Florida between the dates of September 15 and May 15. Speaking for the AMS, Greg Johnson (NRCS) indicated that the AMS would like to proceed with the 2005 plans ASAP. A comment was made that Monday is a bad day to be out of the office – so please do not include Monday in meeting schedule.

Closing

Thanks and applause were given to Roger Pielke as outgoing President. Roger deferred to new President Dave Robinson who thanked Roger and all the members. He also thanked George Taylor for an excellent meeting. He said that he looked forward to seeing everyone in Ithaca next year. The meeting was declared adjourned.

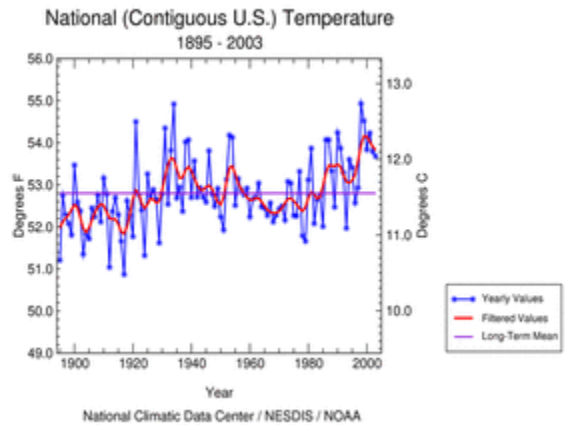
The Climate of 2003 Across The United States

* provided courtesy Anne Waple, National Climatic Data Center

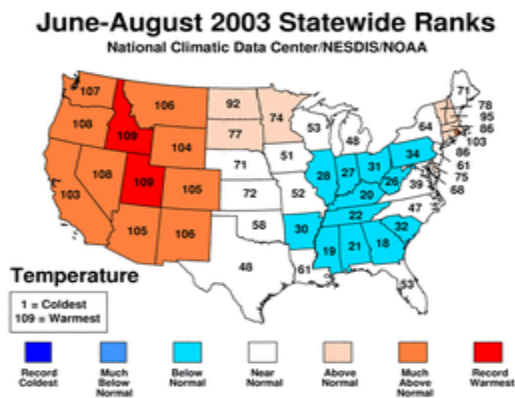
Temperature:

2003 was the 20th warmest year on record for the U.S., based on long-term data from the U.S. Historical Climate Network (Karl et al. 1990). The nationally averaged temperature for the year was 53.7°F (12.1°C). Cool temperatures in the East and warmth in the western half of the country were part of a persistent pattern in 2003.

The last five 5-year periods (1999-2003, 1998-2002, 1997-2001, 1996-2000), were the warmest 5-year periods in the last 109 years of national records, and the latest 6 (1998-2003), 7 (1997-2003), 8 (1996-2003), 9 (1995-2003) and 10-year (1994-2003) periods were the warmest on record for the U.S., illustrating the anomalous warmth of the last decade.



The 2002-2003 winter season (Dec-Feb) was 32nd warmest on record for the U.S., with warmth in the Northwest and West and cool conditions stretching from the South to the Northeast. Spring (March-May) was warmer than normal nationally with much of the country warmer than average in each of the spring months, except for consistently cool conditions in the Northeast. Summer (June-



August) was 14th warmest in 109 years of national records. Climate Division data (Guttman and Quayle, 1996) reveals that the western half of the country contributed most to that warmth, while the Central and Southeast regions were cooler than average over the summer. The 2003 fall season (September-November) was 20th warmest on record, with some states in the West having a record warm October. In November the persistent pattern of warmth in the West and cool in the Northeast was replaced with cooler temperatures to the West and some warmth in the East. However, December returned to the more persistent pattern of 2003 with some southeastern states cooler than average and warmth across much of the remainder of the

contiguous states.

In 2003, according to the divisional data, 4 months (January, July, August, and October) averaged very warm over 30% or more of the country. Nearly 20 percent of the country was very cold in June though in no other month in 2003 was there a large percentage of the country affected by very cold temperatures. Very warm and very cold conditions are defined as the warmest and coldest ten percent of recorded temperatures, respectively.

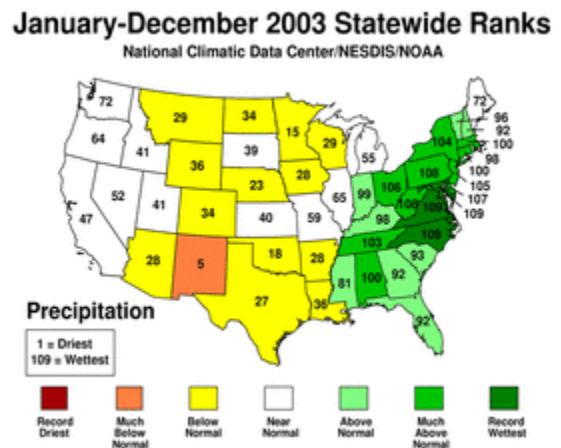
2003 was the warmest year on record for New Mexico and the second warmest for Nevada and Idaho. Seven other states were much warmer than normal during 2003. Cooler statewide annual temperatures were generally confined to the Southeast and parts of the Northeast. Annual temperatures averaged across the state of Alaska in 2003 placed 4th warmest since 1918, with every season in 2003 in Alaska averaging above normal.

Data collected by NOAA's TIROS-N polar-orbiting satellites and adjusted for time-dependent biases by NASA and the Global Hydrology and Climate Center at the University of Alabama in Huntsville, indicate that temperatures in the lower half of the atmosphere (lowest 8 km of the atmosphere) over the U.S. were warmer than the 20-year (1979-1998) average for the 6th consecutive year. 2003 ranks as the 5th warmest year since satellite records began in 1979.

Precipitation and drought:

Based on divisional data during 2003, more than a tenth of the country was very dry in 3 months, with percentages in January exceeding 30%, and in July nearly 25% percent of the country was very dry. In every month from February to July the percentage area of very wet conditions exceeded ten percent. This was due in part to the persistent pattern of cool and wet conditions in the eastern half of the country. Drought persisted in many of those areas which began the year in drought.

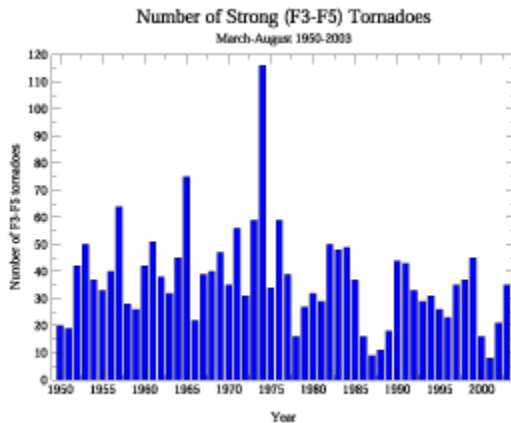
Precipitation in the United States in 2003 was characterized by persistent dryness in the West and above average wetness in the East. Virginia had its wettest year on record during 2003, already exceeding the previous annual record by the end of November. North Carolina and Maryland also broke the previous annual record for precipitation by the end of December 2003. Twelve states were much wetter than normal with the Southeast and Northeast regions as a whole having their third and fourth wettest years on record, respectively. New Mexico had its 5th driest year. Virginia, North and South Carolina had their wettest spring on record. It was also the driest spring on record for Texas. It was second wettest spring and summer for the Southeast and the five month period from May-September included six states with record wetness.



At the beginning of 2003, moderate to extreme drought (as measured by the Palmer Drought Index) covered one-third of the contiguous United States including much of the West and parts of the central and northern Plains to central Great Lakes. Precipitation in many of the drought areas during the subsequent five months resulted in a decrease of the drought area to about 20 percent by June. The combination of generally warmer- and drier-than-average conditions during the following four months led to an increase in the areal coverage to about 41 percent by October. Generally wetter conditions near the end of the year caused a decrease in the drought area to about 31 percent by the end of December. The percent area of the nation in severe to extreme drought followed a similar pattern throughout the year.

Tornadoes:

There were 35 very strong to violent tornadoes (wind speeds in excess of 158 mph, category F3-F5 on the Fujita Scale) during the 2003 tornado season (March-August). This is close to the long-term (1950-2001) mean of 38 and is more active than each of the last 3 seasons. A slight negative trend in very strong to violent tornadoes has been observed since 1950. Though the season was near average, there were several notable storm outbreaks in 2003. These include the record outbreak in May where a total of 516 tornadoes occurred during the month, the greatest monthly total for any month since national records began in 1950. Thirty-nine people were killed as a result of those tornadoes in May. Tornadoes in Texas and Oklahoma in April claimed 11 lives, while 6 people died in severe thunderstorms and a tornado in Georgia in March.



Tropical Storms:

There were 16 named tropical storms in 2003, 7 of which became hurricanes with 3 reaching major hurricane strength (category 3-5 on the Saffir-Simpson Scale). On average, 10 named storms form with 6 growing to hurricane strength and two developing into major hurricanes. The higher than average number of tropical cyclones in 2003 is consistent with an observed increase in activity since the mid-1990s. Six storms impacted the U.S. with Hurricane Isabel causing 16 deaths and over two billion dollars of damage in the Mid-Atlantic states in September.

Snow:

The 2002/2003 snow season was generally above average along the eastern seaboard. Stations from Oklahoma northeast to the Great Lakes also recorded as much as 200% of normal snowfall for the 2002/2003 season. Snow totals for locations in the West and northern Great Plains were mostly below normal for the season, although the Rockies' Front Range and parts of the Sierra Nevada Mountains had near average snowfall. A large snowstorm in March in the Front Range made up for some low snow totals early in the season for the central Rockies, and a large storm in February broke many 24-hour snowfall records in the East.

Wildfires:

The Western wildfire season began slowly in 2003 due to some late winter precipitation at the lower elevations, however a persistent ridge of high pressure dominated the western weather pattern for much of the season leading to hotter and drier than average conditions in much of the West. Fire activity escalated in May in the Southwest continuing well into July. One of the largest fires in the Southwest in 2003 was the Aspen fire near Tucson, Arizona, which burned around 85,000 acres in June and July, according to the National Interagency Fire Center. In late July, fire activity increased in the Northern Rockies with large areas in western Montana and southern Idaho threatened, including areas of Glacier National Park. The fires in the northern Rockies were not completely contained until mid September. Over 700,000 acres were burned and 96 structures destroyed in the Northern Rockies in the 2003 wildfire season.

Santa Ana wind-driven fire activity developed in California in October. Over 750,000 acres were

destroyed in 15 large fires in southern California. Over 3,500 homes were also burned and over 1,100 other buildings consumed in the California fires.

According to the National Interagency Fire Center, at the end of November, the national number of fires was reported at 74% and the acres burned were at 81% of the ten-year average.

References:

Guttman, N.B. and R.G. Quayle, 1996: A Historical Perspective of U.S. Climate Divisions. Bull. Amer. Met. Soc., 77, 293-303.

Karl, T.R., C.N. Williams, Jr., F.T. Quinlan, and T.A. Boden, 1990: United States Historical Climatology Network (HCN) Serial Temperature and Precipitation Data, Environmental Science Division, Publication No. 3404, Carbon Dioxide Information and Analysis Center, Oak Ridge National Laboratory, Oak Ridge, TN, 389 pp.