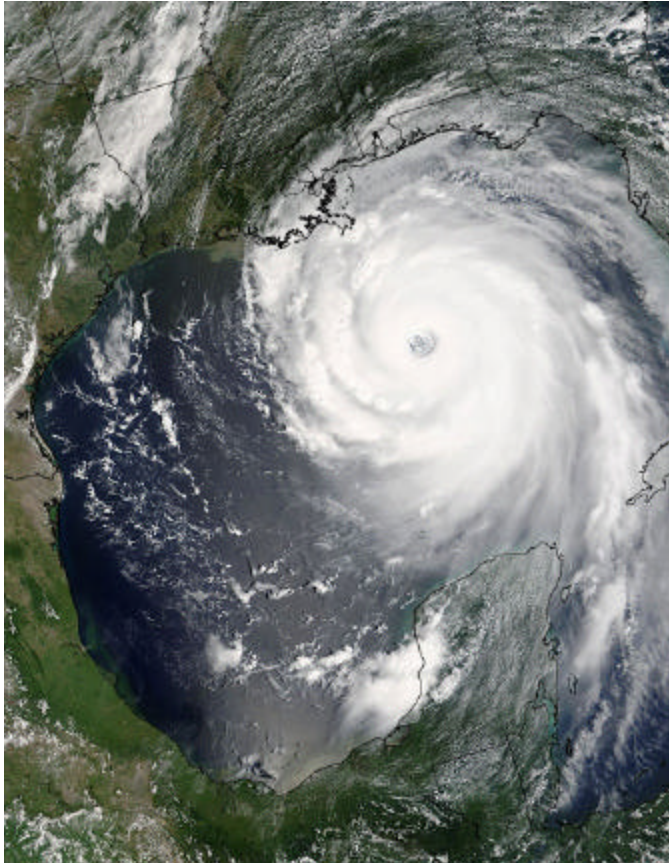


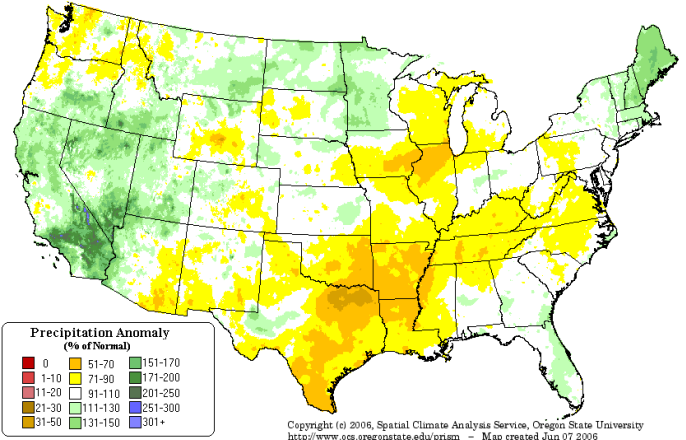
# THE STATE CLIMATOLOGIST

2005 Annual Summary  
Volume 24, Issue 1

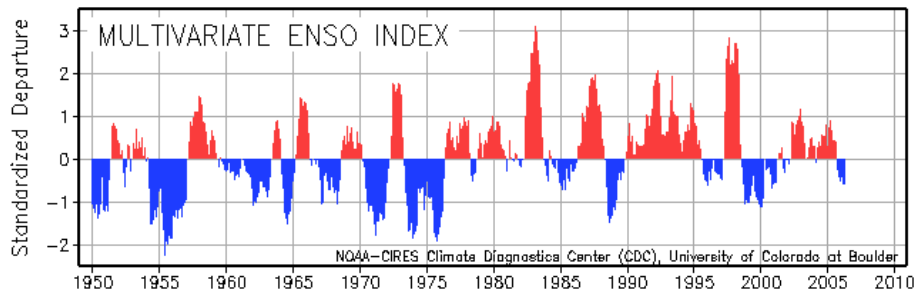
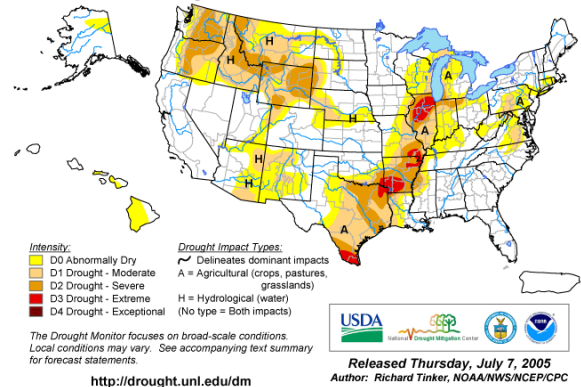


Hurricane Katrina, August 28, 2005

Precipitation Anomaly: Annual 2005  
Final Data



U.S. Drought Monitor July 5, 2005  
Valid 8 a.m. EDT



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

<b>Ken Crawford, President</b> Oklahoma State Climatologist	<b>Paul Knight, President-Elect</b> Pennsylvania State Climatologist	<b>Jan Curtis, Secretary-Treasurer</b> NRCS-National Water and Climate Center
<b>Tim Owen, Ex-Officio Member</b> National Climatic Data Center	<b>Bob Livezey, Ex-Officio Member</b> National Weather Service	<b>Laura Edwards, Editor,</b> The State Climatologist Western Regional Climate Center

## Editor's Note

*The State Climatologist* is an annual report of activities of members of the American Association of State Climatologists. It has been a pleasure to be the editor of this year's edition, covering the period January-December 2005.

I would like to express appreciation to all the state climate offices, regional climate centers, AASC partners and others who contributed to this year's edition.

Laura M. Edwards  
Western Regional Climate Center  
Desert Research Institute  
June 16, 2006

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## **About the American Association of State Climatologists**

The American Association of State Climatologists(AASC) 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.

## Reflections: Significant Changes, Extraordinary Challenges

As my two-year tenure as your President draws to a close, I am struck by all that has occurred in only two years amongst our group and within our field of applied climatology. It hardly seems like two years have passed since our annual meeting in Ithaca, NY where I began serving as the first two-year President for the AASC. And yet, the real marvel is not in how time has flown, but how many changes have come our way during this short period.

For example, since Ithaca, the AASC will have confirmed the appointment of seven new State Climatologists (SCs) with five more appointments pending, the departure of three other SCs, as well as a change in the Directorship of the Southeast Regional Climate Center in Columbia, SC. These numbers convert to a turnover rate of ~32% in our base membership of 47 active SC Offices (SCOs)! In addition since Ithaca, five 'recognized' SCOs have joined (or will soon join) the ARSCO ranks (now 34 and counting) and increased the certification rate to ~72%. Yet, perhaps we should use this occasion to encourage 13 other SCOs to become AASC recognized during the months ahead.

Internally, the AASC is financially sound. Technically, the new AASC Web Pages that will be unveiled in Rapid City, SD promise to interweave our collective wisdom and combined works to make even the inventor of the Internet proud. Scientifically, the announcement of the inaugural AASC Dissertation Medal in Applied Climatology should project the visibility of the AASC into many academic departments across North America. Administratively, the forthcoming re-competing of the RCC Program promises to invigorate a successful program that has been in existence for more than two decades.

Even with these significant changes, many extraordinary challenges lie ahead. None will be bigger than the development of a National Integrated Drought Information System (NIDIS), an emerging NOAA-led federal program that appears to have growing Congressional support. A close second in importance lies with the ultimate fate of decades-long plans to modernize the nation's Cooperative Observer Network. Here, there is good news and there is bad news. The good news is that NOAA (primarily NCDC teamed with the NWS) appears committed to the modernization of ~1000 sites in the Historical Climate Network, a subset of the larger Legacy network. Unfortunately, the fate of remaining sites in the Legacy network hangs in modernization limbo.

As if these changes and challenges were not enough, the rate at which climatic extremes are finding their way into our yearly headlines ought to give us enough scientific fodder to elevate applied climatology into new, uncharted waters. May that be our collective opportunity during the years ahead.

**Ken Crawford, President**  
**American Association of State Climatologists**  
**May 2006**

# Going beyond the data

By *Laura M. Edwards*  
*Western Regional Climate Center*  
*Desert Research Institute*

In preparing this issue of *The State Climatologist*, I was encouraged to read that state climate offices (SCOs) and regional climate centers (RCCs) have experienced growth in the number of customer contacts over the last year. New or old, big or small, SCOs and RCCs are disseminating more climate data, products and information than ever. The expanded use of the Internet is certainly a factor in facilitating this growth. This demonstrates, if nothing else, the AASC's growing importance in the decision-making processes at many levels: local, statewide, and regional.

The growing interest in climate change and variability often calls for us to interpret "plain old data" into understandable terms for users of all backgrounds and interests. The difference between data and information is summarized by Changnon and Kunkel (1999): "Information is the synthesis and interpretation of the data done to address specific needs." Some examples of the user groups requesting climate information include the public and media, water resource managers, the energy supply sector, and the weather derivatives sector, among various others.

Alas, the accurate and effective communication of weather and climate information is not a new challenge (Changnon and Kunkel 1999, Changnon et al. 1990). What is new is the availability of climate information to users, such as through the Internet; more suppliers of information over the last couple of decades in the addition of new SCOs, development of RCCs, and more private companies; and increased media attention, to name a few. Popular media has also piqued interest in weather, global climate change and climate variability through movies such as *Twister*, *Day After Tomorrow*, and most recently, *An Inconvenient Truth*. Interest has turned from acquiring the traditional daily temperature, precipitation or snowfall data towards faster availability, more accurate data on shorter timescales and more sophisticated products. On the products side, more interaction and/or documentation is needed with the users to interpret increasingly complicated derived products, or to wade through the large number of data and products to assess which are most useful for their purpose. Changnon (2004) found that continued interaction between climatologists and the users generally led to increased trust of the climatologists and increased use of the products they developed.



*Figure 1. Jim Ashby, Climatologist at the Western Regional Climate Center, handles data and information calls and answers questions from students, lawyers, government agencies and the media.*

The RCCs were created, in part, in response to the development of the National Climate Program (NCP) in 1978. The Act of Congress PL95-367 in September 1978 focused on three major activities (Changnon et al. 1990): 1) climate impact assessment, 2) climate system research, and 3) data, information and services. The two that particularly apply to the RCCs are climate system research and data, information, and services. Changnon et al. argue that “applied research, particularly in the climate impacts area”, leads to improved services at the RCCs. It is interesting to note that many of the challenges the

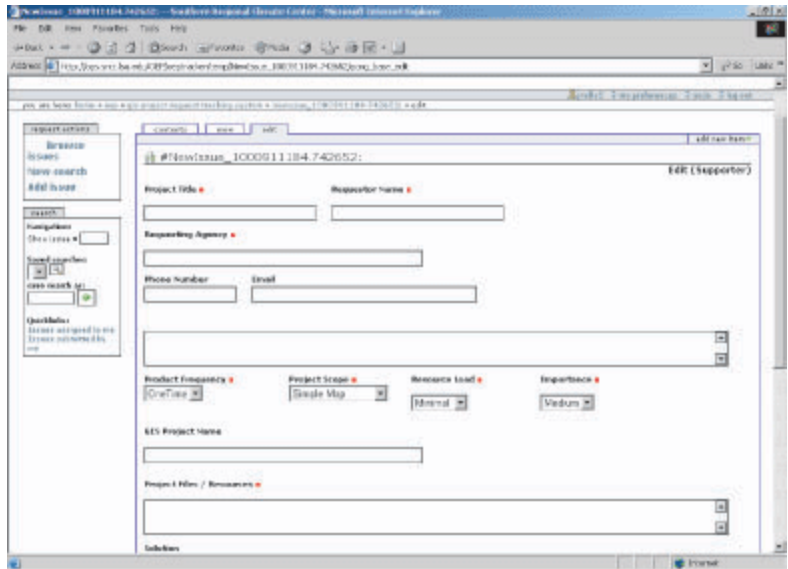


Figure 2. The Southern Regional Climate Center was part of a team that responded quickly to the Hurricane Katrina disaster. Here is their tracking system in the Emergency Operations Center. The report is at: <http://www.colorado.edu/hazards/qr/qr180/qr180.html>.

RCCs faced in the early-mid 1980s still exist today, nearly 30 years after the creation of the NCP. We are still confronted with the factors raised in witness testimony to congressional committees in 1976-77, namely: data management issues, data quality, and misinterpretations of climate data.

The Regional Integrated Sciences & Assessments (RISA, [http://www.climate.noaa.gov/cpo\\_pa/risa/](http://www.climate.noaa.gov/cpo_pa/risa/)) program in the United States has

made progress in addressing the climate impacts on a number of regions and teaching communities in their region about these impacts. Nine RISA offices have been created, or recommended for funding, thus far. These groups are designed to create partnerships in research and climate services, combining physical and social sciences together. Similar to the RCCs, the RISA program has set out to assess regional-specific impacts of climate. For example, California Applications Program (<http://meteora.ucsd.edu/cap/>) works primarily on issues of water supply in snowmelt-driven systems, fire applications, health and drought, and their research group includes climatologists, hydrologists, geologists and fire scientists. The New England Integrated Sciences and Assessments (<http://meteora.ucsd.edu/cap/>) investigate air quality and health issues. Typically, the RISAs work closely with the RCCs and SCOs in outreach and communications with constituents on regional areas of interest, making another complimentary path for climate information to reach beneficiaries. Geared for social interactions, RISAs focus on reducing the vulnerability of groups to changes in climate (i.e. Finan et al. 2002, Bales et al. 2004, Liverman and Merideth 2002).

I would venture to say that most of us thoroughly enjoy the time spent talking with our users, customers, or clients -- however you name them. The potential uses of simple temperature and precipitation data often appear to be as wide-ranging and varied as the



number of times our phones ring in any given month. This diversity of applications can, however, create challenges in interpreting and communicating relevant information in a timely manner.

As a user-driven group, finding more users, or even developing relationships with repeat users, of our products and expertise is a constant challenge. Each potential user group has specific needs for reliability, quality, timing, spatial scope, and other parameters. Scientific literature has been published addressing the use (or non-use) of climate forecasts and historical information in various sectors (McCrea et al. 2005, Rayner et al. 2005, Hartmann et al. 2002). While not necessarily in the realm of all the SCOs or RCCs, through forecasts constituents can learn about and acknowledge climate impacts on various industries, leading to improvements in how we communicate climate information to these sectors as well as priming the audience to understand the science when events such as hurricanes or extreme ENSO warm or cool conditions become a matter of concern.

Murnane et al. (2002) summarized a workshop that included private sector and NOAA climate scientists intended to determine the needs of the weather risk management industry. The weather derivatives group was specific about the data and metadata needs they had. Additionally, the regular, on-demand availability of data was key to their operations, which is also a concern for the wildland fire user group. These are new types of challenges the climate services community faces to provide these kinds of resources to the user groups. The summary concludes that “users benefit by direct communication with federal products producers, and the government benefits by collecting user feedback to improve service” (Murnane 2002). This is a sentiment I hear echoed by many in the climate services community; we cannot improve our services unless we know what is wrong or what the users need.

Climate services are integral to decision-makers. A UCAR webpage (<http://www.ucar.edu/communications/awareness/2001/weather/>) asserts that, increasingly, America depends on weather and climate services in the realms of public safety, economy, environment and national security. On a smaller scale, members of AASC can touch the lives of people closer to us such as a student doing a science fair project, or discussing the finer points of drought with Elderhostel participants. Demands for our services and expertise are increasing and I believe the members of AASC are able to step up to the challenge and continue to provide relevant and scientifically accurate climate services to users young and old. Reaching out to user groups, providing information in a timely manner, reliability, consistency and effective communication will be necessary to keep the public interested in our passion. The next 30 years of climate services are guaranteed to be exciting and challenging.

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# 2005 Summary of the United States Climate

Compiled and written by Anne Waple, STG, Inc. and National Climatic Data Center

## National Temperature

2005 was the 13th warmest year on record for the contiguous United States (U.S.) with a nationally averaged temperature of 54.0°F (12.2°C). This is 1.2°F (0.7°C) above the 1895-2004 mean.

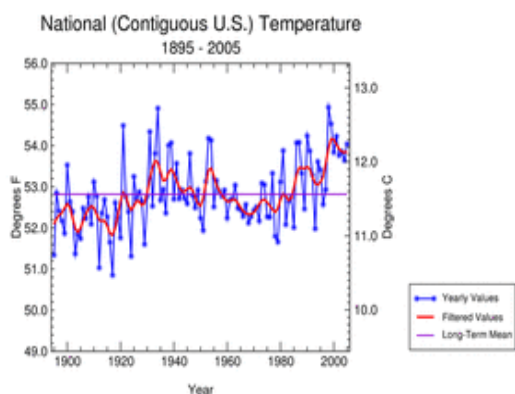


Figure 3. Annual average national temperature for the U.S.

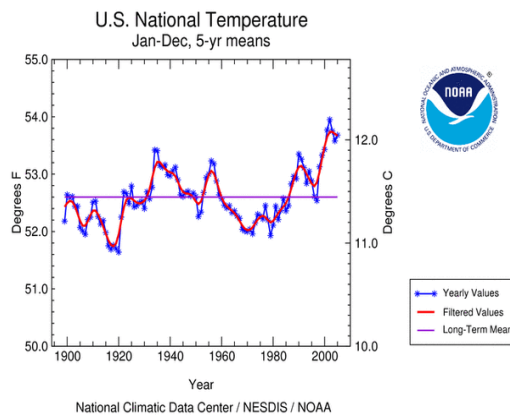


Figure 4. 5-year average of annual temperature for the U.S.

The last five 5-year periods (2001-2005, 2000-2004, 1999-2003, 1998-2002, 1997-2001), were the warmest 5-year periods (i.e. pentads) in the last 111 years of national records (Figure 2), illustrating the anomalous warmth of the last decade. The 6th warmest pentad was in the 1930s (1930-34), when the western U.S. was suffering from an extended drought coupled with anomalous warmth. The warmest year on record for the U.S. was 1998, where the record warmth was concentrated in the Northeast as compared with the Northwest in 1934.

## Seasonal Temperature Analysis

The temperature for the 2004-2005 winter season (Dec-Feb) was warmer than average for the nation (12th warmest out of 110 years), with much warmer than average temperatures in parts of the Rockies and northern Plains.

Spring (March-May) was near average (55th coldest, 57th warmest out of 111 years of records) for the nation with much below average temperatures along the Eastern Seaboard balancing warmer conditions in the Northwest.

Summer (June-August) was warm across much of the nation and ranked 17th warmest in 111 years of national records, with the majority of the northeastern U.S. much warmer than

average. The Northeast as a whole had its 2nd warmest summer on record, with New Jersey and New Hampshire averaging record warm for the season.

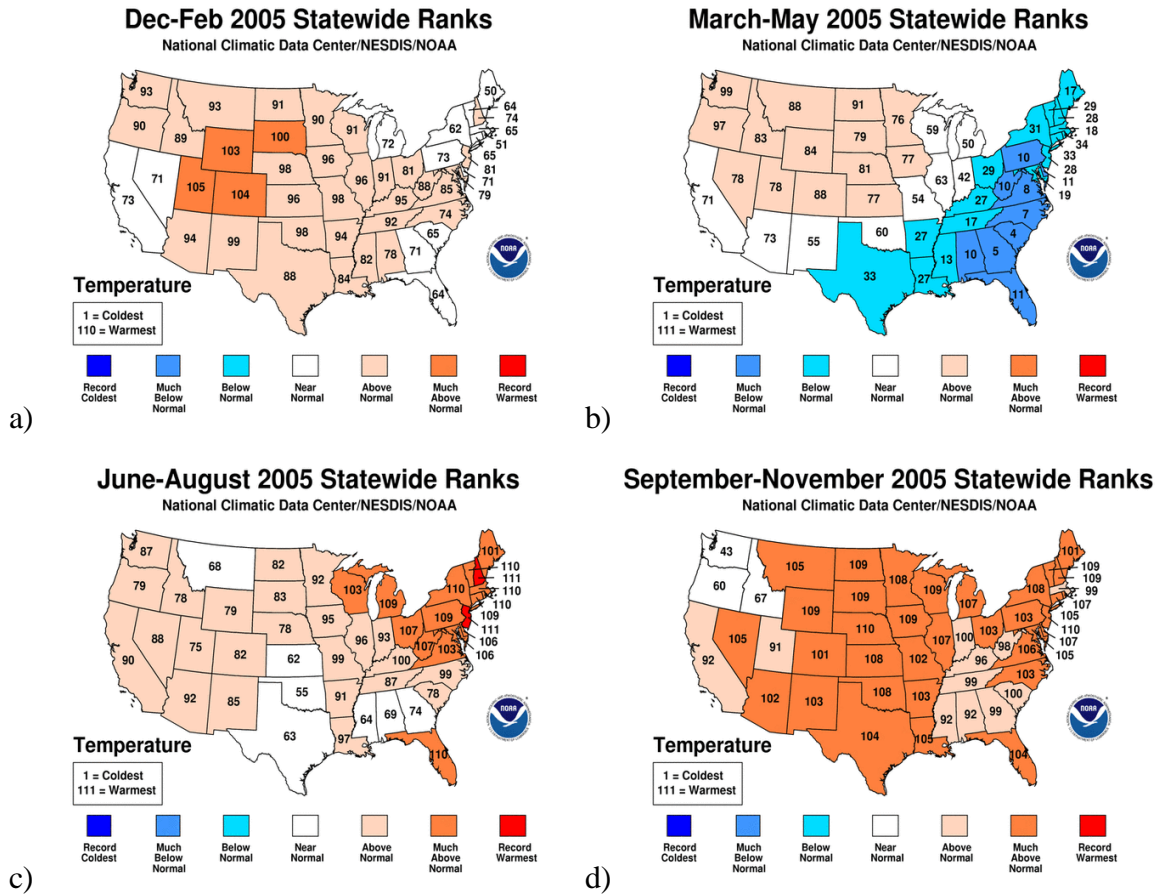


Figure 5. Statewide temperature ranks for a) winter, b) spring, c) summer and d) fall.

The 2005 fall season (September-November) was 4th warmest on record, with all but 3 contiguous states having above average warmth.

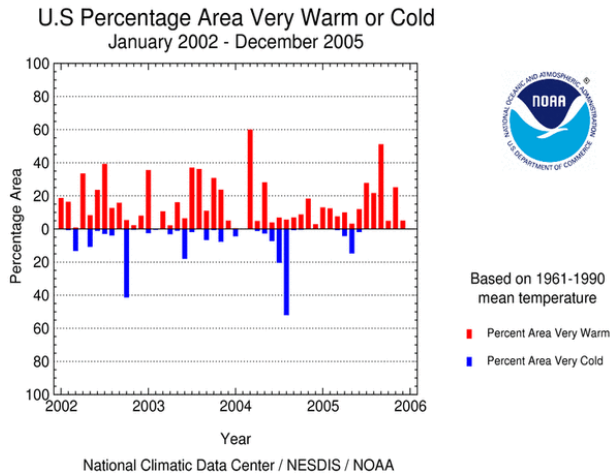


Figure 6. Monthly percent area of the contiguous U.S. which was very warm or very cold.

Figure 4 shows the percentage of the contiguous U.S. that was very warm and the percentage that was very cold during each month of the past 4 years. Very warm and very cold conditions are defined as the warmest and coldest ten percent of recorded temperatures, respectively. In 2005, only one month's average temperature (May) was very cold

over 10% or more of the country, with April at just under 5%. Over 10% of the U.S. was very warm for seven months in 2005, while over 20% of the country was very warm in 4 months, (July, August, September, and November), with September averaging over 50% of the nation in the very warm category.

These percentages are computed based on the climate division data set. Those climate divisions having the monthly average temperature in the top tenth percentile of their historical distribution are very warm and those in the bottom tenth percentile are very cold.

## Statewide Temperature Analysis

2005 was much warmer than average for 17 states, including Minnesota, which was 5th warmest on record. A further 26 contiguous states were warmer than average, and only 5 southeastern states remained near average for 2005.

**January-December 2005 Statewide Ranks**  
National Climatic Data Center/NESDIS/NOAA

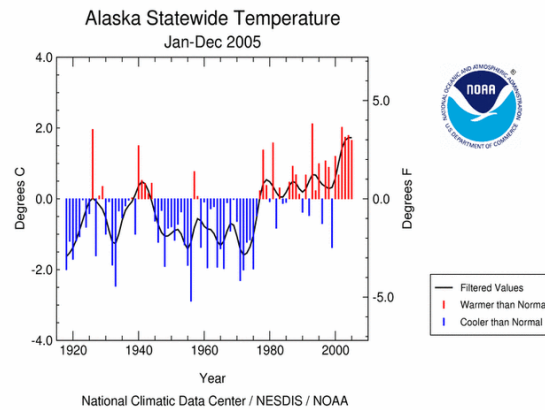
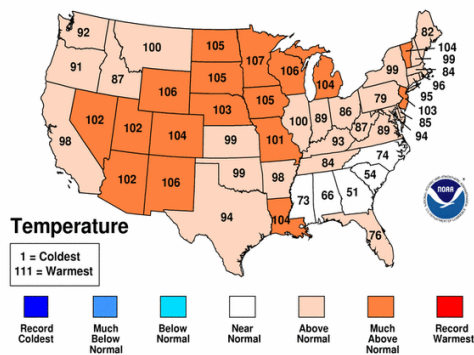


Figure 7. a) Statewide ranks for annual temperature across the U.S. in 2005, b) annual temperature anomalies for Alaska compared to a 1971-2000 normal.

Annual temperatures averaged across the state of Alaska in 2005 placed 6th warmest since 1918 - the 6th consecutive above-average year for the state, which is unprecedented in the historical record. Alaska had another warm summer in 2005 (3rd warmest on record) following the record warm summer of 2004. The summer warmth coupled with anomalous dryness in parts of the state also contributed to an active wildfire season for Alaska.

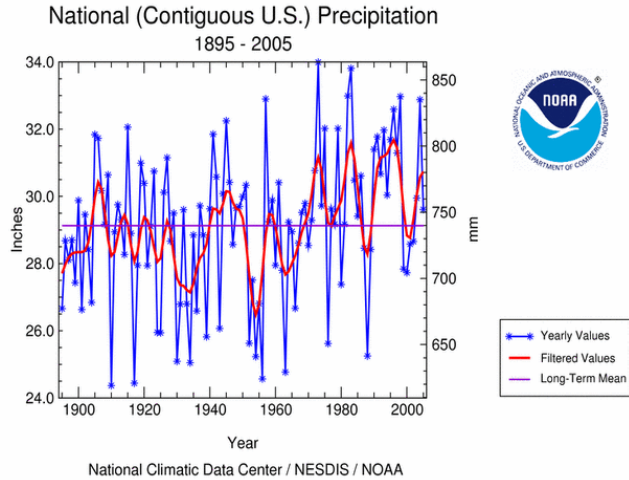
### Satellite-derived temperatures

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 8th consecutive year. 2005 ranks as the 6th warmest year since this satellite record began in 1979.

# National Precipitation

Precipitation in the United States in 2005 was variable throughout much of the country with periods of excessive rainfall, especially in the Southwest and Northeast, and persistent and developing drought in other areas. Winter storms in the Southwest led to record or near-record seasonal precipitation for much of the region, while the fall was record wet for the Northeast. Severe drought affected the Northwest during the 2004-2005 winter, however the drought situation was significantly improved with abundant spring precipitation. The southern Plains to the Great Lakes had severe moisture deficits from the spring through the fall. Twenty-four states were wetter than average from January-December, including 9 states that were much above average and 2 states that were record wet. Ten states were drier than average including Arkansas, which had its second driest year on record. Nationally, it was near the long-term mean, ranking 49th wettest year on record (Figure 6).

Figure 8. Annual precipitation for the contiguous U.S. based on divisional climate data.



Below average rain and snowfall occurred in parts of the South, southern Great Lakes and the Pacific Northwest during 2005. This dearth of precipitation in the Northwest during the winter months, led to severe drought conditions across the region, with the main storm track remaining south and bringing excessive moisture to the Southwest (Figure 7). Some drought relief came during the spring, with above average rain and late-season snow. Drought developed in the central U.S. during the spring and into the fall, leading to extreme drought in parts of the southern Great Plains and in the southern Great Lakes.

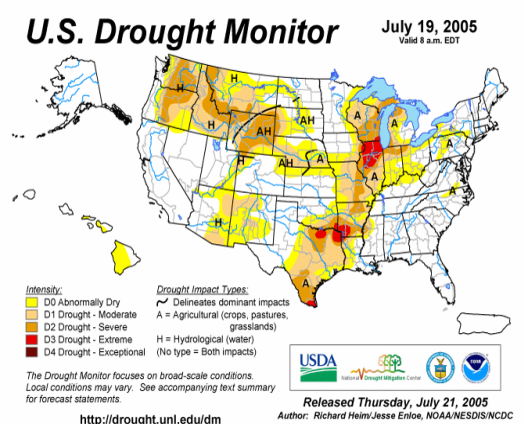
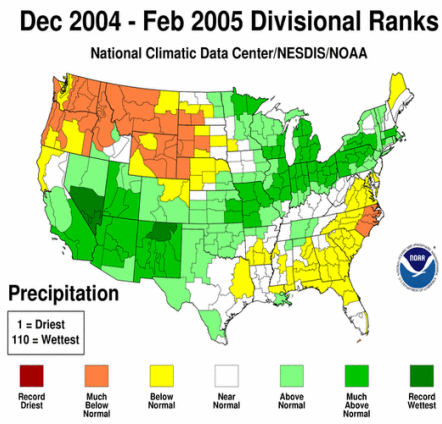
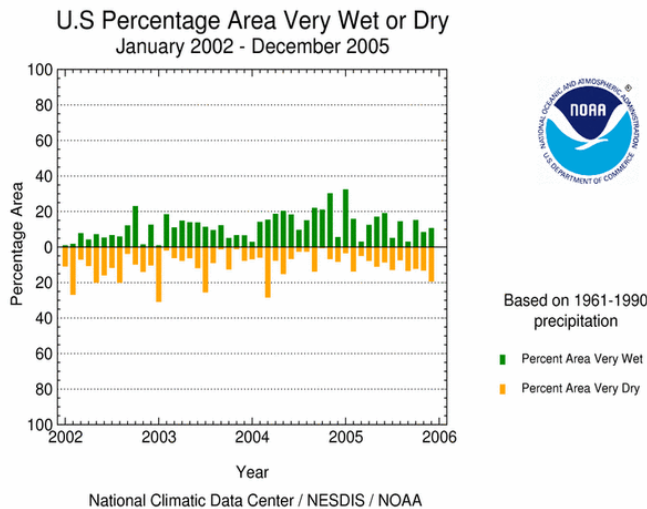


Figure 9. a) Divisional climate ranks for Winter 2004/05, and b) the weekly U.S. Drought Monitor map for July 19, 2005.

A series of major Pacific winter storms contributed to the moisture in the Southwest in 2005, with Los Angeles having its wettest (37 inches) rain year (Jul-Jun) in 121 years and 2nd wettest water year (Oct-Sep) on record. Rainfall for the city totaled 16.97 inches from December 27, 2004-January 10, 2005, making it the wettest 15 days on record for Los Angeles. The storms acquired moisture from the warm central Pacific Ocean before reaching the coast and mountains of the Southwest. The Northeast also had extreme precipitation in fall 2005, with 9 states (New Jersey and Delaware to Maine) having record rain and snowfall for October and 2 states (Maine and New Hampshire) having record precipitation for the year. Over 17 inches of rain fell at Millbrook, NY during October. Some of the October rainfall in the Northeast came from the remnants of two tropical systems (Tropical Storm Tammy and Hurricane Wilma).

Figure 8 shows the percent of the contiguous U.S. that was very wet and the percent that was very dry during each of the past 48 months. During 2005, more than a tenth of the country was very dry in 7 months



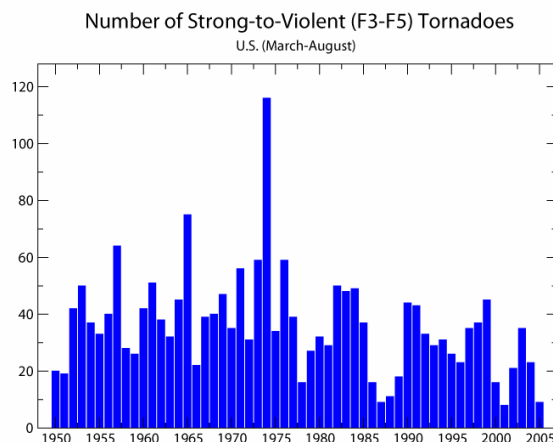
was very dry in 7 months (February, May, July, September, October, November and December). For 8 months, the percent area of very wet conditions exceeded ten percent, also exceeding 15% for 4 months (January, February, May, and June).

Figure 10. Monthly percent area of the contiguous U.S. which was very wet or very dry. See figure 4 for further details.

## Severe Storms

Preliminary estimates indicate there were only 9 very strong to violent tornadoes (wind speeds in excess of 158 mph, category F3-F5 on the Fujita Scale) during the 2005 official tornado season (March-August). This is significantly below the 1971-2000 mean of 37. A slight negative trend in very strong to violent tornadoes has been observed since 1950. There were no F4 or F5 tornadoes during the main tornado season - all 9 major tornadoes were F3 intensity.

Figure 11. Number of F3-F5 tornadoes across the U.S. during 2005.



There were several notable storm outbreaks in 2005. These included an outbreak of severe weather across Mississippi and Louisiana in April that led to reports of over 30 tornadoes. Tornadoes occurred in Wisconsin in June, one of which ripped through the town of Hammond, causing over \$3 million in damage. Again, in August, in Wisconsin and also in Wyoming, severe thunderstorms generated tornadoes killing at least 3 people. Tornadoes also touched down across parts of the central U.S. in September as thunderstorms moved across the area between Oklahoma and Wisconsin. A relatively late storm outbreak occurred across parts of the Midwest in November, with 23 fatalities in Evansville, Indiana on November 6th. More severe weather impacted the same region on November 15th with over 30 tornadoes reported. Although the peak months for tornadoes are April-June for the U.S., outbreaks of severe weather are not uncommon in November as the seasonal transition can provide atmospheric conditions similar to those in spring.

## Atlantic Hurricanes

The Atlantic Basin had a record active season in 2005 with 27 named storms, 15 of which were hurricanes, including 7 major hurricanes. Of the 7 major hurricanes, an unprecedented 4 reached category 5 status. The average (based on data from 1944-1996) is approximately 10 named storms, of which 6 are hurricanes, including 2-3 major hurricanes. The ACE index of hurricane activity also indicates a significantly above average season - the 3rd most active on record, with a preliminary value of approximately  $240 \times 10^4 \text{ knots}^2$ . An average season is anywhere from  $66 \times 10^4 \text{ knots}^2$  to  $103 \times 10^4 \text{ knots}^2$ .

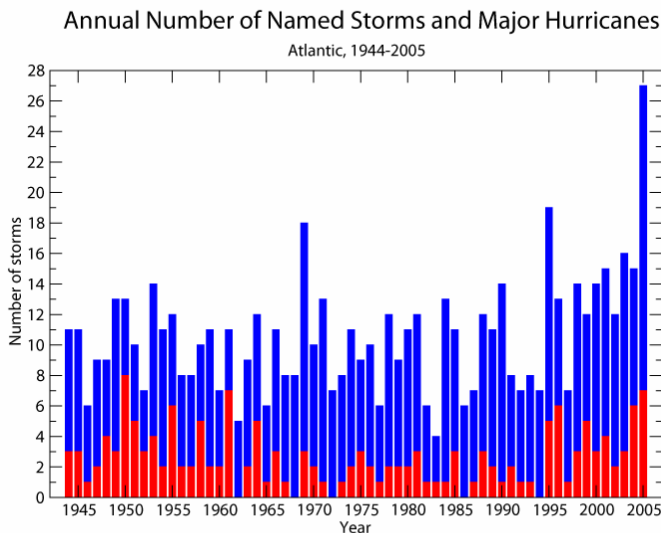


Figure 12. Number of named storms and hurricanes in the North Atlantic Basin in 2005.

Hurricane Katrina, which was one of the most costly storms in U.S. history, made landfall in August. At one stage a category 5 hurricane, Katrina ultimately made landfall in Louisiana and Mississippi at category 3 strength. While loss of life does not approach the magnitude of the Galveston Hurricane of

1900 (6000-12000 deaths), it nonetheless caused more than 1300 deaths and will likely cost more than 100 billion dollars - by far the highest cost of any hurricane in history.

Other hurricanes that impacted the U.S. coast in 2005 were major Hurricanes Rita, Wilma, and Dennis, with Hurricane Emily making landfall in Mexico and producing rain in Texas, and Hurricane Ophelia brushing the coast of North Carolina. More details about these and all the 2005 Atlantic tropical systems can be found on NCDC's hurricane page <http://www.ncdc.noaa.gov/oa/climate/severeweather/hurricanes.html>



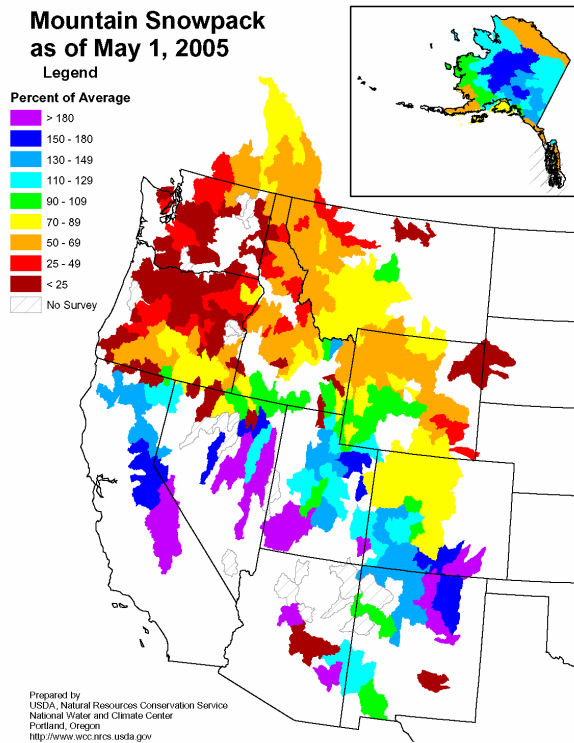
## Snow Storms and Snowpack

The 2004/2005 snow season was generally above average across the Southwest and much below average across the northern Rockies and Pacific Northwest, consistent with weak El Niño conditions in the tropical Pacific. Snow cover was slightly below average for the North American continent as a whole over the winter and much below average for the spring, consistent with a trend towards reduced spring snow cover for North America as shown in Figure 11.

Notable snow storms in 2005 include a major winter storm, referred to as the 'Blizzard of 2005', in January that affected the Northeast and produced well over a foot of snow across much of southern New England. Boston had its snowiest January on record partly as a result of that storm and NCDC's Northeast Snowfall Impact Scale ranked the January snow storm as the 7th most intense on record. Heavy snow produced over 2 feet of accumulation in the mountains around Denver, CO in April and a significant snow storm affected the Midwest early in the 2005/06 winter, with 16-20 inches of snow accumulating across parts of Nebraska and the Dakotas in November. More details of these and other snow and ice events are available in the annual summary of significant events.

*Figure 13. Percent of average western snowpack as of May 1, 2005. Courtesy of Natural Resources Conservation Service.*

Snowpack in the West was much above average for the Southwest and much below average for the Northwest in the 2004/2005 winter. The multiple storm systems that brought rain to the coastal and desert Southwest, also brought abundant snow to the Sierra Nevada and central and southern Rocky mountains. With the storm track remaining to the south, the Northwest snowpack failed to develop as normal and measured less than 50% of normal by the end of winter across large parts of the region. The Northwest relies on melting winter snow to replenish reservoirs. Spring precipitation eased drought conditions in the Northwest.



***This information and more can be found on NCDC's annual report web page:  
<http://www.ncdc.noaa.gov/oa/climate/research/2005/ann/ann05.html>***

# Partner Summaries

## NOAA/National Weather Service Climate Services Division

1325 East-West Hwy W/OS4  
Silver Spring, MD 20910  
[www.nws.noaa.gov/om/csd/](http://www.nws.noaa.gov/om/csd/)



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In 2006, NWS Climate Services Division (CSD) continues the implementation of its regional and local climate services program. In addition to continuing development of new local climate forecast products, data related activities have increased. The following activities and services of the NWS Climate Services Program are highlighted.

### Observations and Data Issues

The CSD continues to play a leading role to ensure the integrity of the nation's climate record. CSD has been cooperating with climate service data partners, including the National Climatic Data Center (NCDC), Regional Climate Centers (RCC), and State Climatologists (SC), on the following ongoing projects:

- Funding for standby power at 150 Automated Surface Observing System (ASOS) sites in hurricane prone areas near the coasts, including 60 Local Climatological Data (LCD) publication sites. Efforts continue to get funding of standby power for the other nearly 200 ASOS LCD publication sites across the country.
- Developing decision criteria for determining data continuity (station renumbering) for relocated Cooperative Observer Program (COOP) stations and decommissioning legacy COOP stations in the NOAA Real Time Observation Network (NERON) environment.
- Investigating ways to increase daily electronic reporting of COOP data through upgrades in web and telephone reporting systems ("IV-ROCs" and "wxcoder" respectively) while meeting NOAA data management requirements.
- Providing improved NWS Weather Forecast Office (WFO) data quality control of near real time and historical data through new data tools developed by the RCCs and NCDC (e.g. "Datzilla" and "Health of the Network" respectively).
- Implementing standard WFO climate web pages for enhanced customer service (<http://www.weather.gov/climate>). These web pages include near real-time NOAA Online Weather Data (NOWdata) from LCD stations and selected COOP stations, supported by the RCCs Applied Climate Information System (ACIS).
- Coordinated consistent data extremes for 255 LCD stations (Threadex) with NCDC and the RCCs. Daily temperature and precipitation records are available publicly, ensuring all partners and customers have a consistent extreme database.

- Initiated efforts to evaluate the potential to automate snowfall and snow depth observations.

### **Training**

CSD has continued to improve training of NWS regional and field personnel through redesigning and updating much of the existing Climate Professional Development Series Professional Competency Units, including residence training, teletraining, webcasts, and website links (online at: <http://www.nwstc.noaa.gov/nwstrn/d.ntp/meteor/clipds.html>). AASC members are encouraged to utilize these materials. Training includes guidance to NWS field personnel on appropriate referral of users to various partners (NCDC, RCCs, SCs, etc.) for climate data and information. Major 2006 climate training events include:

- May - Webcast training on Local 3-month Temperature Outlooks (L3MTO), a new product consisting of downscaled Climate Prediction Center forecasts at specific locations across the country.
- June 6-8 - Residence training on field office Climate Operations in the Pacific Islands, at Honolulu HI.
- June 13-15 - Residence training on WFO Climate Operations, at the NWS Training Center, Kansas City MO, the 5<sup>th</sup> offering in FY06, completing a 1<sup>st</sup> round of training for all NWS field office Climate Services Focal Points.
- Aug. 29-31 - Residence training on Climate Variability at COMET (Cooperative Program of Operational Meteorology, Education, and Training), Boulder CO.

### **New Product development**

L3MTOs are scheduled to be issued officially (once a month) beginning late Sept. 2006.

### **Outreach Activities**

The 2006 Climate Prediction Assessments Science (CPAS) Workshop was held in Tucson, AZ, March 21-24. Consideration for the site of the 2007 CPAS is underway and partners are welcome to apply as hosts. CPAS workshops 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. More information is at <http://www.nws.noaa.gov/om/csd/workshop/>. CSD will also attend the following 2006 NWS sub-regional meetings in the NWS Central Region: April 18-19 in Brookings SD and July 18-19 in West Lafayette IN. Fact sheets for public distribution and customer support are being developed for:

**L3MTO, NOWData, Data Availability, El Niño Southern Oscillation, and Drought.**

### **International Activities**

CSD coordinated a 2-day meeting (February 22-23, 2006) to discuss development of a WMO Regional Association IV Climate Center Pilot Project for Central America.

*Submitted by Ron Berger.*

## NOAA's National Climatic Data Center (NCDC)



NOAA's National Climatic Data Center  
(NCDC)  
Veach-Baley Federal Building  
151 Patton Avenue  
Asheville, North Carolina 28801-5001  
Phone: 828-271-4800 \* TDD 828-271-4010  
Fax: 828-271-4876  
[www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)  
Radar/Climate contact: [ncdc.info@noaa.gov](mailto:ncdc.info@noaa.gov)  
Satellite contact: [ncdc.satorder@noaa.gov](mailto:ncdc.satorder@noaa.gov)

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The National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center's is committed to *providing access and stewardship to the Nation's resource of global climate- and weather-related data and information, and assessing and monitoring climate variation and change*. In 2005, NCDC honored this commitment through a number of important accomplishments, including:

- Continued partnership with the AASC through the State Climate Exchange Program and other activities;
- Radar Data Interactive Viewer for custom data access;
- Climate Data Online interface for improved access to global data sets;
- Hurricane Katrina report on meteorological conditions and climatological perspectives;
- New global land and ocean surface data set;
- Aviation information for convective weather activity made available;
- Optimum interpolation for sea surface temperature analysis improved;
- Nation's first Climate Change Science Program 'Synthesis and Assessment' report released for public comment;
- Climate Reference Network implementation continued;
- Bi-lateral climate partnership activities around the world;
- Regional Climate Centers support NOAA Climate Program priorities; and
- Summer Internship Program.

NCDC has an important responsibility in our Nation's ability to address public safety, protection of property, homeland security, sustainable development, and environmental awareness. Each year weather and climate, and especially weather and climate disasters, have a major impact on the lives of our Nation's citizens. We have also issued numerous public reports detailing the state of the climate and important developments such as the impact of Hurricanes Katrina and Rita.

It is increasingly important that NCDC develops partnerships with the private sector, academia, and other government agencies to ensure we most effectively address these issues. NCDC plays a principal role in NOAA's Climate Services Program. Under Regional Decision Support (RDS), the AASC (along with the Regional Climate Centers) is a key partner between NOAA climate data organizations and regional, state, and local climate community partners. As NOAA looks to support drought impact research for the National Integrated Drought Information System and continues to invigorate RDS partnerships, the AASC membership will be engaged in projects and other collaborations to help realize a more climate-literate public, effectively incorporating NOAA's climate products into their lives, while also assuring that regional decision makers have access to climate information and products required to optimize societal performance.

*Submitted by Tim Owen.*

## Natural Resources Conservation Service

National Water and Climate Center  
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Portland, OR 97232  
<http://www.wcc.nrcs.usda.gov>



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### National Water and Climate Center Overview

The National Water and Climate Center (NWCC) is part of the Natural Resources Conservation Service within the United States Department of Agriculture. The Center's mission is to *“lead the development and transfer of water and climate information and technology that support natural resource conservation.”* The primary goal of the NWCC is to be *“a globally recognized source for a quality snow, water, and climate information and technology.”*

### Staffing

The NWCC consists of three branches; (1) Water and Climate Services (WCS), (2) Water and Climate Monitoring (WCM) and (3) Information Systems (IS). Water and Climate Services has two main functions: (1) produce water supply forecasts for the western U.S. and (2) provide climate services for the NRCS and other cooperating USDA agencies nationwide. The climate services staff consists of the following individuals:  
Phil Pasteris, Supervisory Physical Scientist, Water and Climate Services Branch Leader, [phil.pasteris@por.usda.gov](mailto:phil.pasteris@por.usda.gov), 503-414-3058  
Jim Marron, Resource Conservationist, [jim.marron@por.usda.gov](mailto:jim.marron@por.usda.gov), 503-414-3047  
Jan Curtis, Applied Climatologist, [jan.curtis@por.usda.gov](mailto:jan.curtis@por.usda.gov), 503-414-3017

### Historical Role of NRCS Water and Climate in Drought

Because of the recent high interest in drought and the implementation of the National Integration Drought Information System (NIDIS), this year's report will summary some of the NRCS' involvement in support area. County-level drought mitigation decisions hinge on real-time access to hydro-climatic data and related products that describe the severity of drought. Over the past 16 years, the NRCS has invested in the data networks and infrastructure to deliver these data and products. Specific examples are as follows.

### Applied Climate Information System (ACIS) - Internet-based Climate Services

In partnership with the six NOAA Regional Climate Centers, the NRCS funded the development and implementation of the Applied Climate Information System (ACIS). The National Water and Climate Center, Joint Agricultural Weather Facility and National Drought Mitigation Center get their climate data from ACIS for water supply forecasting, production agriculture forecasts and drought assessments respectively. The agriculture version of ACIS (AgACIS) will be integrated with the NRCS Electronic Field Office Technical Guides during June 2006 (USDA access only).

### **SNOTEL and SCAN Data Collection Networks**

SNOTEL and SCAN are two of the premier federal data collection networks within the U.S. SNOTEL is monitoring snow packs to help assess climate change and SCAN is measuring soil climate. Their success has generated voluntary cooperative funding at the local level, unique in the federal climate community. The networks are essential for the creation of western water supply forecasts and assessing drought risk. The SNOTEL master plan focuses on automating manually measured snow observations at 920 locations and the expansion of SCAN from 120 sites to 2,000 to support water supply forecasting and agriculture production respectively.

### **Spatial Mapping of Climate Data - PRISM**

In partnership with Oregon State University, the NRCS funded the mapping of climate information nationwide through the PRISM project. The PRISM products are the accepted climate standard for visualizing climate information and are now part of the NRCS Climate DataMart. The real-time production of climate maps is also critical for county-level drought risk assessments. The new 1971-2000 PRISM dataset (i.e., temperatures, precipitation, and dew points) for the lower-48 produced at resolution of ~800 meters will be released in July 2006 (<http://www.ocs.orst.edu/prism/>).

### **National Drought Mitigation Center (NDMC)**

USDA/NRCS has partially funded this operation and it has flourished at a time when needed the most.

### **Delivery of Snow and Water Information to Assess Drought**

Snow Survey-Water Supply Forecast state office personnel interact directly with users to interpret our products. This relationship is unlike anything provided by other agencies. NRCS has developed Google Earth technology to easily view SNOTEL and Water Supply Information.

### **Water Resource Information**

NRCS worked with the USGS, NDMC and NWS to establish the WaterMonitor webpage <http://watermonitor.gov/>. This page is one stop shopping for water resource information and a companion to the Drought Monitor.

### **Other Projects**

#### **New QC of SNOTEL Data**

When installation first began in the middle 1970s, the network was never envisioned as a data source for climate change studies; however the network has become a de facto source for middle and higher elevation snowpack, precipitation and temperature data. While technology continues to improve the quality of these observations, PRISM methodology is now being employed to correct these archived data. The results of this effort may indeed provide the basis for identifying a “benchmark” SNOTEL and snow course network for climate change studies (<http://mistral.ocs.orst.edu/www/snotelqc/>).



## **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>.

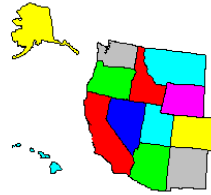
*Compiled by Jan Curtis.*

## Western Regional Climate Center

*Dr. Richard Reinhardt, Director*

Dr. Kelly Redmond, Deputy Director  
and Regional Climatologist

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<http://www.wrcc.dri.edu>



Western Regional  
Climate Center

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The Western Regional Climate Center (WRCC) is housed at Desert Research Institute (DRI) in Reno, NV. DRI is a member of the Nevada System of Higher Education, which includes University of Nevada-Reno, University of Nevada-Las Vegas, and several community colleges. Established in 1986, WRCC's geographical region is large in area and diverse climatologically, including 11 western states, Hawaii, Alaska and the Pacific Islands. The region served by WRCC in the continental U.S. includes Washington, Oregon, California, Idaho, Montana, Utah, Arizona, New Mexico and Colorado/Wyoming (the latter shared with the High Plains Regional Climate Center).

### Data

The Regional Climate Center (RCC) effort to further develop the Applied Climate Information System (ACIS) continues at WRCC. In May 2005 we hired Grant Kelly to assist Greg McCurdy in this task, and other related programming, website, and database management activities. As of this writing, ACIS is active internally, as DRI upgrades its firewall and other security services.

WRCC has also been active in acquiring regional historical datasets, including the California Irrigation Management Information System and California Snow Survey through California Data Exchange Center in Sacramento. WRCC continues to be the archival home for Remote Automated Weather Stations for the country.

More weather and climate monitoring stations are being deployed by WRCC for active collection and display. These include sites for California climate monitoring, mountain monitoring, wind and solar power, and municipal water use. Sites in the Sierra Nevada functioned well during a very snowy winter, and along Big Sur coastline have shown extremely interesting differential elevation effects this summer.

Jim Ashby has been correcting and rehabilitating portions of the Coop database for locations throughout the region. Kelly and Greg have participated in the National Data Stewardship Team activities, with a goal of better linking NWS and NCDC activities, including early efforts to enhance rapid data entry with Weather Coder 3.

### **Climate Services**

The WRCC website now receives about 150,000 accesses per day, with a total of 32.9 million in 2005. WRCC averages a few hundred orders per month for offline data and products; California is the single largest source, accounting for 40-45% of the total number. Media contacts have continued at their typical pace, particularly interviews and conversations with Kelly Redmond, covering a wide range of weather and climate phenomena, but especially drought and increasingly, climate change. Jim Ashby, Michelle Breckner (Chambers) and Dorothy Miller continue to assist customers in the region with the various requests for data and products. Jim, with the assistance of Heather Angeloff (Kemp), hired in September 2005, keep the WRCC in touch with the National Weather Service local office in Reno and elsewhere.

### **Applied Research**

Several research activities were in progress at WRCC during 2005. Dick Reinhardt was active in renewable wind energy activities with NREL and the State of Nevada. Michelle Breckner, Greg McCurdy, Heather Angeloff and Kelly Redmond participated in Yucca Mountain climate activities, including data quality control from monitoring sites. In addition to getting ACIS off the ground, Grant Kelly made significant improvements to the Community Environmental Monitoring Program website.

Kelly Redmond is Principal Investigator for a complex project involving six staff at WRCC that has a goal of producing weather and climate monitoring inventories for 285 units of the National Park Service. The approach utilizes ACIS metadata and data. A new post-doctoral researcher, Dr. Christopher Davey of the Colorado Climate Center, was hired in February 2006 to assist in the creation of these inventories. Christopher received the Dissertation Medal from AASC in summer 2006.

Kelly is involved in numerous projects in California as well, including analyzing 300-500-year tree ring chronologies for blue oaks, and collaborating with others in the Climate Research Division at Scripps Institution of Oceanography in hydrologic issues in the western states. He has also been very active in working with the NOAA Regional Integrated Sciences Assessments (RISA) program.

Dave Simeral has been an integral participant in the NPS inventory project, creating dozens of GIS-based maps for these publications. Additionally, Dave has been busy as our field meteorologist, installing and maintaining WRCC climate stations. In 2005, new installations occurred at Big Sur and in the Sierra Nevada as a part of an Enhanced California Climate Monitoring project. In December, Dave received his Master of Science degree in Geography from Northern Arizona University. He based his thesis on work performed at the Storm Peak Lab in Steamboat Springs, CO, and the title was "New Snow Density in the Park Range of Northwestern Colorado".

Laura Edwards continues to work on California climate issues. Newly acquired California climate data sets expanded the capabilities of the WRCC, and work is progressing to merge the NRCS SNOTEL and California's own snow survey data. She produces a monthly newsletter entitled *California Climate Watch*, distributed primarily

through an email list and online. Most recently Laura has been developing climate monitoring indices for California.

**Other Activities of Interest**

Kelly has also been heavily involved in western U.S. drought issues and the development of NIDIS (National Integrated Drought Information System), which have led to participation on a National Research Council panel on “The Scientific Bases for Colorado River Basin Water Management.” He also served as a key participant or organizer in a number of conferences, workshops and meetings in 2005, including CIRMOUNT (the Consortium for Integrated Climate Research in Mountain Regions) and its MTNCLIM meetings, and “Urban Water Supplies and Climate Change in the West”, held in Las Vegas in September. Kelly also published several articles and book chapters over the course of the year, and is participating in NOAA Climate Test Bed, Hydromet Test Bed, and CLIVAR boards and panels.

*Compiled by Laura Edwards.*

## **Southeast Regional Climate Center**

***Dr. Bud Badr, Director***

South Carolina Department of Natural Resources

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The Southeast Regional Climate Center (SERCC), housed within the South Carolina Department of Natural Resources, is one of six regional climate centers in the United States. The SERCC was established in March 1989 in response to an assessment that identified various user needs for regional climate services in the Southeast. Overall direction of Regional Climate Center Program is provided by the National Climatic Data Center (NCDC) and the National Environmental Satellite, Data, and Information Service (NESDIS) of the National Oceanographic and Atmospheric Administration (NOAA). The SERCC provides climate information, services, research, and education for Alabama, Florida, Georgia, North Carolina, South Carolina, Virginia, Puerto Rico, and the U.S. Virgin Islands.

The SERCC is involved in a variety of research and public outreach activities. It maintains an extensive database that includes weather operations from more than 1,000 cooperative daily stations, more than 200 NWS hourly stations, and several dozen automated hourly stations from state mesonet-works. Data are transmitted to SERCC via a NOAAPORT satellite to ensure near real-time ingestion into our database. The SERCC serves a wide variety of clients in the public and private sectors, including: insurance agencies; lawyers, contractors and construction companies, energy/utility companies; media organizations; educational institutions; and the general public. The SERCC also maintains an outreach program that meets the weather and climate-related needs of the K-12 educational community. Many educational resources are available on the SERCC website, including online games and activities, resources for students and teachers, and links to our daily quiz.

Specific online services include the continued development and maintenance of ACIS (Applied Climate Information System). This system is an interactive subscription-based system that allows users to access a variety of climate information from SERCC's vast database of hourly and daily observations. ACIS Web is accessible via the World Wide Web and provides users with many ways to summarize and display climate information. In addition to a new user-web interface, specific new and updated products have been implemented:

- 2005 precipitation and track maps for tropical systems affecting the Southeast are available on the SERCC Tropical Weather webpage.
- Latest NHC public advisories are available in near real time.
- Current and archived Local Storm Reports for all NWS offices in the Southeast and Puerto Rico all are available at one location on the SERCC website.

- Drought maps are updated through December 2005: PDSI, CMI, Field Capacity, and Z-Index.
- Historical Climate Summaries are updated with final data through September 2005, preliminary data through December 2005. Southeast Climate Watch summaries are updated through December.
- ACIS base software installation is complete and running properly.
- Archived COOP data are loaded into the ACIS database and current data are automatically ingested from NOAAPort.

During 2005, the SERCC undertook a number of research projects. These projects are intended to advance the research and knowledge of the climate in the Southeast United States. Continuing applied research projects include:

- The SERCC presented a poster on fog frequency analysis to the AMS in Savannah GA in June (article accepted in *Physical Geography*).
- The SERCC presented a paper on climate variability and water availability in the Southeast Region at the June AMS meeting in Savannah GA.
- Early stage of research on verification of long-lead climate outlooks.
- Spatial and temporal changes in frequency and duration of heat waves for the Southeast United States.
- Spuriously generated temperature trends in the climate division dataset due to station movement (in press – *Theoretical and Applied Climatology*).
- Spuriously generated precipitation trends in the climate division dataset due to station movement (in review – *Climate Research*).
- Defining appropriate averaging periods for climate normals.
- Changes in climate normal averaging periods due to anthropogenic climate change.
- The SERCC is working with Clemson University on evaporation rates from lakes and ponds. During testing, special evaporation pans designed by Clemson will be placed in Lake Hartwell to make measurements within the lake area.
- Tropical precipitation climatology and river forecast model verification for the coast from Texas to Maryland from 1971 to 2000, in collaboration with the Lower Mississippi River Forecast Center

*Compiled by Jason Allard.*

## Midwestern Regional Climate Center

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### **Data, Data Systems, and Data Management**

The MRCC resumed work on converting its current on-line data system, the Midwest Climate Information System (MICIS), to a new ACIS-based system called MACS (MRCC Applied Climate System). The MRCC also participated in the development of xmACIS and NowData, both ACIS clients deployed at NWS offices around the country. More recently, MRCC staff have begun adapting web tools developed for the CDMIP project for use with the output from the real-time QA/QC process being developed by the High Plains Regional Climate Center.

### **Climate Services**

Traffic on the MRCC web site has steadily increased in the past 6 months, and now regularly exceeds 1 million hits per month. One of the popular features on the web site is the Midwest Climate Watch, which provides an up-to-date 'snapshot' of the current state of temperature, precipitation, and snowfall. A weekly narrative of significant weather is also included on the page, as well as links to similar pages at the State Climate offices in the region. In the period since July 1, 2005, 33 newspaper, 7 radio, and 15 television contacts were made by MRCC staff, providing information and/or interviews on a variety of topics.

The MRCC continued to foster relationships with the National Weather Service offices in our region. We hosted a National Weather Service Central Region "Sub-Regional" Climate Services workshop in Champaign on August 2-3. The workshop, organized by Doug Kluck, Climate Program Manager for the Central Region, was attended by more than 60 people consisting of NWS staff from eight offices, Midwest state climatologists, staff from the MRCC, and a number of private sector representatives.

MRCC staff also visited NWS offices in Louisville and Romeoville, and in November met with staff from the Indiana State Climate office in West Lafayette as well as NWS staff from Indianapolis and Louisville. Mike Palecki, regional climatologist, regularly participated in e-mail and teleconference interactions regarding data quality issues, applied climate applications, the U.S. Drought Monitor, and the U.S. Drought Outlook.

### **Applied Research**

MRCC staff are involved in a variety of research activities, and published 11 peer reviewed articles and several other reports and chapters during 2005-2006.

Kenneth Kunkel completed the revisions to a paper and Web tool derived from his work on West Nile Virus (WNV) and climate. Based on the findings of this paper, an experimental Web site was developed to provide probabilistic projections of the time when the risk of WNV transmission increases. This web site became operational in June 2005 and weekly projections were disseminated until mid-August. The weekly projections will resume in May 2006. Ken and Mike Palecki are progressing on a NOAA sponsored project to examine the quality and utility of early 20th Century snowfall data. Among recent activities related to this project was the submission of a paper examining changes in observational practices that impact time series homogeneity and trends.

Nancy Westcott is continuing to pursue the accuracy of multi-sensor (radar and gage) precipitation estimates (MPE) at the county scale and its utility in computing soil moisture.

Karen Andsager manages two Climate Database Modernization Program (CDMP) projects at the MRCC. The Forts Database Build project includes the selection, digitization, quality control, and development of metadata for the weather observations collected at U.S. Army forts in the 1800s. The major objective of the Station Histories project is to develop comprehensive station histories for weather observing stations from the 19<sup>th</sup> Century to facilitate long-term climate trends studies. 55 station histories have been completed to date, and 24 more will be completed in the next year.

Progress continued to be made by Mike Palecki and Ken Kunkel on the NOAA sponsored project "Using the Forts Daily Climate Observation Data Set to Extend Analyses of U.S. Extreme Climate Events to the Mid-19<sup>th</sup> Century". A special emphasis is placed on those extremes that are accessible only with daily data, including heavy precipitation events, heat waves, and cold waves. Mike Palecki pursued a number of drought related projects, including contributing a chapter on Atlantic Ocean controls of the level of Lake Michigan for a forthcoming Water Survey publication. He continued his collaborative work with Greg McCabe (USGS-Denver) on global scale multidecadal climate variations of the oceans and land surfaces. This project and a separate project on recent Midwest snow droughts are moving forward as his next MRCC supported research projects.

Stan Changnon, Ken Kunkel, Steve Hilberg, and Mike Palecki contributed to a publication for the Illinois State Water Survey summarizing the nature of the 2005 drought in Illinois and the region, the circulation dynamics associated with the drought, and the impacts of the 2005 drought on the environment, agriculture and business. The same group also contributed to another Water Survey publication on the water cycle and water budgets in Illinois for drought and water supply planning. Mike Palecki also worked with Water Survey colleagues to produce a major report on drought planning resources for small public water supply systems in a 10-state Midwest area.

Stan Changnon completed a book to be published by the American Meteorological Society, *Railroads and Weather*, melding together his two distinct research passions in one project. Meteorological impacts on rail transport are a topic of substantial interest and importance to the U.S. economy. Stan also published a variety of other papers related to topics of applied climatology and climate extremes, including heavy snowfall events.



## High Plains Regional Climate Center

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The High Plains Regional Climate Center (HPRCC) continued its mission to increase the use and availability of climate data in the High Plains region.

### **Data Management and Dissemination Infrastructure**

Updates and additions to the Applied Climate Information System (ACIS) were made in partnership with the other Regional Climate Centers, NCDC, NWS, and USDA. As a result a web interface is now available to each NWS Weather Forecast Office (WFO). This interface, called xmACIS, allows the Climate Focal Point to examine recent observations in light of the historical record and to determine how the current situation ranks and to look for the possibility of new records. Another interface was developed for the NWS WFO home pages to support the NWS clients need for climate information. This interface, called NowData, links to the RCC data bases at the click of a button.

### **Increased Demand for Climate Services**

The other web-based interfaces, including the home-page, ACIS Climod interface, and other interfaces have accounted for 34 million hits from clients during the 2005 calendar year. In addition, many clients made direct contact with the HPRCC staff for climate data/information and interpretation. The sectors making the greatest use of this service include agricultural producers, ag consultants, private citizens, lawyers, and university personnel.

In addition, HPRCC staff were interviewed by numerous media outlets regarding a host of topics including drought and water supply, severe weather, and heat waves among others.

### **Applied Studies to Support Mission Objectives**

Several topics dominated the applied research performed by scientists at the HPRCC. The first is the monitoring and modeling of soil moisture data in support of agricultural decision making and drought monitoring. The second is the comparison of various sensors used in the climate networks (COOP, ASOS, CRN, and mesonets) to determine physically sound transformation algorithms to remove sensor specific biases. This has been expanded to search for change points in the historical records, when a new sensor was installed at each station. Removal of these biases will result in homogeneous data sets that are then appropriate for use in statistical analyses. The third area of study involves the development and testing of quality control/assurance methods that can be used to identify

outliers in real-time and historical records and development of techniques for estimating missing data or values in lieu of outliers. The final area of study involves the consideration of climate/weather in decision making situations with a focus on why individuals do or do not adopt the available information in their decision making processes.

HPRCC scientists prepared numerous reports, 9 peer-reviewed articles, and a book chapter in 2005.

# State Summaries

## Alabama Office of the State Climatologist

*John R. Christy, State Climatologist*

Bob Clymer, Assistant State Climatologist

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The major effort of the Alabama Office of the State Climatologist (AOSC) in 2005 was to begin the installation of seven new, modernized cooperative network stations (NERON). We coordinated this effort with the NWS (Ken Crawford at HQ and Mike Asmus at Southern Region HQ) and NCDC (Sharon LeDuc and Bruce Baker). There were several meetings and conference calls which dealt with the many issues involved such as determining the specific equipment to be installed and the criteria for site selection. Other programmatic details were also ironed out. When all was done for this preparatory stage, a site selection team was named, co-chaired by the John Christy, State Climatologist and Mike Asmus of SR NWS. Others included Ken Crawford and Stephen Pritchett from NWS, two members of the Huntsville (HUN) WFO, and staff of NCDC. The team met in Huntsville at the offices of HUN and selected some sites for installation and others for further review.

Site surveys were performed by personnel of the NWS HUN WFO. This was a significant effort as all sites were visited several times, and sites originally thought to be good were found to have unforeseen problems. It should be noted that site selection is by far the most difficult aspect of the Coop Modernization process. Four of the sites in North Alabama were HCN sites. Each of these was deemed inappropriate for the NERON climate purpose, and so all locations were changed. We anticipate a similar result for the remaining 11 HCN stations in the remainder of Alabama. As of April 2006, four of the stations were installed and providing data (see Figure 1).

Also in 2005, the AOSC worked with NCDC to establish two new Climate Reference Network Stations, one in Crossville and another near Marion Junction. As CRN stations, the effort was directed completely by NCDC staff and thus was not a logistical problem for the AOSC.

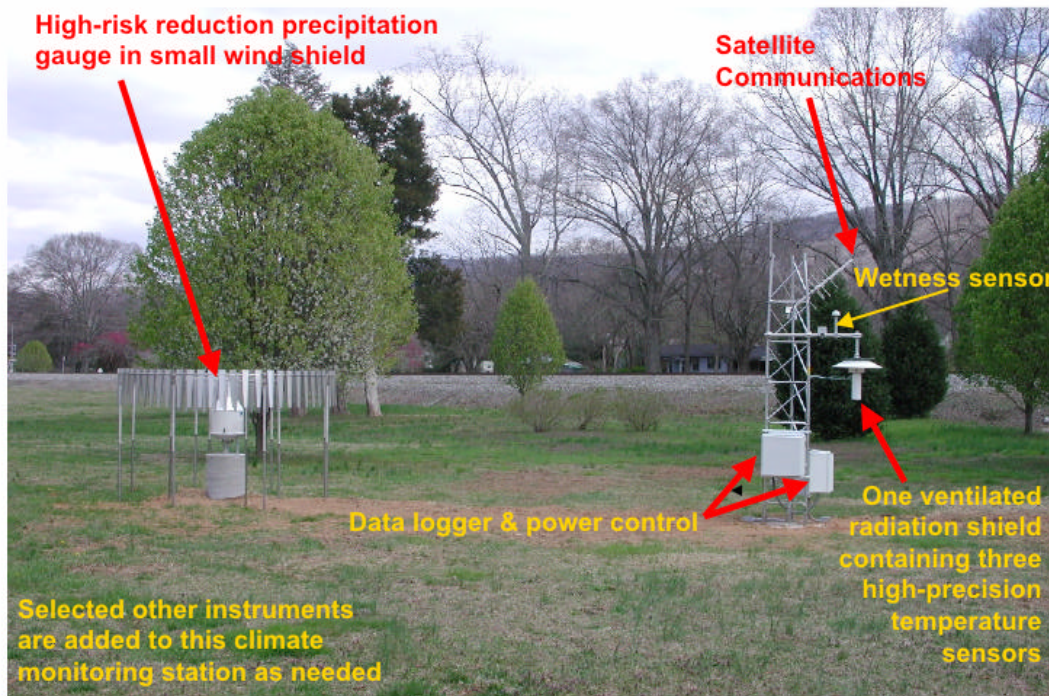
Due to a shortfall in the State's budget in 2004, funding for the AOSC was eliminated for the year 2005. We operated the office on very limited UAH monies which in general allow for infrastructure of the Earth System Science Center which Christy directs.

The AOSC expanded the daily Lawn and Garden index to South Carolina, Georgia and Florida: [http://vortex.nsstc.uah.edu/aosc/lawn\\_garden\\_se.html](http://vortex.nsstc.uah.edu/aosc/lawn_garden_se.html)

Alabama does not participate as well as other Southeastern states in agriculture due to the influence of typical summer drought conditions. With only minimal additional water in the summer, the state could rival any in terms of productivity. The AOSC is working with other universities to answer questions about economic development, water resources, employment, land-use changes and water quality related to the establishment of widespread irrigation in Alabama. Funding for this project has been secured and AOSC is playing an important role in water resource development and climate variability.

Many other traditional functions were performed to keep the AOSC engaged in climate information and economic development activities for Alabama.

**New Historical Climatology Network Station for  
Regional-Level Climate Monitoring (Valleyhead, Northern Alabama)**



## Office of the State Climatologist for Arizona

*Andrew W. Ellis, State Climatologist*

Office of Climatology

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The Office of the State Climatologist for Arizona (ASC) is located within the Office of Climatology of the Department of Geography at Arizona State University in Tempe. The office consists of the State Climatologist, Andrew Ellis, an Associate Professor, and Assistant State Climatologist, Nancy J. Selover. The purpose of the program is to: (1) manage and disseminate climate information to Arizona citizens and stakeholders either in Arizona or with an interest in the state, (2) monitor the climate of Arizona and the region, and (3) conduct research aimed at an improved understanding of the spatial and temporal variability of the climate of Arizona.

In addition to serving as a link to established climate data resources, the Office receives and archives data from the Phoenix Real-time Instrumentation for Meteorological Studies (PRISMS) station network. The network is comprised of 17 stations across the Phoenix metropolitan area and is maintained by a local utility company. Also archived by the office are data from the Automated Surface Observing System (ASOS) of the National Weather Service Office in Phoenix. Two stations on the campus of Arizona State University are operated by the Office of the ASC – a cooperative observer station of long record and a newly constructed automated precipitation station.

The Office of the State Climatologist for Arizona maintains several service roles within the state. Representation on the Governor's Arizona Drought Monitoring Committee (Department of Water Resources; [www.azwater.gov](http://www.azwater.gov)) and the Arizona Flood Warning System (Department of Water Resources/National Weather Service; [www.afws.org](http://www.afws.org)) headline state-level activity. Additionally, the Office works regularly with the Arizona Department of Environmental Quality ([www.azdeq.gov](http://www.azdeq.gov)) and the local utility/water provider Salt River Project ([www.srpnet.com](http://www.srpnet.com)). Presentations at primary and secondary schools, invited presentations to civic groups and state agencies, interviews from statewide media outlets, and the fielding of approximately 250 data requests per year constitute the remaining service activity.

Research activities generally focus on hydroclimatology (North American monsoon, winter precipitation variability, drought monitoring) and study of surface-atmosphere interactions (urban heat island, influence of urban lakes).

As the ARSCO for Arizona, the Office of the ASC is committed to supporting the objectives of the AASC. Below is a brief description of the activities of the Office over the past year that addresses each of the ARSCO qualifications:

### **Communication Capabilities**

- develop the ASC web page (<http://www.public.asu.edu/~dellis/azsc.html>), which includes general climate information, statewide climate updates, educational information, real time weather information and forecasts, and links to other resources
- archive more than 200 GB of national and Arizona data annually
- provide information and data that are free and accessible; additional communication maintained through phone, fax, postal mail, and electronic mail

### **Information Services**

- fill requests for data, media interviews, and expert advice/analysis/testimony (over 250)
- monthly statewide climate update on the web page (<http://www.public.asu.edu/~dellis/update.html>)

### **Research**

- collaborated with/funded by local utility company (Salt River Project) on two projects: (1) develop seasonal forecast model for the Central Arizona Winter Precipitation Index, (2) develop operational runoff models for Arizona watersheds
- ? partner in establishment of \$6.9 million National Science Foundation center - Decision Center for a Desert City – for studying water resource decision-making under climatic uncertainty and variability

### **Outreach**

- appearances at primary and secondary schools, invited lectures, and interviews/feature stories with local media outlets (newspaper, radio, television)
- monthly statewide update in addition to daily climate information for the state
- service on Arizona Drought Monitoring Committee and Arizona Flood Warning System Committee

### **Monitoring and Impact Assessments**

- provide monthly statewide climate update
- serve on the monitoring committee of the Governor's Drought Task Force
- archive data for the PRISMS network for Phoenix; developing method for archiving data from the Arizona Flood Warning System; archive data from first-order weather station of Phoenix NWS
- ? aiding NWS in the selection of NERON-NIDIS sites

## Office of the California State Climatologist and CalClim

*Michael Anderson, Acting State Climatologist*

*Laura Edwards, Western Regional Climate Center, Desert Research Institute*

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<http://www.calclim.dri.edu>

The Office of the California State Climatologist (OCSC) is housed in the California Department of Water Resources (DWR) Division of Flood Management. Interacting with other divisions within DWR and the California Climate Data Archive (CalClim) group at the Western Regional Climate Center, the OCSC is in the process of reviving and expanding climate programs in California.

2005 was a year of transitions for the Office of the California State Climatologist. In April, Bill Mork retired from the California Department of Water Resources. He served 13 years as state meteorologist and state climatologist. With his retirement, the Department named Matt Winston the state meteorologist and later named Michael Anderson acting state climatologist.

Activities at DWR during the past year include work on a report of water resources related impacts related to climate change in California, updating the California Water Plan which now includes discussion of climate change issues, work on updating the state's rainfall intensity duration frequency design curves, maintaining the California Irrigation Management Information System (CIMIS) and California Data Exchange Center (CDEC) data portals, and development of a state climatologist web site.

Over the course of 2005 approximately 500 data requests were handled through the office. As for the data portals, CDEC recorded 42.3 million page views in 2005 while CIMIS recorded 203,509 data reports generated.

Presentations were also made in November at the annual meeting of the California Cooperative Snow Surveys in Mt. Shasta City, CA. More travel and presentations are expected for 2006 as the program adjusts to the changes from 2005. The following paragraphs discuss the activities of the CalClim group of the Western Region Climate Center for calendar year 2005.

Calendar year 2005 was a year of continued growth of the CalClim project, sponsored by the California Energy Commission (CEC). The number of web hits has increased; from January 2005 to January 2006 web hits grew from 3866 (474 GB) to 9972 (623 GB) per month. The number and size of data requests received by the Western Regional Climate



Center that receive the free data option as a part of the CEC funding has also increased over the year.

The *California Climate Watch*, a monthly online newsletter, was redesigned this year. This newsletter continues to take about 25% of the work hours per month for one person to assemble. Topics addressed in this year's issues include: California tornadoes, Mono Lake, air quality and climate, and the Sierra Rotors Project. Distribution has expanded to include the AASC listserv and others interested in California climate, including water managers, NWS, and other groups with operational weather responsibilities.

In addition to these two primary activities, progress has been made in assembling climate monitoring indices for California. The first two elements to be investigated are precipitation and temperature for Historical Climatology Network stations in California. This work will be expanded in 2006 to use the daily Summary-of-the-Day data sets from NCDC (3200 and 3206, the pre-1948 data). Preliminary results were presented at the AMS Annual Meeting in January 2006.

A related project, also sponsored by CEC, has been designed to install instrumentation for climate monitoring purposes in the Sierra Nevada, coastal areas, and other locations vulnerable to climate changes in California. The information we are receiving from these sites will help us to interpret historical climate records and understand climate issues related to various regions of the state.

One publication was produced as a result of this project this year. Laura Edwards and Kelly Redmond wrote an article that appeared in Department of Water Resources (DWR's) *Colorado River Basin Climate*, in November 2005. See: [http://www.climate.water.ca.gov/docs/Colorado\\_River\\_Basin\\_Climate\\_Nov2005.pdf](http://www.climate.water.ca.gov/docs/Colorado_River_Basin_Climate_Nov2005.pdf) for details.

2005 also brought much travel, to communicate with sponsors and possible collaborators. Kelly Redmond and Laura Edwards visited the DWR's Flood Management Division, National Weather Service offices, Scripps Institution of Oceanography Climate Research Division and California Climate Change Center, University of California-Davis, and California's Air Resources Board to name a few. Conferences and meetings attended include: AMS Annual Meeting in San Diego, NOAA's Data Users' Workshop in Asheville, AMS Applied Climate/AASC meeting in Savannah, and the USDA WERA-102 meeting in Asilomar, CA.

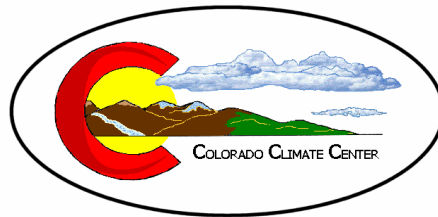
In the coming year, the OCSC plans to continue coordination of activities with the Western Regional Climate Center. The state climatologist will re-establish connections to climate researchers active in the state through communications and in-person visits. Finally, the OCSC will work to ensure that each of the ARSCO activities for a state climate office is carried out.

## Colorado Climate Center

*Roger A. Pielke, Sr., State Climatologist*

Nolan J. Doesken, Climatologist

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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 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 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/>)

Brazenec, W.A., 2005: Evaluation of ultrasonic snow depth sensors for automated surface observing systems (ASOS). Dept of Forest, Rangeland, and Watershed Stewardship, M.S. Thesis, Colorado State University, Fort Collins, CO, Fall 2005, 134 pp.

Brazenec, W.A., and Doesken, N.J., 2005: Ultrasonic snow depth sensors for measuring snow in the U.S. Extended Abstract JP1.25, 15<sup>th</sup> AMS Conference on Applied Climatology, Savannah, GA, June.

Brazenec, W.A., Doesken, N.J., and Fassnacht, S.R., 2005: Evaluation of two ultrasonic snow depth sensors for National Weather Service Automated Surface Observation System Sites. Hydrology Days 2005, April, Colorado State University, Fort Collins, CO.

Cifelli, R., Doesken, N., Kennedy, P., Carey, L.D., Rutledge, S.A., Gimmestad, C., and Depue, T., 2005: The Community Collaborative Rain, Hail and Snow Network, Informal education for scientists and citizens. Bull. Amer. Meteor. Soc., Vol. 86, 8(August), 1069-1077.

- Davey, C.A., and Pielke, Sr., R.A., 2005: Microclimate Exposures of Surface-Based Weather Stations, Bull. Amer. Meteor. Soc, Vol. 86, 4(April), 497-504.
- Doesken, N., and Gillespie, M., 2005: A Review of the 2004 Water Year in Colorado, Hydrology Days 2005, Colorado State University, Fort Collins, CO, April, pp. 279-291.
- Doesken, N.J., 2005: Ten-year comparison of daily precipitation from the 4 inch diameter clear plastic rain gauge versus the 8 inch diameter metal standard rain gauge. Extended Abstract 2.2, AMS 13<sup>th</sup> Symposium on Meteorology, Observations and Instrumentation, Savannah, GA, June.
- Doesken, N.J., 2005: The NWS MMTS – 20 years after. Extended Abstract 1.26, AMS 15<sup>th</sup> Conference on Applied Climatology, Savannah, GA. June.

### **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**

During 2005, the Colorado Climate Center's personnel traveled throughout the state providing information on the climate, drought and precipitation. Many interviews were routinely given and featured in newspapers, radio and television. The National Drought Mitigation Center and NOAA have also used this information in their monthly updates. The Governor's Water Availability Task Force and State Flood Task Force were given 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 *Colorado Climate* magazine is another venue to communicate information across the state and nation. The magazine at is available on-line at <http://ccc.atmos.colostate.edu/magazine.php>.

#### **Information Services**

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

#### **Research**

1) Colorado Agricultural Meteorology network (COAGMET) added several new observing sites in S and SE Colorado. All current and historic data are made available for agricultural applications via [www.coagmet.com](http://www.coagmet.com). 2) Several climate observational studies were completed including evaluations of various types of rain gauges, thermometer intercomparisons, and an assessment of recently installed instrumentation to automatically measure and report snow depth. The historic Fort Collins weather station completed 118 years of uninterrupted daily weather observations. 3) Recent and historic wind gust data were collected to help develop a new wind load map for structural engineers and building

code officials. 4) Study on the photographic metadata of Eastern Colorado coop stations was completed and published.

### **Outreach**

Continued climate monitoring presentations to the public via news media, traditional publications, Colorado Climate magazine, web site and Climate Science blog <http://climatesci.atmos.colostate.edu/>. In addition, the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) Network has expanded in 2005 to eleven other states. This project encourages volunteer observers to collect rain, hail and snow data for many climate monitoring and research applications, <http://www.cocorahs.org>.

*Submitted by Odie Bliss.*

## Office of the Delaware State Climatologist

*David R. Legates, State Climatologist*

Daniel J. Leathers, Associate State Climatologist

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The Office of the Delaware State Climatologist is located in Newark, Delaware, in the Center for Climatic Research at the University of Delaware. It is closely allied with the Department of Geography, which operates a Ph.D. program in Climatology. Both the Office and the State Climatologist continue unfunded to provide climate support services to the State of Delaware. This year, the Office of the Delaware State Climatologist finally has office space, which it shares with the C.W. Thornthwaite Reading Room and the UD Hydroclimatology lab. In addition, the day-to-day duties of the Delaware State Climatologist have now been passed from Daniel J. Leathers to David R. Legates, although Leathers still serves as the Associate State Climatologist.

The Office of the Delaware State Climatologist is an AASC Recognized State Climate Office (ARSCO) and partners with the National Climatic Data Center, the Northeast Regional Climate Center, and the National Weather Service in Mt. Holly, NJ, to provide data and climate services to the citizens of the State of Delaware. As with most State Climate Offices, we provide climate data and expertise to both the public and private sector as well as conduct newspaper, radio, and television interviews and, occasionally, court testimony. The Delaware State Climatologists also man the Technical Assistance Center of the Delaware Emergency Management Agency during critical weather events. In addition, the Office currently has undertaken two main projects:

### **The Delaware Environmental Observing System (DEOS)**

Our main funding effort has been the establishment of a real-time system dedicated to monitoring environmental conditions across the Delmarva Peninsula. The Delaware Environmental Observing System (DEOS) is designed as a tool for decision makers involved with emergency management, natural resource monitoring, transportation, and other activities throughout the State of Delaware. DEOS also provides both State agencies and the citizens of Delaware with immediate information as to environmental conditions in and around the State. Being that it is supported by the Office of the Delaware State Climatologist, DEOS also provides a climate archive of the data to support the developing needs of high-resolution (in time and space) requests for environmental data. (<http://www.deos.udel.edu>)

Being a peninsula, isolated by the Delaware Bay, the Delaware River, and the Chesapeake Bay, the Delmarva Peninsula is very much affected by coastal storms and processes. To make appropriate decisions that depend upon these environmental conditions, decision makers must have environmental data with the highest spatial and temporal resolution possible. Data needs include weather information, observations of streamflow, bay and ocean conditions, and water and air quality. But more importantly, these data must be of the highest quality, readily available, and easily applied. DEOS integrates existing observations from federal, state, and local sources and augments these existing observations with approximately twenty additional observing sites (primarily weather stations, but installed sensors also have included water temperature, wave period, and water quality for the Delaware Bay) around Delaware, Maryland, and Pennsylvania. These observations are connected to a central data collection facility through existing telecommunications capabilities. DEOS currently provides timely data dissemination to State agencies, the National Weather Service, and the public and also is in the process of developing reliable data quality control and quality assurance procedures.

DEOS consists of three main components: (1) the DEOS Environmental Monitoring and Observing Network (DEMON), a network of approximately thirty new meteorological observation sites coupled with existing weather and other environmental observation sites in and around Delmarva, (2) the DEOS Integrated Visualization and Analysis System (DIVAS), a GIS-based integration of surface weather observations with National Weather Service WSR-88D radar estimates of precipitation, thereby providing estimates of meteorological and environmental variables over a high spatial resolution grid, and (3) a number of DEOS Analysis Systems (DAS), designed to provide decision support in a variety of environmentally-sensitive areas. One such system will provide transportation and emergency management officials with real-time assessments of coastal and stream flood risk potentials. DEOS also is working closely with the Kentucky Climate Center and the Virginia Office of State Climatology to provide joint expertise to enhance our developing system.

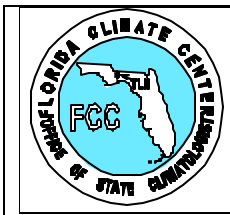
### **The DEOS Environmental Monitors Program (DEMs)**

In cooperation with *The NewsJournal*, a regional newspaper based in Wilmington, DE, we have created the DEOS Environmental Monitors Program (DEMs). DEMs is a statewide spotter network of more than fifty volunteers that make daily measurements of rainfall, snowfall, and (for some) air temperature. DEM volunteers also serve as local spotters to inform State Weather Officials and the *NewsJournal* of breaking severe weather as well as provide local conditions during emergency weather events.

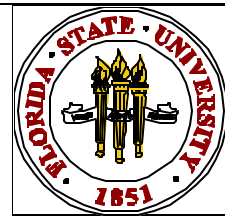
DEMs volunteers enter their data directly into the DEOS database through webpage access (a few, however, still prefer to use mail-in cards). Over time, the number of cooperative observers working for the Office of the State Climatologist has dwindled to just four individuals. We see this program as a way to identify those people that are truly interested in taking long-term climate measurements and make them official cooperative observers by providing them with more accurate (and more expensive) equipment. Since most of the population in Delaware, and most of the impact of the *NewsJournal*, is

focused on New Castle County, we are seeking ways to enhance participation by downstate observers.

In summary, the Office of the Delaware State Climatologist is growing. In the past two years, we have obtained support for three undergraduate and two graduate students working on specific projects with DEOS and State Climate personnel. We also hope to obtain permanent support for a technician and a programmer to continue our development of DEOS.



**The Florida Climate Center**  
*James J. O'Brien, State Climatologist*  
David F. Zierden, Assistant State Climatologist



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[www.coaps.fsu.edu/climate\\_center](http://www.coaps.fsu.edu/climate_center)

### **About the Office**

The Florida Climate Center (FCC) 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 FCC 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 FCC full-time staff currently consists of James J. O'Brien, the State Climatologist, David F. Zierden, Assistant State Climatologist, and Melissa Griffin, research assistant. Joining the Climate Center in 2004 as a part-time researcher is Preston Leftwich, retired from the National Weather Service Central Region Headquarters. He now is a full-time research associate and teaches an introductory meteorology course to undergraduates in the main department on campus. 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 FCC 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 FCC 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](http://www.coaps.fsu.edu/climate_center)). Recently, we have added a detailed wind climatology for the first-order stations, complete with wind roses for each month of the year. 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 FCC 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 FCC 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 FCC is the leading authority on climate variability in Florida, particularly as related to ENSO. The Climate Center is involved with the Southeast Climate 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, and Auburn University. The Southeast Climate Consortium now receives additional funding through USDA and USDA Risk Management Agency.

An example of the climate information products developed by FCC is a method of forecasting wildfire threat based on the Keetch-Byram Drought Index (KBDI). The experimental forecast expresses wildfire threat in probabilistic terms and is used by the Florida Division of Forestry for planning management strategies and allocation of resources. This year the wildfire threat forecast was expanded include the states of Georgia and Alabama. These results were presented at the National Seasonal Assessment Workshop, Eastern and Southern States in January of 2006. The KBDI forecast for the Southeast was included as guidance in the final report.

### **Communication and Outreach**

The FCC provides outreach and education is 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 serves on Florida Commission on Hurricane Loss Projection Methodology, which advises the insurance commissioner and industry on coping with the hurricane threat.

The FCC has been involved in a major outreach and extension activity this past year through our partnership in the Southeast Climate Consortium. The Climate Center has been a key participant in the development of *AgClimate* ([www.agclimate.org](http://www.agclimate.org)), a web-based decision support system facilitating the effective use of climate forecast information in agriculture and forestry in the Southeast U.S. *AgClimate* displays information on ENSO climate variability based on historical weather data from over 200 cooperative observer stations in the Southeast. In addition, *AgClimate* provides probabilistic information how climate variability effects yields of such crops as peanuts, tomatoes, and potatoes. *AgClimate* also provides background information on ENSO and climate as well as management options of crops and forests during the various ENSO phases.

A key to the effective use of the information in *AgClimate* is the proper education and outreach to the users. The agriculture extension services in Florida, Georgia, and Alabama is a key partner in this outreach. The FCC has participated in many extension-sponsored workshops in recent months and will continue to provide training and to promote *AgClimate* in the coming year.

For those who live to fish -- or fish to live -- along the Southeastern coast from the Outer Banks of North Carolina to Alabama, climate scientists from Florida State University and the University of Georgia have recently unveiled a unique online source for all manner of regional data on weather and fishing conditions: COASTALCLIMATE.ORG. COASTALCLIMATE.ORG shares onshore climate data such as temperatures, rainfall and winds for each month and each phase of El Nino/La Nina, while offshore data includes water and ocean bottom temperatures and buoy-generated wind readings. Anglers can access extensive data on the region's various fish types -- plus a handy tide generator for every harbor along the Southeast coast. Visitors to COASTALCLIMATE.ORG also will find detailed histories of hurricane tracks and occurrence statistics for each Southeastern state's coastline. Funded by the National Oceanic and Atmospheric Administration (NOAA), O'Brien co-led the Web site's yearlong development with UGA Assistant Professor David Stooksbury. COASTALCLIMATE.ORG is a key component of the Southeast Coastal Climatology Project, a multidisciplinary, multi-institutional team within the Southeast Climate Consortium that forms partnerships with user communities.

Finally, the State Climatologist and staff are always available to the media for facts and opinions on current climate issues. We have a working relationship with such newspapers as the *USA today*, *Tampa Tribune*, *St. Petersburg Times*, *Tallahassee*

*Democrat, Gainesville Sun, News-Press, Florida Today* 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.

### **Changes on the Horizon**

Dr. James J. O'Brien, Florida State Climatologist and founder and director of the Center for Ocean-Atmospheric Prediction Studies (COAPS) at Florida State University, will retire at the end of 2006. Assuming the role of director of COAPS is Dr. Eric Chassignet. Dr. Chassignet's areas of interest are general oceanic circulation from the complementary perspectives of ocean modeling and ocean observations. Taking over the role of State Climatologist is David Zierden, the Assistant State Climatologist since 1999. Although retired, Dr. O'Brien will remain highly involved in the climate research, services, and applications efforts performed at COAPS through our partnership in the Southeast Climate Consortium and activities of the state climate office. Dr. O'Brien will be considered the "State Climatologist Emeritus" and continue an active presence in the climate services and applications community, including AASC.

## Georgia State Climatology Office

*David Stooksbury, State Climatologist and Assistant Professor*

Pam Knox, Assistant State Climatologist

Dr. Pierre Gerard-Marchant, Post-doctoral scientist

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The Georgia State Climatology Office is located in Athens, GA, on the campus of The University of Georgia in the Biological and Agricultural Engineering Department. The office houses two full-time climatologists: Dr. David Stooksbury, the State Climatologist and Assistant Professor, and Pam Knox, the Assistant State Climatologist. We also have a postdoctoral scientist, Dr. Pierre Gerard-Marchant, and anticipate hiring two or three student workers for summer research projects.

The Georgia State Climatology Office continues to be involved in a variety of research and public outreach activities. We maintain a web site and actively interact with users from around the state. These contacts include university scientists, educators, lawyers, construction and insurance companies, government agencies, reporters, and private citizens. Many of these data requests come by way of email, but we also receive phone calls, walk-ins and the occasional letter.

Our research projects this year have focused on joint work with the Southeast Climate Consortium. The joint work has focused on agricultural climatology, coastal climatology, and hydroclimatology.

Our biggest project this year was the continuing development of a mesonet of weather stations around Georgia. Ultimately, this mesonet will be similar to the Oklahoma Mesonet in scale and data flow. This project has been undertaken as a cooperative effort with the National Weather Service and the National Climatic Data Center as part of the movement to modernize the National Cooperative Network. A multi-agency task force has been identified and a large number of potential sites for automated weather stations are undergoing review by a committee of interested agency representatives.

In the summer and fall of 2005 a large number of the most promising sites were surveyed and the metadata captured for final assessment by the site survey selection committee. So far 223 sites have been surveyed in all. Several other sites were also visited but were determined to be unsuitable for long-term climate records. About 53 final grid choices have been selected for recommendation by the National Weather Service out of a total of 178 grids. This surveying effort is continuing into 2006. Another 29 grids are scheduled for final review in May 2006. Some grids have no active sites where weather data are already collected, and we are working with the National Weather Service to identify new sites in these grids. If you are starting this process in your own state, we would be happy to share our experiences with the mesonet organization and surveying process with you.

*Submitted by Pam Knox.*

## Hawaii State Climate Office

*Dr. Pao-Shin Chu, State Climatologist*  
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The Hawaii State Climate Office had a busy year for 2005. There were 180-200 requests for data from various weather and climate events. The office also completed many projects; some of which are ongoing into 2006.

One of the larger projects was to update the rainfall records and stations. The last publication of this sort was made in 1973 by the Commission of Water Resources Management of the Department of Land and Natural Resources. Many stations have changed since then and the location of stations needed to be updated. Also, the islands are in a swing in a natural cycle of precipitation and the mean annual rainfall maps for the last 30-yr help to see how the islands are affected by the recent change in rainfall patterns. The rainfall contour maps were created in GIS using data from current and historic NCDC and volunteer stations. Some stations' coordinates listed for the sites in the 1973 report were incorrect, which in turn led to complications when putting the stations on the map in GIS. We have been requested by Kauai County, Maui County and Hawaii County to update their rainfall and station records. We are also hoping to update the records for the City and County of Honolulu, so that we may provide complete coverage for the entire state.

Many of the requests received by the office were from people who simply wanted to know the weather at specific times of the year to plan their vacations. Other requests were for rainfall from a particular weather station at a specified date. However, some requests were unique and required more research. One particular request was for the rainfall data for the past fifty-years from the Barbers Point Naval Station. The hardest obstacle to overcome for this request was that the airport from where the data were collected had changed names and was listed as two different stations with NCDC.

Another request was to help a student compile a hundred year rainfall profile for the Honolulu area. This involved retrieving data from some of our oldest records that have not been digitized and is not available through NCDC. The Hawaii State Climate Office also answered many requests about hurricanes in Hawaii. Many people wanted to know the about the few storms that were in our neighborhood and what threat (i.e., strongest wind speeds) they posed to our islands. Other requesters wanted to know if Hawaii has a chance of having a major hurricane hit the island chain in the near future.

The Climate Office had a very good year in 2005. There are more projects lined up for 2006 and the coming year looks to be even more eventful than last year. There is one thing all of our projects and requests had in common; they all made us look into our past climate to see what might lie ahead.



## Idaho State Climate Services

*Dr. Russell J. Qualls, Idaho State Climatologist*

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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 more than six Idaho newspapers.
- Maintain an automated weather station, a Cooperative Observer Station with over 110 years of data, and a recording precipitation gage, and partially fund a Sno-Tel site.
- Established three Idaho Transportation Department Road Weather Information System Weather Stations.

***Research:***

- Analyzing historical temperature trends at climate stations across Idaho
- Examine the effect of climate change scenarios on snowpack and runoff volumes and timing for the mountains of Idaho.
- Analyze socio-economic impacts of various climate change scenarios
- 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
- Conduct studies for the Idaho Transportation Department assessing relative merits of different proposed highway alignment alternatives with regard to the impact of climate on those alternatives.

***Outreach:*** Participation and collaboration of the following outreach activities:

- Climate Presentations to local elementary schools
- Provide news interviews
- Serve as a climate expert on Idaho Public Television talk shows.
- Work with Boy Scouts of America as a merit badge counselor for environmental science

## Illinois State Climatologist Office

*Jim Angel, State Climatologist*

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The Illinois State Climatologist Office (SCO) is located at the Illinois State Water Survey (ISWS) in Champaign Illinois on the campus of the University of Illinois. The ISWS 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 ISWS with a paid observer. The ISWS has served as host for the Illinois SCO since 1973.

In 2005, severe drought struck Illinois, starting in March. Hardest hit were northern and western Illinois. As a result, a large portion of time was devoted to drought including giving over 250 interviews and 23 talks, interacting weekly with the U.S. Drought Monitor and frequently with the Illinois Drought Response Task Force. Demand for climate data and analysis was high from the media, individuals, farm groups, and businesses as well as federal, state, and local agencies.

**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 SCO 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 wide variety of climate topics.

### **Information Services**

The Illinois SCO 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 contains maps, plots, and tables of current climate conditions, historical data, and climate summaries. The web site includes information on important climate topics in Illinois such as El Niño, drought, winter storms, and heat waves. The benefit of a web site is that it can off-load many of the routine requests for climate information. The office maintains a voicemail recording of the daily coop observations for the Water Survey site. A monthly report of the coop observations at the site is prepared and sent in the mail and published on the web.



## **Research**

- Climate trends in Illinois;
- Quantified storm characteristics across the U.S. with two papers published in the Journal of Applied Meteorology;
- Updated the tornado climatology of Illinois;
- Calculated drought frequency at selected return periods for the Midwest;
- Co-authored report on the 2005-06 drought and submitted a manuscript on the unusual number of tropical storms that made it to Illinois in 2005 and their impact on the drought;
- Co-authored ISWS reports on drought planning for small community water systems and on the water budget and water cycle in Illinois.

## **Outreach**

- Wrote contributions to the monthly ISWS Water and Climate Summary;
- Provided data and guidance to agencies in Illinois, including the Illinois Drought Response Task Force, the Illinois River Decision Support System, the Northeast Illinois Planning Commission, and the Illinois Emergency Management Agency;
- Provided between 100 and 300 interviews with the media per year and produced regular press releases;
- Gave 23 talks mostly to farm groups about the 2005-06 drought and the outlook for the 2006 growing season;
- Served as adjunct professor in the geography departments at both the University of Illinois and Northern Illinois University;
- Worked with local NWS offices and the Midwestern Regional Climate Center on issues related to climate, including visits to NWS offices and the sharing of data and climate information;
- Assisted the National Drought Mitigation Center in hosting a drought workshop in northern Illinois on March 13-14, 2006.

## **Monitoring and Impact Assessment**

- Developed a series of web-based products for monitoring conditions in Illinois, a very popular site available to the public;
- Provided input into the U.S. Drought Monitor;
- Worked closely with the Illinois Drought Response Task Force during the 2005-06 drought.

## Indiana State Climate Office

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Ken Scheeringa, Associate State Climatologist/Data Coordinator

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The Indiana State Climate Office (Iclimate) was established in 1956 as part of a federal initiative. The office was federally funded until the State Climatology program was terminated in 1973. At that point, Purdue University took over the role of funding the office where it has been housed since its inception within the Department of Agronomy.

In 2005, in response to a concerted effort across Purdue, the office took on a new direction with the appointment of Dev Niyogi as State Climatologist. The office has moved to a new location and been updated to satisfy its current computational needs. The staff increased from one to nearly twenty, including undergraduates, several graduate students, post doctoral associates and research scientists.

### **ARSCO Qualification**

Iclimate has applied for ARSCO status to the AASC in 2006. The following describes some of the recent and ongoing activities at the climate office.

### **Communication Capabilities**

The most common methods of communicating with the public for data services for our office are email and telephone. The number of requests have been steadily increasing and automated data downloads and electronic formats are the prominent mode of data communication. We are currently developing a survey which will help us serve our clients better. We have designed and developed a website ([iclimate.org](http://iclimate.org)) for public awareness information dissemination and data services related to Indiana weather, climate and the environment. Fax and U.S. Mail are also available for use, however not routinely used. We have a staffed office and, being located on the Purdue University campus, have access to various conference rooms as needed for small to large community meetings. We also routinely work with the University News Service to communicate broader announcements (e.g. seasonal forecasts) as news releases.

### **Information Services**

Most data requests come via the internet, either email or web request. The remainder comes from telephone calls to the office. The most common users of our service are researchers, attorneys, agriculture, government and insurance adjusters. We are currently not charging fees for our services but a cost structure has been developed. We have

developed automated data request forms, have put significant data and reports online for download and are working with state cooperative extension to update extension reports. A GIS based climate atlas is under development. This will be part of a PhD dissertation for a graduate student and has resulted in data QA/QC and development of products such as evapotranspiration that are currently not observed.

### **Research**

The staff at Iclimate is working on several research projects on weather and climate that would be of relevance to the Midwest and the citizens of Indiana. We have started developing a Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) program which is a joint project with NWS Indianapolis and the CoCoRaHS national office in Colorado. This project started in Indianapolis and is expanding statewide. As of March '06, there are nearly 100 volunteer observers. A study is underway examining the trends and variability of frost free days in Indiana and the Midwest. The output from this study will be available in GIS based maps, graphs and animations available on our website. A study is underway to show how the various microclimates in the state affect evapotranspiration. We are using GIS based maps to disseminate the information through our website. We have completed set-up and are collecting data for a model evapotranspiration station which we will replicate and place throughout the state. An agricultural weather and climate atlas study is underway to document, archive and process all the supplemental information to weather products in Indiana.

Iclimate is tied closely with the Land Surface Lab, which uses observations and models to investigate meteorological and climatological phenomenon. One such study, currently underway, is modeling thunderstorm formation, climatology and characteristics around urban areas, specifically Indianapolis. We are also currently studying the role of land use changes, the biosphere-atmosphere feedbacks and changes in water and carbon cycle using several models over differing study areas. These models include WRF, MM5, RAMS, RefET and Planet Simulator. Several abstracts and peer-reviewed publications which were generated by Iclimate staff are available on the Lab's website: [landsurface.org](http://landsurface.org).

### **Outreach**

We have developed a web-based survey form to assess how clients are using the data/information they receive from us and, in turn, how we might be able to help them to accomplish their goals. We also work closely with Purdue News Services to provide broader dissemination of the studies underway.

As the office has evolved over the past year, we have utilized different opportunities to make public appearances in order to get our name out to the public. Recent speaking engagements include being an invited speaker at a local Kiwanis meeting, at the Indiana NRCS annual meeting, the Midwest Turf Expo in Indianapolis and most recently at the Indiana Association of Professional Crop Consultants. We make an effort to send a representative to applicable conferences and workshops for networking and developing collaborations with various resources. Our Purdue Extension publications are in the process of being updated for future re-release and distribution and a new priority has been placed on writing timely press releases to gain more visibility in print media.

**Monitoring and Impact Assessments**

As part of the Purdue Automated Agricultural Weather Station (PAAWS) network, Iclimate currently collects, quality controls and archives data from eight weather stations throughout the state. This data are then disseminated electronically through our website. Iclimate also participates in the National Atmospheric Deposition Program (NADP). Climate Office staff have been collecting weekly samples for the program since 1988.

**Funding**

Office operation and the Associate State Climatologist are supported by the Department of Agronomy. Research grants from various federal agencies complete the remaining funding support.

*Submitted by Bryn Takle.*

## Iowa State Climatologist Office

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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. 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.

### Information Services

The Iowa SC office maintains archives of NWS co-op and first order station data back to the beginning of records. This would include the regular NCDC reports such as *Storm Data*, *Iowa Climatological Data* and *Local Climatological Data*, as well as the original observations. Access to a multitude of federal and state weather and climate data archives are also maintained. With 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 19<sup>th</sup> and early 20<sup>th</sup> 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 co-op 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 three research reports were generated with partial support from NCDC. The first, "Analysis of the Magnitude of Potential Bias in Air Temperature Readings in Iowa Obtained from Standard NWS Liquid-in-Glass Thermometers, 1917-1977" found that minimum thermometer readings averaged from 0.6 to 1.1°F too low in comparison to simultaneous readings made with maximum thermometers. A second study "A History of Iowa Co-op Station Temperature and Precipitation Equipment, 1906-2002" found that a wide variety of shelters, precipitation gages and exposures were used in the

early portion of the record but standardization was rapidly achieved in most cases by 1920. Also, the effect upon temperatures resulting from the conversion of the Cotton Region Shelter to the electronic MMTS in the 1980's and 1990's is more difficult to quantify than might be expected because the new system was only rarely located in the same location as the old, thus raising issues with changes of exposure, as well as instrumentation. The final report, "Results of a Five Year Side-by-Side Comparison of Cotton Region Shelter/Liquid-in-Glass Temperatures and the Electronic Maximum-Minimum Temperature System at Ankeny, Iowa, 1981-1986" provides a detailed comparison of the two NWS co-op network temperature installations. However, results from this comparison were greatly clouded by frequent thermometer problems. Nevertheless, MMTS maximum temperatures found to average 0.3°F lower than the CRS liquid-in-glass maximum readings.

### **Outreach**

The office maintains very open communication with the news media with a total of 423 news media contacts this past fiscal year (July 2004-June 2005). 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 2,177 inquiries were answered during the past fiscal year. Most inquiries were received from government agencies (35%), the news media (19%), attorneys (10%) 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 on-line; however, the raw data are provided to Iowa State University's Iowa Environmental Mesonet web page and made available at that site.

The Iowa State Climate Office works closely with the National Weather Service in monitoring the co-op and ASOS data networks so as to improve the quantity, quality and timeliness of Iowa climate observations. The State Climatologist has served on several NWS regional and national committees involved with climate and data issues. Finally, the Iowa SC participated in the NWS Central Region's Climate Services Workshop in Lincoln, NE in April 2005 and attended the AASC annual meetings in Ithaca, NY in August 2004 and Savannah, GA in June 2005.

### **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 DOT for their use in evaluating where roadways may be in need of detailed examination of possible flood damage.

## Kentucky Climate Center

# *The Kentucky Climate Center*

at WESTERN KENTUCKY UNIVERSITY 

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The Kentucky Climate Center observed its 28<sup>th</sup> year of operation in 2006. As a member of Western Kentucky University's Applied Research and Technology Program (ARTP), the Kentucky Climate Center received funding to support both undergraduate and graduate students and provide opportunities for them to participate in a variety of research and service activities, including presentations at statewide, regional, and nationally prominent meetings. During the course of the past year, the Kentucky Climate Center benefited from a number of ongoing partnerships, including those with the National Weather Service offices throughout Kentucky, the National Park Service at Mammoth Cave National Park, the Barren River Area Development District, and the Center for Climatic Research at the University of Delaware.

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

### **Services**

The Kentucky Climate Center contributed to a variety of service activities over the past year. While continuing to respond to requests for data and advice on climate-related concerns via telephone, fax, and e-mail, the Center has expanded its mass service delivery by adding innovative content to its website. Of particular note, a set of interactive daily climate graphs was added to the site so that users can now view historical daily patterns of temperature and precipitation. A mouse-over capability enables users to view the values of the daily observations for any date in the historical record of Kentucky's cooperative observer sites. The Kentucky Climate Center also provided content on weather and climate for publication of the premier edition of Clark's Kentucky Almanac and Book of Facts 2006. Content included an overview of Kentucky's climate by season, information about natural hazards, summaries of weather and climate for recent years, a compilation of weather records for Kentucky, and a section on weather and climate folklore. This publication quickly became a best seller at many outlets across Kentucky. In response to drought conditions in portions of Kentucky during 2005, the state climatologist provided



analysis of drought conditions and historical perspective at two meetings of Kentucky's Water Availability Advisory Group.

### **Research**

Faculty and students associated with the Kentucky Climate Center are involved in a variety of applied research projects. Many of these projects have been funded through grants and contracts at the state and national level. Work on the *GeoProfiles Initiative* continued over the past year. We now have approximately 40 stations completed and have an article forthcoming in the *International Journal of Climatology* that demonstrates the value of GeoProfiles for identifying and interpreting biases in climatic records. In addition to these internal research initiatives, the Kentucky Climate Center has also been a participant in the Station History Project led by NCDC. Among the station histories that have been completed are three sites in Kentucky: Newport Barracks, the Louisville area, and Bowling Green. Graduate and undergraduate student research assistants working in the Kentucky Climate Center presented papers and posters at several professional meetings, including the AMS Conference on Weather Analysis and Forecasting in Washington, D.C., the Annual Meeting of the Association of American Geographers in Chicago, the AMS Midwest Extreme and Hazardous Weather Regional Conference in Champaign, Illinois, the Annual Meeting of the Southeastern Division of the Association of American Geographers, and the Annual Meeting of the Kentucky Academy of Science in Richmond, Kentucky.

### **Outreach**

The Kentucky Climate Center expanded its outreach over the past year. In conjunction with our partnership with the National Weather Service, we participated in staff meetings hosted by the Louisville and Jackson, Kentucky WFOs on August 17<sup>th</sup> and 18<sup>th</sup> of 2005, respectively. The Kentucky Climate Center also participated in a public question and answer session regarding the development of the Barren River Area Development District's Natural Hazard Mitigation Plan. These outreach efforts were in addition to ongoing outreach through media interviews, service on statewide committees, and addressing elementary and middle school students.

#### *Special Topic: The Kentucky Mesonet*

The Kentucky Climate Center received an earmark of \$1.5 million to be administered through the NWS to develop the Kentucky Mesonet. A second year of funding is anticipated. The mesonet will provide a statewide infrastructure for environmental monitoring and if fully funded will include nearly 100 sites. The Kentucky Mesonet will include an instrumentation laboratory and information technology operations to be housed at Western Kentucky University. In January, a kickoff meeting with officials from NWS, NCDC, and WKU met to outline a plan for developing the mesonet. On April 5<sup>th</sup>, the Governor of Kentucky, Ernie Fletcher, signed a resolution recognizing the Kentucky Mesonet as the official source of climatological observations for the state. To date, efforts by the Kentucky Mesonet Steering Committee have focused on issues concerning the choice of instrumentation and communication packages, as well as the development of a site selection strategy aimed at identifying high quality monitoring sites, while

simultaneously building broad political support for the mesonet at the local level throughout Kentucky. The first mesonet sites are expected to be collecting and reporting observations before the end of the calendar year 2006.



## Louisiana Office of State Climatology

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### LOSC Staff:

Betty Wall, Administrative Assistant  
Malcolm Moe Moreau, NWS Liaison  
Ricardo Noguera, Graduate Assistant  
Jay Grymes, Past State Climatologist  
[www.losc.lsu.edu](http://www.losc.lsu.edu)

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The LOSC is located on the campus of Louisiana State University (LSU) and is placed within the Department of Geography and Anthropology.

### LOSC 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 recognized 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 near 1000 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, including hurricane return periods, floods, and human dimensions of climatic change.

### **Outreach**

The LOSC conducts frequent interviews with radio, newspaper, and magazine media. Over 200 media requests were handled in 2005, much of which centered on Hurricane Katrina. 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, especially during hurricanes.

### **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](http://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*.

## Office of the Maryland State Climatologist

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The Maryland Office of the State Climatologist is the state repository for climate information. We provide climatic data to Maryland state agencies, businesses, students, researchers, and citizens. We maintain links with the many cooperative weather observers in the state, the National Climatic Data Center, the National Weather Service offices, and many other sources of weather and climatic information.

### Our Mission

The functions of the State Climatologist and its office are to:

- Act as liaison between Maryland weather information users and the National Climatic Data Center
- Maintain a data bank of climatological and hydrological data and information
- Work with users of climatic and hydrological data to ascertain their needs for data and analyses
- Provide climatological data in the most pertinent, accessible form for users
- Refer requests for complex analyses to the appropriate person, agency or consulting firm
- Maintain a bibliography of publications pertinent to Maryland and its surrounding areas

### 2005 in the Maryland Office of the State Climatologist

During 2005, the Office completed a wide range of requests, including those from members of the public, state government, education, and military installations. Examples include working with members of the United States Air Force to ascertain and provide the most appropriate wind data for aircraft testing purposes, helping elementary school students to understand the basic elements of climate in general and Maryland's climate in specific, and providing heating degree day information to both the Maryland state government and members of the public to aid in the calculation of heating and cooling efficiency. We answered many requests for specific daily weather information from legal offices, and held discussions with various graduate students from a wide range of fields, including entomology and engineering, to determine the most useful data available to them to complete their research projects. Research projects in 2005 included updating temperature and precipitation trend charts to include the most recent data, researching the historical climate of Maryland, and the web-publication of a narrative description of Maryland's climate.

*Submitted by Emily Becker.*

## Minnesota State Climatology Office

*Jim Zandlo, State Climatologist*

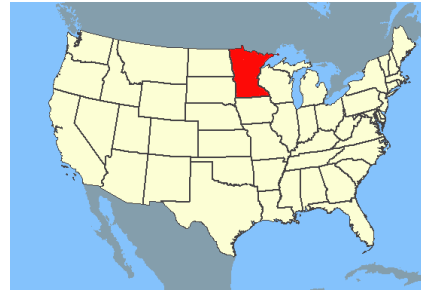
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The Minnesota State Climatology Office (MN\_SCO) exists to manage, analyze, and disseminate climate information in service to the citizens of Minnesota. The MN\_SCO is funded by the State of Minnesota Department of Natural Resources - Division of Waters, 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 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 data base managed by the MN\_SCO consists of over 90 million numbers. The data base features data collected by Minnesota's 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 data base. 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 2000 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.
- the Web site offers online daily data entry and data maintenance capability to volunteer precipitation observers.
- phone and e-mail – the MN\_SCO answers approximately 50 phone calls and e-mails per week from customers with climate questions.

***Research:***

- continued high spatial snowfall data collection by the MN\_SCO "Snow Rules" project. New data were added to analyses designed to identify influences of Lake Superior and terrain changes on the snowfall patterns of northeastern Minnesota.
- created algorithm to use high-spatial-resolution grids of monthly precipitation with low-resolution grids of hourly precipitation to form high-resolution daily grids. Methods being tested that 'adjust' station-based daily precipitation record sets to a uniform observation time and improve hourly precipitation grids.
- in collaboration with the University of Minnesota Department of Plant Pathology and the Illinois State Water Survey, the MN\_SCO is involved in the development of a weather-based disease forecast model to help farmers optimize their chemical spray schedules in the fight against Asian Soybean Rust disease.

***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 (430 subscribers).

*Submitted by Greg Spoden.*

## Mississippi State Climatologist

*Charlie Wax, State Climatologist*

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The Mississippi State Climatologist was appointed in 1983 and was vested in the Department of Geosciences at Mississippi State University, where the office remains today. The SC is not funded beyond one-quarter time release from teaching in the department. The SC is involved in teaching, research, and service through the university, and was granted ARSCO status last year.

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 South Central 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 the routine handling of daily requests for data or information, and provision of data analyses for more complex requests. The same sort of climate data consumers are found in Mississippi as elsewhere—lawyers, engineers, professors, researchers of all types, businessmen, housewives, farmers, teachers, students with science fair projects, and every other imaginable user. Much time is spent providing weather summaries to other government agencies upon request, but no routine publication of this sort is attempted.

Activities this year have been heavily focused on the effects of Hurricane Katrina. The SC office has been overwhelmed with requests for information on the storm and for presentations about hurricanes to groups throughout the state. The insurance industry, lawyers, and engineers have been especially eager to get information for claims payments and for the rebuilding effort. Several companies considering locating plants in Mississippi have requested special information on hurricanes and other severe weather events. The public is also manifesting a heightened awareness of the effects of weather and climate on all types of activities, and the SC has been unwittingly drawn into debates as fundamental as whether a storm surge produces wind or flood damage!

The following outreach activities and presentations on weather and climate were conducted this year:

- o Member of Mississippi Mesonet Steering Committee attempting to establish a mesonet in the state.



- Preparation of a distance learning course on “Climate Change.”Mississippi State University.
- Weather Processes and Stability Classes in Mississippi” Shortcourse for State, County, and Private Foresters on Prescribed Burning. Presented in April and October to foresters from throughout the southern region. Sponsored by the Mississippi Forestry Commission and the Cooperative Extension Service of Mississippi State University.
- “Effects of Hurricane Katrina in Mississippi” presented so far to the Civitan and Rotary clubs in Starkville, MS, to the Tupelo, MS middle school, and to the Piney Woods School in Richland, MS
- “Severe Weather in Mississippi.” M’Lady Garden Club, Starkville, MS
- “Hurricanes in Mississippi.” Ward-Stewart Elementary School, Oktibbeha County, MS.
- “Weather Careers.” Sudduth Elementary School Science Day, Oktibbeha County, MS.
- “Severe Weather and Storm Chasing in Mississippi.” East Webster Elementary School, Webster County, MS.
- “Severe Weather and Storm Chasing in Mississippi.” Henderson Elementary School, Starkville, MS.
- “Severe Weather and Storm Chasing in Mississippi.” Friends of the Library meeting, Monroe County, MS.
- Hosted visits of dozens of school groups to the Climatology Lab.
- Provided a booth at the Fall Farm Days Exposition, Mississippi State University School of Veterinary Medicine, Mississippi State University.
- Provided a booth at the Careers in Conservation Day, Mississippi State University Cooperative Extensive Service, Mississippi State University.

Research activities this past year included investigating the effects of a manage plan to conserve groundwater use in aquaculture in the southern region, development of a climatological model 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), effects of physiographic regions on weather in the state, development of a dynamic fire risk model for the southeast, development of a simple method to estimate daily evaporation at inland and coastal locations, climatological influences on occurrences of West Nile Virus in Mississippi, and climatological controls of tick infestations in Mississippi.

In summary, with the exception of the enormous effects of Hurricane Katrina on the SC’s operations, 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. The level of support provided by the state for the SC activities is not nearly commensurate with the output of the program, and it must be realized this level of activity is heavily dependent upon support from the Department of Geosciences at Mississippi State University.

## Missouri Climate Center

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Christopher Schultz, undergraduate assistant

Michael Berlinger, undergraduate assistant

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**ARSCO Qualifications:** The Missouri Climate Center (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:*

- The MCC web site provides easy access to weather and climate information including links to specialized web sites for real-time and historical weather in Missouri. Drought and agricultural weather web sites are also available;
- An agricultural weather forecast is developed every morning and e-mailed to all the county extension offices in Missouri;
- Over 4000 lines of data arrays are collected daily from a network of 25 automated weather stations. The daily and hourly arrays are posted on a server for free access.
- A new e-mail delivery product, called Horizon Point, was implemented. Horizon Point is a custom weather analysis system for farmers and provides an opportunity to have specific weather reports sent directly to their e-mail address.

### *Information Services:*

- Submitted 19 press releases to the Extension news service related to weather, climate and the environment;
- Serve as an information source for the media including national, state, and local mediums;
- Provide drought status reports for Missouri to the National Drought Mitigation Center;
- Fulfilled hundreds of requests for climate information and provided climatic expertise;
- Submit soil information that is published in a national bulletin **Weekly Weather and Crop Bulletin**: <http://www.usda.gov/oc/waob/jawf/wwcb.html>;
- Run the black cutworm forecasting program over the internet for public utility: <http://agebb.missouri.edu/weather/reports/bcwforecast.htm>;
- Run the rice model program to predict rice growth stages: <http://agebb.missouri.edu/rice/ricemodel.htm>;
- Provide weekly weather information to the Missouri Agricultural Statistics Service: <http://agebb.missouri.edu/mass/crweamen.htm>;
- Provide a weekly climate summary table for the **Integrated Pest and Crop Management Newsletter**: <http://ipm.missouri.edu/ipcm/> ;
- Provide a 2-inch and 6-inch soil temperature table for the Agricultural Electronic Bulletin Board (AgEBB): <http://agebb.missouri.edu/weather/reports/soilTemp2.asp>

<http://agebb.missouri.edu/weather/reports/soysoil6.asp>;

- Brought six weather stations online real-time: <http://agebb.missouri.edu/weather/stations/>;
- Real-time weather data from automated network is made available to local NWS offices;
- Campus weather station linked to main MU web site: <http://www.missouri.edu/> ;
- The real-time stations are providing 5-minute weather conditions to the Meteorological Assimilation Data Ingest System (MADIS);
- Writing a monthly weather column for the **Missouri Ruralist** publication;
- Participate in a weekly radio show on KMIZ, Carrollton, MO, featuring Ag Weather.

**Research:**

- Weather and climate monitoring at Ozark National Scenic Riverways in the context of watershed control;
- Assessing the decline of paper birch stands in the Niobrara River, NE through the interaction of weather, microclimate and genetics;
- Methodology for the retrieval and posting of weather and streamflow data within 80-km of National Park Service units found in the Heartland Network;
- Providing real-time weather status to 11 weather stations in the Commercial Agriculture Automated Weather Station Network for Integrated Pest Management;
- Provide climate data for graduate students research projects

**Outreach:** Education, Awareness, and Contact Activities

- Various Field Days across the state;
- Cattle Grazing Program;
- Crop Injury Diagnostic Clinic;
- Roundtable Discussion with Senator Kit Bond
- Indian Grove Educational Club
- Wet Weather Project Producers Meeting
- Crop Management Conference;
- Computers on the Farm conference;
- In Service Education for Regional Agronomists;
- Missouri Pork Association;
- Missouri Department of Agriculture and Natural Resources
- Soils and Crops Conference;
- Cass County Winter Integrated Pest Management Workshop;
- Ag Systems Management Course, Irrigation and Drainage;
- Regional Climate Services Conference
- Ag-Marketing Teleconferences;
- Integrated Pest Management and Horticulture Teleconferences;
- Missouri Drought Assessment;
- Information resource for the media: Missouri Net, Brownfield Network, Cooperative Video Group, and other state television, radio, and newspaper outlets

## Nevada State Climate Office

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*Nevada State Climatologist*  
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Nevada State Climate Office

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The Nevada State Climate Office (NVSCO) is located in Reno, Nevada, on the Campus of the University of Nevada. The Office operates as part of the Department of Geography at the University. The State Climatologist, Jeffrey Underwood, has a half-time appointment to the NVSCO and a half-time appointment as an assistant professor in the Department of Geography. The NVSCO is very fortunate to have a very capable graduate student, David Walker, assisting in Office duties.

The character of the NVSCO has changed dramatically since August 2004. Since that date the Office has made strides to become the primary data archive for Nevada climate records and the primary climate research entity for the state of Nevada. The data collection and archiving function of the Office was greatly enhanced during the past year with the help of the NCD Climate Modernization Program, which selected an NVSCO work request to digitally key more than 20-years of climate records from stations across the state. The records had previously been photocopied as part of the WSSRD program. The NVSCO has also worked with a number of state and local agencies to expand the data archive for Nevada. For example, the Clark County Regional Flood Control District has agreed to share data from its 140+ station network with the NVSCO. This data will be available from the NVSCO website later in the year.

The NVSCO began a large field project during 2005 to photo-document all weather and climate monitoring infrastructure in the state of Nevada. The protocol for the photo-documentation was developed by the State Climatologist using guidance from the Western Regional Climate Center. A pilot field project which was completed in the fall of 2005 was a success and with adequate funding this project should produce an outstanding online product for data users.

During the past year the NVSCO began soliciting external funding for a number of research projects across the state of Nevada. Among these projects—an observational study to assess the influence of the urban heat island on the convection climatology of the Las Vegas Valley. A second project will collect and analyze post-wildfire hydrologic data to determine the rainfall rates that produce flash floods and debris flows at wildfire burn areas throughout Nevada. The NVSCO is also partnering with the Nevada Division of

Emergency Management to request FEMA funding to update Nevada's statewide hazard assessment. The NVSCO will be responsible for analyzing and reporting on hazards including: lightning, wildfire, thunderstorms, flash flooding, and dust storms.

The NVSCO has also been very active with its outreach and media relations mission. Over the past year the State Climatologist provided more than 30 interviews to print and broadcast media. The State Climatologist was active speaking to both professional groups and the general public. Meetings ranged from The Annual Meeting of the European Meteorological Society in Utrecht, The Netherlands to the Nevada Water Resource Association in Reno, Nevada. Additionally, the Nevada State Climatologist along with Melanie Wetzel at the Desert Research Institute helped to found and presently act as the academic sponsors for a new student chapter of the American Meteorological Society in Reno, Nevada. The new chapter is called the Reno-Lake Tahoe AMS Student Chapter.

Ending on an ironic note—the NVSCO facility located on the ground floor of the MacKay Science Building on the campus of the University of Nevada received considerable damage from flood waters which rose with rainfall and melting snowpack during early January 2006. Some records dating back to the 1800's were damaged but none destroyed. The Office has been repaired and sandbags are now kept at the ready for rising water.

# New Hampshire State Climate Office

*David P. Brown, Ph.D., New Hampshire State Climatologist*

Department of Geography

University of New Hampshire

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## **NHSCO Mission**

The activities of the NHSCO are centered on (a) gathering, archiving, and disseminating climate data from New Hampshire to interested users; (b) conducting and fostering research regarding the climate of New Hampshire and New England; and (c) educating and informing the citizens of New Hampshire on matters related to climate science and climate policy. With increased continuity in the State Climatologist position, the NHSCO has continued to be an active State Climate office and an important part of the climatological community in New Hampshire and northern New England. The NHSCO was certified as an ARSCO office at the 2005 AASC meeting in Savannah, GA. Specific ongoing and planned activities of the NHSCO are outlined below.

## **Data**

The NHSCO is engaged in the collection and distribution of climate data on several fronts. The NHSCO maintains an on-campus weather station at the University of New Hampshire, where it collects sub-hourly meteorological data and archives the data on-line (<http://www.weather.unh.edu>) in a format easily accessible to the public. Additionally, the NHSCO is responsible for ongoing maintenance of two Climate Reference Network (CRN) stations located on UNH property in Durham, NH. In addition to on-site collection and archival of New Hampshire climate data, the NHSCO works closely with the Northeast Regional Climate Center (NRCC) and the National Climatic Data Center (NCDC) to provide climate datasets to stakeholders across New Hampshire and New England as requested. Interested parties can contact the State Climatologist directly with data requests or can utilize an on-line data request interface available on the NHSCO webpage. The NHSCO is continues to negotiate with a private land owner to install wind direction and wind speed measurement instrumentation onto a new cell phone tower in the Lee, NH area to supplement the readings from the UNH weather station. While the infrastructure and funding needed to establish a state-wide mesonet are not currently in place, the NHSCO is interested in pursuing new data collection and dissemination opportunities associated with the NERON automated cooperative station network in New Hampshire and the implementation of the NIDIS drought program.

## **Research**

The NHSCO is currently involved in several research projects aimed at furthering the understanding of climate variability in New Hampshire and New England on interannual to interdecadal time scales. The NHSCO is a key member of the Atmospheric Investigations, Regional Modeling, and Prediction (AIRMAP) and New England Integrated Sciences and Assessment (NEISA) projects, both funded by the National Oceanic and Atmospheric Administration (NOAA). The goals of AIRMAP and NEISA are to engage in research on

climate change and climate variability across New England, and to address stakeholder vulnerability to the impacts of climate. Current research being conducted by the NHSCO in conjunction with these projects is centered on analyses of interannual linkages between climate, air quality, and human health in New England. The NHSCO is playing an active role in researching interannual climate controls on air quality parameters such as ozone and pollen, and is receiving a portion of the NOAA funding to support faculty and student salary/stipends, professional travel, and equipment. Several peer-reviewed publications with NHSCO staff as primary authors are in preparation from AIRMAP-related work, and multiple professional conference presentations on NEISA activities were given by NHSCO staff in 2005 and 2006.

An expansion of NHSCO research activities is expected during the next year. Possible collaborations with NWS field offices in Gray, ME and Taunton, MA on climate downscaling topics have been discussed, and a study on cold air outbreaks in New England is planned, in possible consultation with staff at the NOAA-UNH Joint Hydrographic Center. Furthermore, internal UNH discussions have begun regarding how best to create and maintain a “New Hampshire Climate Portal” of current and archived geospatial climate data for the state. In this vein, the NHSCO plans to strengthen on-campus ties to the UNH Institute for the Study of Earth, Oceans, and Space (EOS) and develop new opportunities for undergraduate research and service.

### **Outreach**

The NHSCO strives to meet a continual demand for educational and outreach activities. Because the NHSCO is currently staffed by only the State Climatologist (the bulk of whose duties are teaching and research in the Department of Geography at UNH) and part-time student help, the amount of outreach the office conducts is somewhat limited. However, every effort is made to address requests for data, media comment, and invited talks and appearances.

The NHSCO web presence at <http://www.unh.edu/stateclimatologist> continues to be a useful tool for both private and public interests across New Hampshire. However, it is expected that a transition to a new, AASC-based website will occur sometime in Fall 2006. The new website will be designed to serve as a “point of first contact” for residents of New Hampshire and other interested users who have a need for climate data or information, and will feature historical climate summaries and products along with current regional-specific and national climate products such as the U.S. Drought Monitor and 30-day departure-from-normal maps of temperature and precipitation. There will be a number of links to external sites with climate information, and a detailed description, including photos, of the UNH on-campus weather station and local CRN stations. A CGI interface will continue to allow the public to submit requests for climate data on-line via the website.

NHSCO staff maintain a regular presence on local and regional media. Since July 2005, the State Climatologist has conducted a dozen interviews with newspapers such as the *New Hampshire Union-Leader* and *Portsmouth Herald*. He has also appeared on New Hampshire Public Radio, New Hampshire Public Television, and WMUR Channel 9 (ABC affiliate) in Manchester, NH. The most prominent topic discussed was the unusually heavy rainfall across much of southwestern New Hampshire during October 2005, resulting in

extensive flooding in the Keene, NH area. Other interviews focused on specific topics such as regional weather events, climate impacts on regional transportation, and hurricane impacts in New England.

NHSCO staff are routinely called upon to provide presentations on New Hampshire and New England climatology at both professional meetings and for various public and private organizations. Recent invited presentations have included national meetings of the American Geophysical Union and NOAA's Climate Prediction Application Sciences community, as well as regional meetings such as the University of New Hampshire Hurricane Katrina Forum and the New Hampshire Tree Fruit Growers Association annual meeting. The State Climatologist also maintains an active role as a participant with the U.S. Drought Monitor and is a member of the New Hampshire Drought Task Force. The NHSCO is also active on the UNH campus in its roles with the Energy Task Force and Office of Sustainability Climate Initiative programs.



## New Mexico Climate Center

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### *Ted Sammis, State Climatologist*

Deborah Bathke, Assistant State Climatologist  
Stanley Engle, Programmer/Analyst  
Brock Boven, Undergraduate Student Assistant



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The New Mexico Climate Center (NMCC) is located within the Department of Plant and Environmental Science at New Mexico State University in Las Cruces, New Mexico. The Office of the State Climatologist was originally created within the New Mexico Department of Agriculture in 1978. In 1997, a memorandum of understanding between the New Mexico Department of Agriculture and the Agriculture Experiment Station of New Mexico State University officially transferred the responsibilities of the state climatologist from the Department of Agriculture to the Agriculture Experiment Station.

### **Information Services**

The NMCC is involved in the collection and dissemination of climate data through various channels. The NMCC maintains a network of 19 automated weather stations throughout the state. Daily data from these sites and from approximately 136 sites owned by various state and federal agencies, university researchers, and private citizens, is collected, processed, and distributed via the NMCC website. In 2005, the NMCC website had more than 930,000 page hits for climate information and data and several hundred requests were answered by phone and email.

In addition to processing climate data and responding to requests, the New Mexico Climate Center provides a variety of web based tools for decision support in the areas of agriculture, hydrology, construction, health and economic development.

### **Research**

By New Mexico law, the duties of the state climate office primarily involve information services and do not include research activities. However, climate center staff conducts applied research in conjunction with other University research programs in which climatic information provided is used for studies involving crop improvement, pest control, and irrigation/water management. Additionally, staff members work collaboratively with the New Mexico State University Water Task Force and other university researchers on the Rio Grande Basin Initiative, a joint Texas A & M University and New Mexico State

University effort to improve water conservation through research and education of irrigation efficiency.

### **Outreach**

With the addition of a full-time assistant state climatologist in the spring of 2005, the New Mexico Climate Center significantly enhanced both its service and outreach roles in order to better meet the needs of the state. The state climate office actively participates in various state programs including: the Drought Monitoring Workgroup of the New Mexico Drought Task Force, the Governor's Coordinated Resource Management Initiative, and a workgroup on Climate Change and Greenhouse Gas Reduction.

The New Mexico Climate Center has also worked in cooperation with the Colorado Climate Center, to bring the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) to New Mexico in the Spring of 2005. Approximately 385 observers are currently registered in our state after one year of involvement in the program. The state climate office is working with New Mexico State University's Water Task Force, Cooperative Extension Service, and Master Gardener Program as well as the New Mexico Floodplain Managers Association to further expand precipitation observations across the state.

Further community outreach activities include regularly presentations on New Mexico Climate at professional meetings, the general public, and at local elementary schools. NMCC staff have also conducted multiple interviews with newspapers and have appeared on a local morning radio show.

Plans for 2006 include upgrading the NMCC automated weather station network and the development of a new NMCC website that will feature an improved user interface and new climate products for decision support; participating in the New Mexico team for site recommendations for NOAA's Environmental Real-Time Observing Network (NERON); the development of a Flood Smart Calendar in conjunction with the New Mexico Floodplain Manager's Association, and the initiation of the "Student Award for Achievement in Climate Studies" to reward student involvement in science fair projects related to weather and climate.

*Compiled by Deborah Bathke.*

**Office of the New  
Jersey State  
Climatologist**

*Dr. David A. Robinson, NJ  
State Climatologist*

Keith Arnesen, Assistant State Climatologist  
Chad Shmukler, Technical Director  
John Read, Technical Assistant  
Mathieu Gerbush, Research Assistant

Center for Environmental Prediction  
NJ Agricultural Experiment Station  
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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. Almost 300 media interviews were given 2005, a year that saw the hottest summer, driest August-September and wettest month (October) on record in the Garden State.

**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  
<<http://climate.rutgers.edu/stateclim>>.

### **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.

### **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 more than 300 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 Earth Science Teachers Association annual meeting, the NJ Farm Bureau annual meeting and many 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 NOAA Integrated Surface Observing System ad hoc advisory committee, and the AMS Applied Climatology Committee. He also chairs the National Research Council Committee on Archiving and Accessing Environmental and Geospatial Data at NOAA

### **Monitoring and impact assessment**

- Operation of the NJWxNet. <<http://climate.rutgers.edu/njwxnet>>
- 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\\_v1/climreportcard/climate\\_report\\_card.html](http://climate.rutgers.edu/stateclim_v1/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

*Sethu Raman, Director and State Climatologist*

Peter Robinson, NC Climate Program Coordinator

Ryan Boyles, Associate State Climatologist and Operations Coordinator

Ameenulla Syed, Instrumentation Meteorologist and Manager, NC ECONet

Aaron Sims, Environmental Meteorologist

Mark Brooks, Environmental Meteorologist

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**The State Climate Office of North Carolina** is a public service center for climate-environment interactions at NC State University. It serves the State of North Carolina as the American Association of State Climatologists Recognized State Climate Office (ARSCO) for North Carolina. Its public service mission includes extension, research, and educational components. Highlights of activities and efforts during 2005 in support of the center's mission include:

- Continued public outreach through improved Internet resources, weather forecast applications, and enhancement of the NC ECONet.
- Providing numerous vital information and services related to weather and climate of NC to several state and federal agencies and the private citizens. This covers a wide variety of weather and climate related problems that the state has faced in the recent past and the ones it could experience in future. This includes hurricanes, floods, drought, air quality, and technological disasters such as bio-terrorism.
- External support from NC DENR Division of Water Resources, NC DENR Division of Air Quality, and NC Department of Transportation. NSF funding to support an undergraduate student for three years was obtained in 2003

### **Extension Services**

- SCO web site continues to be a leading source of climate information for NC. The site has been expanded significantly to improve navigation, information access, and user feedback. The SCO website is averaging over 8000 unique visitors and 45,000 hits each month, an increase of 15% since last year.
- NC CRONOS database allows access to real-time and recent historical observations of hourly, daily, and monthly weather and climate data. Users with SCO accounts

(including state agencies and University faculty) have access to the complete database. Other enhancements include:

- Comprehensive climate summaries for most hourly stations in the CRONOS database to include temperature, cloud, wind, and soil summaries. This product will continue to expand to include summaries for all variables.
- Map Server technology has been implemented to allow dynamic data viewing of mapping products, including climate observations from the CRONOS database, radar-based precipitation estimates, and real-time radar imagery. This product will be expanded over the next year to serve as a primary point of entry to the SCO's climate database and weather-based applications for agriculture, forestry, and transportation services.
- NC ECONet continues to expand and improve the quality of environmental observations. There are now 28 stations in this network, including new stations installed and maintained with other University partners.
- Development of website for real-time modeling applications. SCO Staff run a high resolution regional weather model in real time, with benefits to many applications including agriculture, emergency response, and air quality interests.
- Development of automated Peanut Disease Advisories began in summer 2005 in collaboration with Dr. Barbara Shew. These advisories will be operational for summer 2006.
- SCO worked with colleagues at the SC Climate Office and University of SC to develop a prototype high-resolution drought monitoring tool for river basins in NC and SC. This work was funded by Duke Energy, and will serve as the basis for a future real-time drought monitoring tool for the Carolinas.
- SCO provided hundreds of hours of service to federal, state, and local government agencies. These agencies included NC Department of Transportation, U.S. 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, U.S. Geological Survey, NC Flood Warning Program, NC Flood Mapping Program, U.S. Army Corps of Engineers, and county economic development agencies.

### **Educational Outreach**

- Last year the SCO hosted six undergraduates, each with individual projects.
- SCO continues its 4 year partnership with Centennial Campus Middle School and annually hosts 4 middle school student interns.

### **Research**

- Five graduate students worked at the SCO on topics related to weather and climate in NC.
- SCO staff and students co-authored 20 professional meeting presentations, 1 invited presentation, published or communicated 8 scientific papers for peer-reviewed journals.

*Compiled by Ryan Boyles.*



***Dr. Ken Crawford***  
***Director and State Climatologist (on temporary assignment)***

Dr. Renee McPherson	Acting Director
Dr. Mark Shafer	Director of Climate Information
Derek Arndt	Acting State Climatologist
Gary McManus	Staff Climatologist
Andrew Reader	Staff Climatologist
Liz Stoppkotte	Student Intern

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**Oklahoma Climatological Survey**

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The Oklahoma Climatological Survey was established in 1980 to provide climatological services to the people of Oklahoma, conduct research on the impacts of climate on human activities, and serve as a support facility for the State Climatologist. OCS has a legislative mandate to acquire, process, and disseminate climate and weather data and information for use by the state's citizens. The Survey maintains an extensive array of climatological information, operates the Oklahoma Mesonet, and hosts a wide variety of educational outreach and scientific research projects. The Oklahoma Climatological Survey is a research unit of the College of Atmospheric & Geographic Sciences at the University of Oklahoma. OCS employs 41 full-time staff and 23 student employees with FY05 expenditures of \$3.3 million.

OCS celebrated its 25<sup>th</sup> anniversary in 2005. If there was a theme to OCS' activities in 2005, it was building partnerships. Dr. Ken Crawford continued his Intergovernmental Personnel Action with the National Weather Service to lead the modernization of the cooperative observer network. Related to that, OCS became the prototype data processing and quality assurance system for NOAA's Environmental Real-time Observation Network (NERON) program, including a 100-station automated network in New England. Another partnership was forged with Mixon/Hill, Inc. to design a national road-weather data-ingest, quality control, and dissemination system for the Federal Highway Administration. OCS' "Innovations in Managing Weather-Impacted Situations" workshop drew 13 state emergency management officials, representing 11 states, to Oklahoma for a 5-day



workshop to discuss replication of the OK-FIRST public safety outreach program. Close interaction with four of those states continued throughout the year and into 2006.

Other activities in support of the ARSCO mission are listed below:

### **Information Services**

- Served 65 million files in 2005.
- Added forecast components to agricultural disease models.
- Updated databases and web pages for Oklahoma Mesonet instrumentation, NOAAport products, outreach programs, and the Agricultural Research Service.
- Provided frequent updates on drought and wildfire conditions to state officials, the media, and the public.

### **Research**

- Conducted a comparison of real-time drought monitoring using cooperative observer data from an ACIS feed to similar products produced from Oklahoma Mesonet data (supported by a grant from NCDC's State Climatologist Exchange Program).
- Mentored 7 graduate research assistants, supervised 4 undergraduate research assistants, and advised 18 undergraduate students.
- Provided a 4-month summer internship for two students from the Institut Universitaire de Technologie du Limousin in Limoges, France.
- Secured more than \$1.1 million from federal and other non-state sources.

### **Outreach**

- Hosted the EarthStorm summer workshop for K-12 teachers and the annual Oklahoma Mesonet/Atmospheric Radiation Measurement (ARM) Program science fair.
- Produced a severe weather preparedness poster, distributed locally by OCS to Oklahoma teachers and nationwide by the American Meteorological Society to its local chapters.
- Provided continuing education to 258 decision-makers from Oklahoma and surrounding states.
- Developed a new briefing page for the OK-FIRST public safety program, giving a quick overview of current and anticipated weather threats.
- Seventeen international visitors, primarily from Southeast Asia, visited OCS for the U.S. Telecommunications Training Institute workshop.

### **Monitoring and Impact Assessments**

- Continued real-time collection, quality-assurance, and distribution of data from the Oklahoma Mesonet, with updates every five minutes.
- Moved 15 stations from the Little Washita Micronet to create a new Micronet in the Fort Cobb Watershed (USDA-Agricultural Research Station sponsor).
- Secured funding for instrumentation for an urban micronet in Oklahoma City.
- Created climatological trend graphs (temperature and precipitation, by month and climate division), highlighting the decadal nature of previous drought episodes in Oklahoma.
- Issued 4 seasonal climate summaries and 12 monthly climate summaries.

- Produced local climate summaries for each of Oklahoma's 77 counties.
- Released new versions of WeatherScope visualization software, allowing display and manipulation of multiple data streams, including Mesonet, NWS, and radar data.
- Provide hazard assessments for the state's Hazard Mitigation Plan, which FEMA qualified for Enhanced Plan status, making Oklahoma eligible for additional mitigation funding.

*Compiled by Mark Shafer.*

## Oregon Climate Service

*George H. Taylor, State Climatologist*

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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   | Melanie Mitchell, Undergraduate Assistant  |
| Christopher Daly, Research Professor | Cadee Hale, Undergraduate Assistant        |
| Wayne Gibson, Programmer             | Kelsey Kuykendall, Undergraduate Assistant |
| Matt Doggett, Research Assistant     | Sarah Joos, Undergraduate Assistant        |
| Eileen Kaspar, Research Assistant    | Sean Daly, Undergraduate Assistant         |
| Joseph Smith, Research Assistant     |  |
| Mike Halbleib, GIS Manager           |  |

### Linkages

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|---|--|
| OCS acts as the liaison with:               |  |
| National Climatic Data Center               | Climate Prediction Center                    |
| Western Regional Climate Center             | American Association of State Climatologists |
| National Weather Service                    | Other state climate offices                  |
| USDA Natural Resources Conservation Service |  |

### 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 100,000 "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 U.S. states and possessions, for USDA Natural Resources Conservation Service. New maps, nearly completed, are for the 1971-2000 period and at a resolution of approximately 800 m.
- 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 U.S., 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
- Probable Maximum Precipitation (PMP) mapping for the U.S. and Canada.

## Pennsylvania State Climatologist



### *Paul Knight, Pennsylvania State Climatologist*

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The Pennsylvania State Climate Office database now incorporates observations from at least six separate networks within the Commonwealth. Approximately 100 new hourly reporting stations have been added into the office's relational database. When combined with hourly reports from the FAA and Pennsylvania's DEP and DOT, there are over 250 observations of temperature, dew-point and wind each hour. The State Climate Office has also improved its interactive data archive and metadata files and we are working with state officials to bring the non-federal AWOS III sites on-line (about 15 hourly sites).

The vision for a Pennsylvania Mesonet remains a high priority for the State Climate Office. New initiatives with the state's environmental protection are being launched. The CoCoRaHS network has expanded into Pennsylvania under the auspices of the state climate office and with the name FROST. By late winter, over 65 new volunteer observers have been added. The State Climate Office in conjunction with the Center for Environmental Informatics is completing an objective methodology for selecting new sites for an expanded environmental observation network.

#### ***Information Technology Capabilities:***

- 775 web data requests since late November 2005 (new logging software to be installed in summer 2006)
- Primary users are commercial, educational and government organizations
- Typically 5-8 requests per week from public for data
- Over 400 requests filled and logged

#### ***Communication Capabilities:***

A new web server was installed early in 2005 to meet the needs of the expanding user base and increase our capabilities with more computational power. Development of new products continues on this new server to fully utilize the increased computing capability.

***Information Services:***

The development of a new Interactive Data Archive continues. This new archive allows users to easily obtain data as well as metadata from any of our primary data sources. Currently, the new IDA is open to visitors to download 31 days of data, but a new user interface will allow registered users to access larger chunks of data. A collaborative effort with the Northeast Regional Climate Center continues to bring evapo-transpiration data to the users and is part of a water budget project.

***User Base Growth:***

The number of site visits continues to increase from year to year. We anticipate this trend to continue as we work with more state agencies and provide more data products. Since the deployment of the latest version of the data archive (2005-11-21) we have had 775 visitor data requests. During the next year, we will track the specific users and amount of data downloaded for a better profile of our clientele.

***Data Quality Control/Assurance:***

A multi-tiered quality assurance system is under development to process and test the increasing volumes of environmental observations. Standards established by other ARSCO's (particularly the Oklahoma Climate Survey) are being adapted for uniformity of data quality control. Data collection of the PA Cooperative Weather Observer Program (CWOP) takes place from the Forecast Systems Lab (FSL) MADIS system. The PA Climate office takes advantage of the sophisticated DQ control routines provided by MADIS on these data sets.

***Climate Office Projects:***

In collaboration with the National Park Service, a climate data inventory project is underway to assess all atmospheric reporting sites within the domain of approximately eight parks stretching from the Delaware River to central West Virginia. Comprehensive metadata for all sites within Pennsylvania are being compiled and will be part of an interface for NPS personnel.

***Special Projects:***

Collaboration with experts in the College of Agricultural Sciences continues with the development of environmental data monitoring systems for a Wheat Scab project. A real-time water budget for the Spring Creek Water Shed in collaboration with Pennsylvania's DEP will be completed in mid 2006. A joint project with Pennsylvania DOT and Penn State Civil Engineering is focusing on crash data and quantifying the weather hazards related to auto crashes.

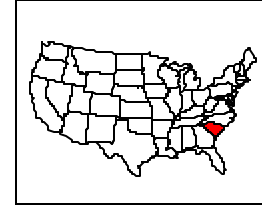
***Selected Presentations:***

The Pennsylvania State Climate Office hosted the Climate Diagnostic and Prediction Workshop from October 24-28, 2005. More than 150 scientists participated in the workshop. Presentations were given at the Pennsylvania Agronomic Education Society as well as the Central Pennsylvania Crop Conference during the winter of 2006.

## South Carolina Office of Climatology

### *Hope Mizzell, State Climatologist*

Wes Tyler, Assistant State Climatologist for Service  
Mark Malsick, Severe Weather Program Liaison  
Denise Woncisz, Administrative Assistant (Part-time)



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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 an expert witness in civil and criminal litigation involving weather and climate, averaging 12-24 cases per year.

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.

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.

**ARSCO Qualifications:** The following describes the ways in which SCO addresses each of the ARSCO qualifications:

### **Communication Capabilities:**

- Maintains the 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 active hurricane season these numbers triple with 60,000 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. During 2005, the SC Drought Response Committee was convened twice to review the drought conditions and impacts. Staff spent significant time working with hydro-electric dam operators and other resource agencies to enhance drought mitigation efforts during the Federal Energy Regulatory Commission's (FERC) dam relicensing.
- Issued Weekly Weather Report that was also provided to the USDA SC Agricultural Statistics Service during the growing season.

#### **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.
- A High Resolution Regional Drought Monitor Application was developed through a partnership between CISA, SCO and the NC State Climate Office (<http://drought.dnr.sc.gov>). Funded by Duke Energy the application is being used to identify drought triggers for their FERC Relicensing Low-Inflow Protocol.

#### **Outreach:**

- Staff member serves as commissioned law enforcement officer to assist SCDNR during weather emergencies.
- Provide approximately 50 annual presentations to various governmental, private sector, and civic organizations including the 15<sup>th</sup> Annual Conference for Applied Climatology, Association of State Climatologists Annual Meeting, the SC Hazard Mitigation Conference, and the Saluda Reedy Water Users Forum.
- Attend state and national conferences such as the National Hurricane Conference.
- The SCO produced the first ever South Carolina Weather Calendar during 2005. The calendar provides a fun and unique medium for educating the public about SC's spectrum of changeable weather and increases visibility for the Office.
- An article highlighting the functions of the SCO was published in the SC Wildlife Magazine.



**Monitoring and Impact Assessment:**

- Maintains a network of climatological observers.
- Prepare event summaries for significant weather-related events. During 2005, Open File Reports on Hurricane Ophelia and Tropical Storm Tammy were published online.
- As a member of the State's Emergency Operations Team, staff participates in quarterly hurricane task force meetings, annual exercises and trainings. Provided forecast analysis and weather briefings to emergency officials during Hurricane Katrina, Hurricane Opehlia, Tropical Storm Tammy, and the December 15<sup>th</sup> Winter Storm.
- Issued press releases on Winter Weather Awareness, Severe Weather Awareness, Hurricane Preparedness and Flood Safety Awareness.



## South Dakota Office of Climate and Weather

*Dr. Dennis Todey, State Climatologist (Extension climatologist)*

Chirag Shukla – Climate Data Specialist

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The South Dakota Office of Climate and Weather is part of the Cooperative Extension Service at South Dakota State University. Consequently the mission of the state climate office of providing data and information to the people of the state overlaps the mission of the extension service in providing science-based information to the people of the state. As part of the SD CES, it has connections in every county of the state to communicate with people of the state providing for a direct set of users as well as transfer of information back to the office.

The South Dakota Office of Weather and Climate (SDOCW) was granted ARSCO status in 2005. South Dakota also agreed to serve as host for the 2006 AASC meeting. Preliminary planning determined two potential locations, Sioux Falls and Rapid City. Near-unanimous opinion from the AASC membership indicated the Rapid City location as the preferred location. Planning has been on-going for the Rapid City meeting.

State climatologist, Dennis Todey and Climate Data Specialist, Chirag Shukla, attended the Applied Climate/AASC combined meeting in Savanna, GA in June 2005. Dr. Todey presented a paper comparing recent yield trends correlated to growing season precipitation.

The SDOCW expanded its monitoring capability by deploying nine new weather stations in the state during the summer of 2005. Data from the stations is available free of charge at 5-minute intervals via the state climate web site. This data is also being supplied to users directly via the UNIDATA data stream at hourly intervals for use by National Weather Service office for forecasting and warning verification. Station locations were chosen to fill large holes in the real-time network across the state.

The SDOCW developed a state climate advisory board with its first meeting on October 28, 2006. This group was selected to represent the main federal and state data users within

the state. Fifteen members first met in Pierre to begin assessing data needs in the state, how those needs could be met and to determine potential funding streams for this work. Subsequent meetings are planned for 2006. The goal is for this group to connect users in the state with available data and to act as a conduit for comments to the state climate office.

### **Student work**

Two MS graduate students completed work with Dr. Todey. One project developed a forecast system for crop water use for irrigation scheduling comparing National Weather Service and direct model forecasts. This routine is in preparation for publication and will be implemented on the state climate web site this summer. The second developed an ArcIMS interface to create a user interface for web-user to choose types of data on the state climate site. Another student has begun work assessing differences in weather station data between coop sites, our automated stations and other surrounding stations.

A new climatology of pan evaporation was created with the work of another MS student thesis. This information is being developed for inclusion on the state climate web site.

### **Interaction with clientele**

South Dakota was a test location for a cooperative project between USGS's EROS Data Center and the National Drought Mitigation Center to assess drought status at very high resolution using SPI data and remotely sensed surface vegetation condition. The state climate office provided feedback on the weekly products based on surface reports.

We created periodic drought updates for the state drought web site on current moisture conditions and impacts.

### **Media**

The state climate office handled over 50 media requests for data and interviews from television, radio, newspapers and other media outlets.

Dr. Todey did a weekly feature for an extension-produced statewide gardening program (Garden Line) on South Dakota Public Television. He also did a monthly feature on a statewide agriculture program (Today's Ag) discussing current drought conditions, recent precipitation events and other agricultural impacts.

### **Data requests**

The state climate office responded to over 100 direct data requests as well as served large amounts of data on its web site. The web site is still introduced as one of the most useful parts of the climate program.

Dr. Todey gave 35 presentations and 2 field day presentations to producer groups, extension meetings, civil groups and school classes.

## Texas Office of the State Climatologist

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

*Dr. John W. Nielsen-Gammon, Texas State Climatologist*  
*Matt Mosier, Undergraduate Assistant*

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### **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 and a Power Mac G5, 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 out-of-pocket expense for the Office is hourly wages for one part-time undergraduate assistant. Cost recovery is available for large data requests.

### **Communication Capabilities:**

The Office of the Texas State Climatologist utilizes all mainstream forms of communication. The Office has access to electronic mail, telephones, facsimile machines, regular mail, and allows for people to come directly to the office. A website is maintained by Office staff, and it is updated weekly with statewide weather summaries.

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, to those with general questions about the weather. Most information is sent via electronic mail, but the Office uses facsimiles and regular mail on a regular basis to disseminate larger amounts of information to clients that would be impractical to send through other methods. The Office continues to charge a service fee on requests that take longer to complete and/or require large amounts of data. 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 an easily accessible format. In 2005, about 270 electronic climate requests were received, and sent the same amount. The Office has also received approximately 175 phone calls, sent nearly 50 facsimiles, and sent numerous mailings through the postal services.

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 as well as 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 at Easterwood Field, 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:**

This year the Office of the State Climatologist is receiving funding from the National Oceanic and Atmospheric Administration (NOAA) and the Texas Water Development Board (TWDB) for participation in three related projects. The NOAA project is directed toward documenting and understanding decade-scale changes in observed climate in Texas and Oklahoma. The TWDB projects include assisting in the development of a high-resolution climate atlas for Texas and making recommendations regarding the best ways to monitor meteorological, hydrological, and water supply drought in Texas.

The Office of the State Climatologist also receives funding under an interagency grant agreement from the Texas Commission on Environmental Quality (TCEQ) for a variety of projects related to air pollution meteorology. These include research activities undertaken locally and weather observations arranged through a subcontractor.

In addition to these funded projects, the Office of the State Climatologist is also investigating the local-scale and large-scale controls on summertime precipitation in Texas, with the eventual objective of developing ways to forecast drought on a monthly and seasonal time scale.

**Outreach:**

The Office's primary means of outreach is through data access and publications available on the OSC web site. In addition, the OSC responds regularly to media requests and requests for guest lectures. During the past year, the greatest interest among the public has been with regard to topics related to drought, hurricanes, and climate change.

**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.

## Utah Climate Center

*Dr. Esmaiel Malek, Interim Director*

Tess Davis, Research Technician III

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The Utah Climate Center is located within the department of Plants, Soils, and Biometeorology of Utah State University in Logan. The state climate program for Utah was officially assigned to the College of Agriculture in 2004 by the Utah state legislature. With this assignment the Utah Climate Center was also officially state funded.

The mission of the Utah Climate Center (UCC) is to facilitate access to climate data and information, and to use expertise in atmospheric science to interpret climate information in an accurate and innovative fashion for the public and various entities. The mission includes the design of new products to meet present and future needs of groups that include agriculture, natural resources, government, industry, tourism, and educational organizations in Utah and the intermountain region.

### **Communication Capabilities / Information Services**

The Utah Climate Center debuted its' long awaited updated website in December 2005; <http://climate.usurf.usu.edu>.

The web site is capable of locating stations *worldwide*, downloading requested data, and rapidly exporting it into comma separated variable (CSV) Excel files. A Geographic Information System (GIS) search engine for data retrieval is provided to facilitate the access of the climate data.

The new website has many exciting capabilities, and will continue to expand in products and data.

In addition to serving as a link to established National Weather Service Coop Weather Station climate data, The Utah Climate Center's web site receives and archives data from Automated Weather Observing System (AWOS) and the Global Summary of the Day (GSOD). The AWOS data is automatically ingested into the database in near real-time from the UNIDATA Internet Data Distribution System.

### **Research**

The Utah Climate Center was involved in new and ongoing research projects in 2005. One aspect of research involved local (Logan) inversions and consequential pollution. Interim director Esmaiel Malek is the lead author of a paper outlining the pollution and inversions unique to Cache Valley; Malek, E., Davis, T., Martin, R.S., and Philip, J.S. 2006. Meteorological and Environmental Aspects of One of the Worst National Air Pollution Episodes (January, 2004) in Logan, Cache Valley, Utah, U.S.A. *Atmospheric Research* **79: 108-122.**

The Utah Climate Center continued its' efforts to develop new data products and services for the benefit of educational organizations, private industry, the research community, and all other data users within the state, and inner mountain region.

To ensure the most innovative and scientifically valid products, the UCC initiated a scientific committee to aid the process. The UCC Scientific Steering Committee is comprised of scientists from a wide variety of relevant disciplines that are willing to offer their expertise to the UCC.

The Utah Climate Center also embarked on an ambitious project of mapping all weather stations in the state of Utah in a GIS format. So far there have been over 1500 stations documented including COOP, AWOS, ASOS, RAWS, and MESOWEST stations. There are also private stations ran by researchers, the Department of Homeland Security, and Utah Department of Transportation. Any station operator willing to share data with the public is documented. The Utah Climate Center hopes to collect and archive all of the available data from these stations and make it available to the public in the future. The Utah Climate Center also continued to operate several research endeavors for outside institutions including weekly precipitation sampling for the National Atmospheric Deposition Program (NADP), and equipment maintenance for the University of Colorado's UVB program.

### **Outreach**

The Utah Climate Center performs ongoing community outreach. Dr. Malek visits elementary and pre-elementary schools to provide an entertaining and educational program for the kids. He gives them a fun first look at biometeorology.

The Utah Climate Center also accommodates requests for visitors to the Center's Office on campus, and even to Coop weather stations. Many different groups such as Boy Scouts, graduate students, and media personnel take advantage of this opportunity.

Interim director Malek also participated in several conferences in 2005;

Malek, E. 2005(a). Monitoring of cloud at local scale. *OSA Conf.-Fourier Transform Spectrometry/Hyperspectral Imaging and Sounding of the Environment*. Alexandria, VA, Jan.31 – Feb. 3, 2005.

Malek, E. 2005(b). Validation of local-cloud model outputs with the GOES satellite imagery.

*2005 Joint Assembly: AGU, NABS, SEG, SPD/AAS*. New Orleans, LA, 23-27 May, 2005.

Malek, E. 2005(c). Nine years evaluation of radiation and energy fluxes in a semi-arid valley.

*5th International Scientific Conference on the Global Energy and Water Cycle*. Costa Mesa, CA, 20-24 June, 2005.

Malek, E. 2006. Annual Water Balance at the West Desert Basin Playa. *USU Water Initiative 2006*

*Spring Runoff Conf. Program*. Logan, Utah, 27-28 March 2006.

### **Monitoring and Assessments**

The Utah Climate Center continues to provide annual assessment of precipitation in the form of water year tables. These annual tables are now available on the new website.



The Freeze-free season for the state of Utah was also updated through 2005, and posted on the website for the public.

The Utah Climate Center continued in its' responsibility for daily weather observations at two local National Weather Service Coop weather stations.

**Goals for 2006**

The Utah Climate Center plans to update the previously published book Utah Climate . It was published in 1992 by former UCC directors Gaylen Ashcroft and Donald Jensen. The UCC hopes to update the data and then make it available on the website as a free pdf download, and in hard copy format for a small fee.

The Climate Center also plans to engage in micro mapping, which will be readily available to the public on our web site.

*Compiled by Tess Davis.*

## Vermont State Climate Office

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The Vermont State Climate Office (VTSCO) received its ARSCO recognition in June 2005. The office is housed within the Department of Geography at the University of Vermont (UVM) & State Agricultural College, a land-grant institution that emphasises outreach as one of its core missions. In July 2005, the VTSCO moved to new office space that was donated by the Geography department for the expansion and enhancement of the Office. CDMP-funded equipment, archival publications and documents are housed there, with adequate facilities for the undergraduate and graduate assistants.

The core mission of the VTSCO is to provide climate research and services to Vermonters and other constituents (university researchers, policy makers, state agencies, legal firms or school children) in a timely and efficient manner. This is facilitated via a dedicated website and e-mail address.

In AY 2005-2006, the VTSCO created an internship program for undergraduates interested in climate issues. The first three interns were drawn from the Geography and Geology departments, making use of federal work-study funding and CDMP funding. One intern was unpaid and did not receive academic credit for his work. A graduate research assistant was also assigned to the VTSCO by the Graduate College at UVM, for conducting research and assisting with outreach.

**ARSCO Qualifications** : The VTSCO is the AASC-designated state climate office for Vermont. The following activities address each of the Office's ARSCO qualifications.

***Communications capabilities:***

- enhanced the VTSCO website (<http://www.uvm.edu/~ldupigny/sc>) to include the Vermont component of the CDMP (Climate Database Modernization Program) historical data collection effort, mitigation awareness resources, instructions on finding historical and other atmospheric documents in the Bailey/Howe Library at the University of Vermont (a federal depository library) and a streamlining of the most commonly requested NCDC datasets

- provide free data, expert opinions and recommendations via the telephone, facsimile, electronic mail and regular mail

***Information services:***

- provided six interviews on CDMP activities, fall foliage and Caribbean hurricanes to the Associated Press, Reuters-Boston, Hot 105 FM in Kingston, Jamaica and local newspapers.
- handled over 50 non-CDMP related email and telephone requests.

***Research:***

- CDMP-related research on the station histories of Burlington and Lunenburg was conducted. Databases of the contacts, findings and progress of visits around the state were created. Diaries held in the Library Research Annex of the UVM's Bailey/Howe Library were imaged, with copies being forwarded to the CDMP for uploading to WSSRD.
- collaborated with CDMP personnel and Steve Doty to submit a manuscript to the Bulletin of the American Meteorological Society as an awareness-raising effort. SCEP (State Climatologist Exchange Program) funding facilitated this collaboration.
- initiated a neighbourhood level precipitation monitoring program as part of an EPA-funded UVM stormwater project called Redesigning the American Neighbourhood (RAN)

***Outreach:***

- worked with the ECHO at the Leahy Center for Lake Champlain as a consultant on their "Be a Weather Reporter" exhibit
- presentations at science museums and libraries on the role of climate in Vermont and on the use of remote sensing in climatology
- chair of the Technical Subcommittee of the Vermont Drought Task Force and provide advice to the Vermont State Emergency Board where necessary.
- liaise with the Vermont Department of Agriculture, Food and Markets on drought, flooding and nonpoint source pollution issues.

## Office of the Washington State Climatologist



Office of the Washington State Climatologist

*Philip Mote, State Climatologist*

Mark Albright, Associate State Climatologist

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In February 2005 OWSC hired a capable undergraduate Atmospheric Sciences student who developed a map-based inventory of weather and climate data in the state, [www.climate.washington.edu](http://www.climate.washington.edu) (click maps). The maps show stations from a total of ten networks including Canadian and buoy data and display all stations offering data for a selected climate variable, e.g., solar radiation.

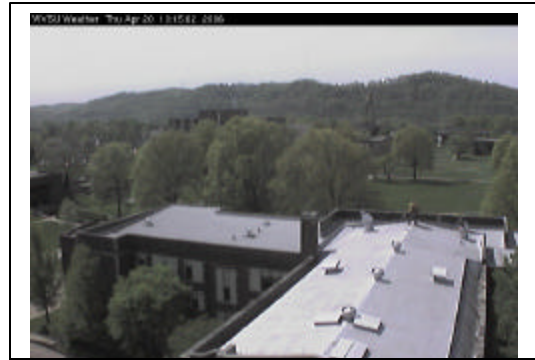
Inspired by Ken Crawford's description of NERON at last year's AASC meeting, I sent a letter to our governor recommending that we pursue NERON installation in Washington. Thanks to the drought of 2005 she was very receptive and we are laying some of the groundwork for NERON/NIDIS implementation. As a serendipitous by-product of that effort and of the drought, state government has shown more interest in providing stable long-term funding for OWSC, which may start to materialize within the next year or so. In our first three years of existence, funding has been small and intermittent (a story familiar to most SC's I'm sure).



## West Virginia State Climate Center

*Dr. Tina J. Cartwright, State Climatologist*

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This is an image from the Weathercam atop Wallace Hall on the WVSU Campus. The image updates every 5 minutes.

The West Virginia State Climate Office is located on the campus of West Virginia State University in Institute, WV, approximately 8 miles west of the state capital, Charleston. After several years of dormancy, Dr. Tina J. Cartwright resurrected the State Climate Office in June 2005.

The mission of this office is to collect and maintain pertinent climatological data for West Virginia and to make that information available to the public. Furthermore, it is the intent of this office to monitor climate variability and develop weather and climate products which will serve to assist decision-makers in identifying optimal management options to reduce risk, increase profits, and sustain fragile natural ecosystems in West Virginia.

### Outreach

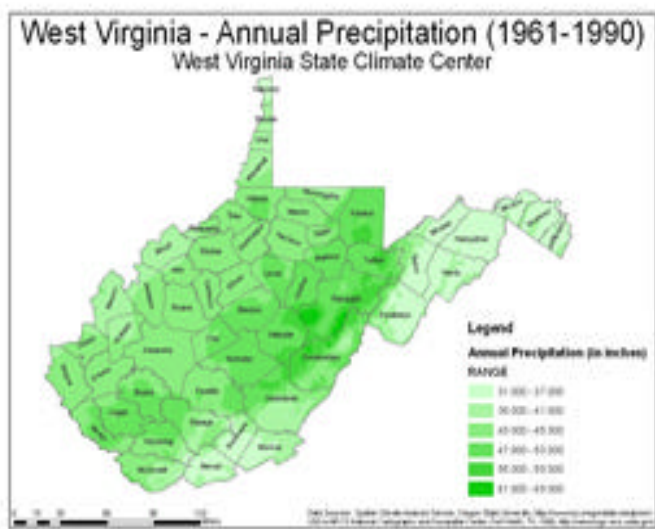
In addition to answering climate data requests from government agencies, corporations, law firms, and private citizens, the WV State Climate Office has participated in several educational workshops with other organizations such as Bayer Corp., NASA, and the WV Science Teachers' Assn. Dr. Cartwright is a certified GLOBE trainer, and is currently working with teachers across the state to implement the GLOBE Program and improve science education in West Virginia's primary and secondary schools. Last summer she developed and hosted the first Advanced Atmosphere teacher workshop and has created training materials and delivery techniques for GLOBE learning activities.

Dr. Cartwright has developed a dichotomous cloud key to help educate visitors to the WV Climate Center website about cloud identification. Also available is general information about El Nino, La Nina, ENSO, and impacts on West Virginia. Agricultural information

important to the state's farmers is made available through a link to WVSU's Division of Agriculture, Consumer, Environmental and Outreach Programs.

## Research

WVSU Applied Meteorology student Dwain Miller determined the historic effects of hurricanes on West Virginia. Specifically, the incidence of flooding as a result of the lingering precipitation associated with dissipating tropical cyclones was investigated. Another student, Laura Hayes, analyzed historical records of severe weather events in WV to determine spatial and temporal patterns in their occurrence. Associate State Climatologist, Steven Fleegel, created GIS maps of 1961-1990 normal precipitation values for the State of West Virginia.





Current research includes collaboration with the National Weather Service to determine what available vehicles are most effective in providing meteorological and climatological data to the public. WVSU Applied Meteorology students Brandon Stover and Dominick Groves have been meeting with the NWS and are planning multiple trips to southern WV to acquire data.

## Future

Projects planned as of this writing include:

- Collaboration with USDA, NWS, NGDC, and WV University personnel to develop a Web-based soil climate mapping application using spatial analyses of soil climate and agroclimatic parameters.
- Working with the WVSU Land Grant Services to determine the needs of West Virginia Extension Agents in terms of climate and weather information to devise a decision support system for the Agents on the “front line”.
- Participation in the Upward Bound summer learning program, sponsored by the NSF, presenting an environmental inquiry into the climate of West Virginia.
- Continued expansion and utilization of the GLOBE Learning Community to promote learning, awareness, and scientific literacy in order to groom future scientists among West Virginia's youth.

## Wisconsin State Climatology Office

	<p>Wisconsin State Climatology Office Prof. John Young, Director</p>	
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### Contact Information –

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Meteorology and  
Space Science  
Building, on UW-  
Madison campus,  
home of Wisconsin  
State Climatology  
Office (photo by  
Hopkins)

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.

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

The mission of the SCO includes:

- acquisition and archiving weather observations from 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.

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## **INFORMATION SERVICES**

### **Website**

The SCO maintains 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 number of entries to this website continued to increase during 2005, with 540 requests made per day. Some of the special features appearing on the site include:

- Season Pages. The winter page continues to be a popular page, especially for those wanting snow information. Climatologies of the summer holidays are available.
- Climate Watch: A section with extensive graphics of contemporary conditions.
- Climate History: Additional graphics have been placed on-line and continually updated to demonstrate 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. The public, the media, industry (e.g., legal, insurance), and governmental agencies made approximately 60 data requests per month via these traditional means.

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 continues to make its presence more widely known to residents of the state of Wisconsin. In addition to interviews with the electronic and print media in the state, the staff continues to give lectures at service groups, universities and business conferences.

### **RESEARCH**

The Assistant State Climatologist is working to check the period of record weather extremes reported at individual stations throughout the state.

### **FUTURE**

- Establish ARSCO status
- Partner with local, state and federal government agencies
- Improve the website with expansion of the information content.
- Expand outreach
- Continue contacts with media and issue timely press releases.
- Develop small applied research projects.
- Research the history of the 19<sup>th</sup> century forts and first order stations in Wisconsin for the Climate Database Modernization Program.



## Office of the Wyoming State Climatologist

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



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### Communications Capabilities:

We are providing data to users via our web pages:

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

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

<http://library.wrds.uwyo.edu>

<http://waterplan.state.wy.us>

Users may also make data requests directly via phone, mail, or email. We are continuing to add to our infrastructure by upgrading older servers, increasing network capabilities, and adding storage as funds permit. Work continues on the development of Internet Map Servers to supplement existing data retrieval methods.

### Information Services:

In 2005, we responded to 384 requests for data via phone, email, letter, etc. In addition to these direct requests, many others obtained data from our various webservers and we are continuing to make more and more products available online. While this may precipitate a drop in the number of direct information requests, it allows us to provide more data to a much larger and wider audience.

The Assistant SC worked with the Wyoming Office of Homeland Security (WOHS) to provide support during the State of Emergency declared because of the storms and flooding in Sheridan County in May, and during the flooding in Albany County in June.

### Research:

We continue to work with the Colorado Climate Center to expand the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS). To date, Wyoming has 270 observers and is continuing to add to this volunteer base. We met our goal of doubling the number of CoCoRaHS observers (125) that we had in 2004. We continue to provide mapping services to the project.

We provided WOHS with updates to the climate data used in the State's All Hazard Mitigation Plan. Our office also began a collaborative effort with WOHS and the Wyoming Geographic Information Sciences Center to assist with updating the State's Flood Maps. We will be serving the new FIRM panels at <http://mapmod.wrds.uwyo.edu> Until the new maps are completed, we will be serving the old FIRMs from this site.

**Outreach:**

We have continued to travel throughout the state promoting our services and speaking with various stakeholders. Numerous interviews were given to news organizations. We are also continuing to add to holdings in our Library (<http://library.wrds.uwyo.edu>). These additions include direct purchases of books as well as donations received from various entities.

During 2005, visits were made to 22 of the 23 County Emergency Managers to give additional training on data collection using Pocket PCs.

\* \* \*

At the beginning of December 2005, our State Climatologist, Jan Curtis, left to go to work with the Natural Resources Conservation Service in Portland where, I am pleased to report, he will be able to remain an active member of the AASC. We anticipate that our new SC, Steve Gray, will be starting here 01 June 2006.

*Compiled by Tony Bergantino.*

# AASC 2005 Annual Meeting Minutes

Savannah, GA

June 24, 2005

## **Business Meeting**

Ken Crawford started the meeting at 8am by turning the floor over to Glen Connor for a light-hearted 'state report'.

Glen Conner (former SC KY) lamented that so many familiar comfortable things 'of home' were not necessarily good things anymore. Some things whose good time had passed included 'Kentucky Fried Chicken' (high cholesterol), Horse Racing (gambling), tobacco, and bourbon – all going downhill in reputation. On the up side a major crop, marijuana, is doing well.

Ken Crawford then started the business meeting.

## **Reading/Approval of Minutes from August 2004**

Paul Knight, Secretary-Treasurer, indicated that minutes had been posted since Sept. 2004 but he also passed out paper copies to those that wanted them. A motion to accept the minutes was made by O'Brien and seconded by Nielson-Gammon. 'Ayes' carried the motion.

## **Treasurer's Report**

Paul gave the treasurer's report. Income from last years meeting was \$157 greater than the cost. Paul noted the good estimating by Keith [Eggleston]! Other details of the budget were briefly noted. No questions from the members. Knapp moved and Raman seconded that the report be accepted. Doesken asked why no travel money was used. Paul answered that everyone who traveled volunteered their own funds. A vote of 'ayes' carried the motion.

## ***Old Business***

- **The State Climatologist Annual Summary by Ryan Boyles** Laura Edwards (WRCC, DRI) has volunteered to work with Ryan on next year's report. Mark Shafer's help (establishing the template) was very helpful. The NC State Climate budget for color printing was very helpful. It's all online in both lo-res ('screen' version) and hi-res (for printing).
- **ARSCO Reports/New ARSCO States by Tim Owen** Tim pointed out the contributions to the State Climatologist Annual Summary counts as the annual report required for ARSCO status. South Carolina, Mississippi, Washington and Delaware became ARSCOs last year. Letters of acceptance were given to the two representatives from those offices that were present. This year South Dakota, Vermont, and New Hampshire were added as ARSCOs and letters were given to office representatives. Tina Cartwright is new SC for West Virginia. Pat Guinan is the new SC for Missouri, Dev Niyogi for Indiana, and Heather Kemp for Nevada. Other states are 'in the pipeline'.

- **AASC Journal by David Stookesbury** David talked about establishing an ‘AASC Journal of Service and Applied Climatology’ to publish and document what we are doing. A very low page charge of, say \$10, would be possible for members. David sees it as a refereed journal. All papers would be offered online as PDFs. David volunteered to be first editor. Niyogi pointed out that the Journal of Applied Meteorology is being renamed to Journal of Applied Meteorology and Climatology. So, that does affect our naming, especially the inclusion of ‘applied climate’. Zandlo noted that the word ‘service’ was especially important to AASC. Christy noted that we need to see something other than just talk. He suggested that we could vote later online. O’Brien pointed out that we have a lot of freedom and some of the topics that might be submitted could be under-appreciated by reviewers. Ken Crawford suggested that we should move forward with the meeting – the AASC web page presentation could help with the discussion. Robin Williams (PR) pointed out that many times legal and reinsurance professional are clients and may be interested in the publication. The Committee was mostly present at the meeting. It was suggested that the committee quickly confer and steer the next steps. Robinson suggested that the word ‘applied’ be avoided in favor of ‘AASC Journal of Service Climatology’. A proposal will be made by the committee (Boyles, Bergantino, Todey, Taylor and chaired by Stookesbury) to the general membership within the next few weeks.

- **Dissertation Medal by David Stookesbury** - David talked about a dissertation medal to pay the way to our annual meeting for presentation of a paper on applied or service climatology. An anonymous donation of \$500 has already been given and it was asked to be matched with general AASC funds. O’Brien pointed out that it must be well publicized, including through NCAR. Dupigny-Giroux asked that Canada should be eligible as well. Mote asked how it would be paid for. Niyogi suggested non-Americans should also be eligible. Curtis suggested that we need an American emphasis. Knapp pointed out that new higher dues were to promote the organization and we should put money aside for this medal. Hillaker suggested that the medal would not have to be annual. Boyles suggested that perhaps NCDC could help with travel funds. The discussion focused on designating \$1,500 for the medal. No committee was in place. The Executive committee would assign members to it in the next few weeks. Their responsibility would be to solicit papers and review them with a recommendation for an award. O’Brien moved that the draft plan be accepted. The motion was seconded by Robinson and ‘ayes’ carried it.

- **Draft of new AASC Web Home Page by Derek Arndt** - Several people (Robinson, Owen and Arndt) were charged last year with developing a new AASC web page. The existing page is hosted by NCDC and gives the impression that AASC is a part of NWS. An easier venue was also sought. Several ‘news style’ web pages were shown. Oklahoma Climate Survey has similar content. An AASC mockup was shown. Standard features have buttons. The page can have the latest climate news. Profiles of SCs would be available and state-level ‘gateways’ to state web pages would also include local ‘news items’. A page for ‘submit news item’ was shown. Items can be made eligible for regional or national exposure. Similar pages would be made for RCCs. The page will be at the domain name: StateClimate.org. Derek asked ‘Is it worth finishing?’, ‘Who will host it?’, and ‘What was missed?’ Todey asked if RCCs liked the URL and there was no disagreement. Cartwright asked about the online journal to which Derek replied that a button for ‘standing content’

could accommodate it. O'Brien pointed out that continuity and permanence are very important. Livezey concurred that a long-term commitment must be ensured. Heim pointed out that it was nice and gives more freedom since it was not hosted by a Federal site. Owens asked if Oklahoma could host it for a couple of years to get stability and Derek, after consultation, answered 'yes'. Christy asked about costs. Derek answered that about 2 weeks FTE had been spent and he anticipated at least 2 more weeks were needed before it could be 'released'. Boyles suggested that North Carolina may be willing to host it once it is developed. Mote noted that the 'news feed' needs supervision and may be problematic. Age of content and controversy may be issues. Derek replied that a more formal detailed proposal needs to be provided to members. O'Brien pointed out that state personalization may be very variable. Livezey reiterated that a maintenance commitment is critical. Solid policy and procedures of managing content is needed to avoid embarrassment to AASC. Shafer suggested that the state level content is the state's problem. Robinson said that an op-ed piece could be posted that could be unrepresentative of the association. He suggested an oversight committee. A vote by membership will be taken once a procedure and a tutorial are developed.

### ***New Business***

#### **- Budget Presentation and Vote.**

Paul Knight showed the proposed next year budget. A discussion of the budget was started. Hillaker pointed out that [while SCs are not constitutionally required to pay dues to be a member of AASC] ARSCOs should be required to pay. Knight acknowledged that dues are an issue. Nielson-Gammon asked why less 'extra' money is projected for next year to which Paul answered that presidential travel support was zero. Nielson-Gammon continued by asking why less dues were reported to which Paul answered that dues came in outside of the meeting. Robinson pointed out that 34 states were at meeting and dues from them should be in budget. Paul said that he will send out notices but that he expected a low response. Livezey asked what the constitution reads about dues. Only a little more than half of the members paying seemed low. Stookesbury offered that constitutionally SCs are by default a member and that there is no requirement of dues. Aside, Stookesbury pointed out that \$500 should be in the budget for the dissertation medal. O'Brien suggested that previous year total should be shown as a 'carry over' income. Knapp suggested that dues for SCs who are ARSCOs should be projected (is it a requirement of ARSCO). Livezey and Robinson chimed in that it was not a requirement of ARSCO either. Crawford suggested that the Executive Committee would take dues issues under advisement. Edwards asked about the cost of the meeting to which Paul answered that income should balance cost. Mote suggested that the Treasurer should have some teeth to collect dues. O'Brien suggested that in light of unresolved budget adjustments the membership could vote online later. Crawford added that the Executive Committee would work out the details. Knight said that \$500 would be added for the medal, carry-over would be handled as discussed. Stookesbury suggested that travel money should not come from AASC for SC 1<sup>st</sup>-timers, etc. Boyle suggested that a revised budget should be sent to everyone to preview before being offered for a vote on-line.

#### **New Members (Associate/Full)**

An apparently flawed list of members who had paid via meeting registration was shown – many who had paid were not listed. New associate members were nominated. Owens nominated Jason Caldwell (SC), William Schmitz (SERCC), Michael Johnson (SERCC). Raman nominated Aaron Sims (NC). Niyogi nominated Ken Schnerringa (IN). Todey nominated Chirag Shukla. Crawford nominated Renee McPherson (OK), and Andrew Reiter (OK). Doesken nominated Debora Bathke (NM), Henry Reges (CO) and Mike Spinar (MWRCC). Edwards nominated Heather Kemp (NV). Cartwright nominated Steven Fleagel (WV). A motion to close the nominations and accept the new members was made and then seconded by Crawford. A vote of ‘ayes’ carried the motion.

### **Officers for 2006 and Beyond**

- Keim (LA) from the nominating committee nominated that Paul Knight be elected president and Jan Curtis Secretary-Treasurer. Knox (GA) pointed out that a committee motion doesn't need a second. There were no other nominations from the floor. ‘Ayes’ carried both nominations. The President will take over duties in 2006 after the annual meeting.
  
- **New Nominating Committee by Ken Crawford** New nominating committee will be announced in a few weeks. Sethu Raman has agreed to handle ARSCO submissions into 2006.
  
- **Meeting Locations in 2006 and 2007** Dennis Todey indicated that the 2006 meeting could be in Rapid City or Sioux Falls. A Rapid City meeting would have to be in June or July, still a busy tourist season. Hotel costs would be less than \$100 per day. Rapid City is relatively hard to get to. Sioux Falls is easier to get to and has easier accommodations but does not have other amenities to recommend it. A voice vote decided to have the 2006 meeting in Rapid City. Knapp pointed out that the very last week of June and first week of July are not good times. Dennis indicated that dates will be established later and options will be presented to AASC list-server. He went on to say that price quotes are on the way from Chambers of Commerce. Christy asked if it would be the usual 2 or 2-1/2 day meeting which was answered with a ‘yes’. Someone wondered how we would have a riverboat cruise there. For the 2007 meeting Crawford offered Oklahoma, Keim offered Baton Rouge, and Dupigny-Giroux offered Vermont.

### **Submitted by:**

Paul Knight  
Secretary/Treasurer  
AASC  
July 30, 2005