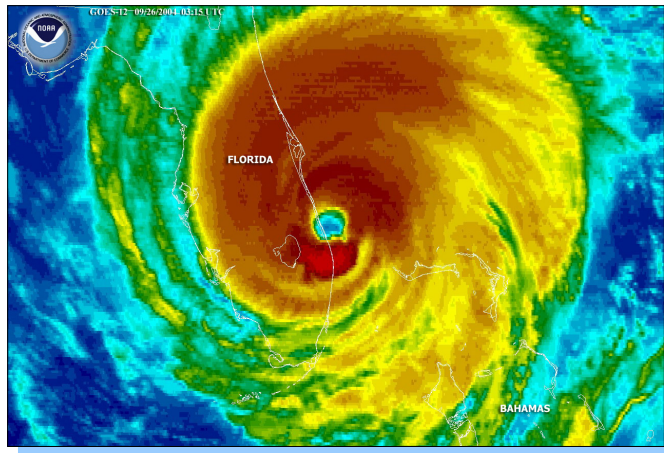
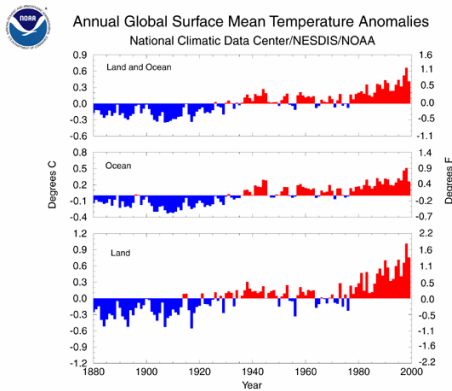
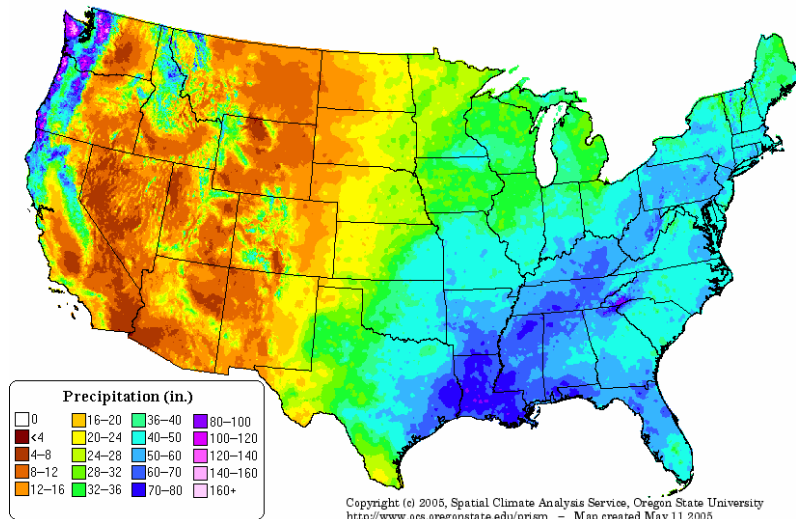


# THE STATE CLIMATOLOGIST

2004 Annual Summary  
Volume 23, Issue 1



Precipitation: Annual 2004  
Final Data



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

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## **ABOUT THE AASC**

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

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

## **ARSCO**

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

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

Candidate offices must demonstrate the following capabilities:

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

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

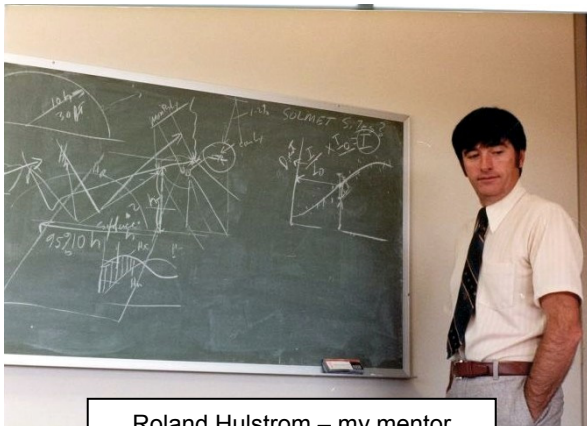
## 20 Years of Solar Measurements: The Solar Radiation Research Laboratory (SRRL) at NREL

Tom Stoffel  
April 6, 2005

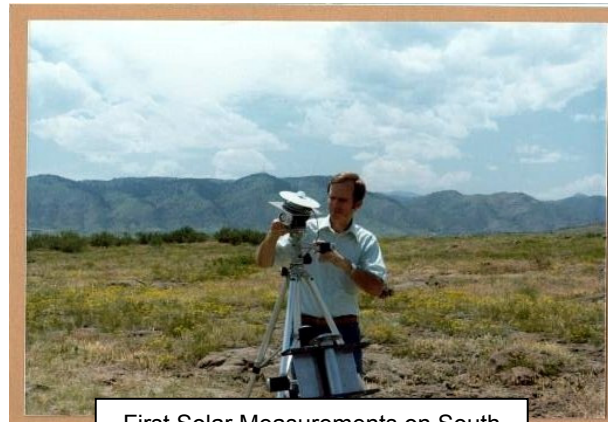
The development of SRRL began immediately following President Carter's visit to SERI on May 3, 1978, when Roland Hulstrom directed me to develop an outdoor research laboratory to provide for:

- Maximum annual solar access
- Continuous measurements of key solar radiation resources
- Calibrations of instruments used to measure solar radiation
- Training of meteorological station operators
- Development of novel systems for resource monitoring.

At the time, we had access to the top of South Table Mountain, but the land still belonged to the State of Colorado. In the absence of electrical and telecommunications services (remember, this was before cellular networks and the personal computer), Bob Rader and I used available surplus equipment to take the first solar radiation measurements at SERI.



Roland Hulstrom – my mentor

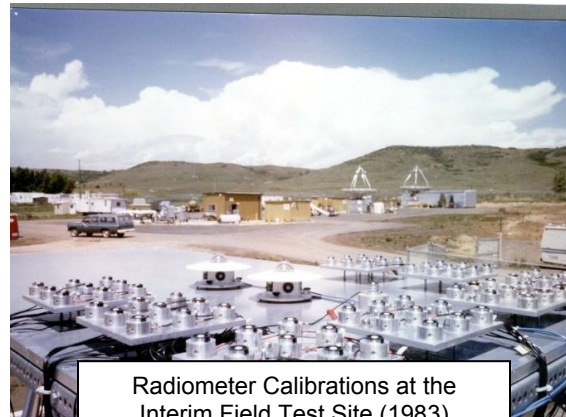


First Solar Measurements on South Table Mountain (1978)

While waiting for the transfer of land ownership to the DOE, SERI rented the Interim Field Test Site at the base of South Table Mountain (now the location of the Denver West Marriott Hotel). With access to basic utilities, we established the Insolation Research Laboratory and began our more permanent research measurements in 1980.



The Insolation Research Lab (1980)



Radiometer Calibrations at the Interim Field Test Site (1983)

By early 1985, we planned and built the first Solar Radiation Research Laboratory (SRRL) on top of South Table Mountain. Using surplus meteorological monitoring sheds built for the EPA in the early 1970's, we met the original design functions for the lab.



Daryl Myers calibrating radiometers (1983)



The Solar Radiation Research Lab (1985)

Having outgrown the mouse-infested EPA sheds, a new Solar Radiation Research Laboratory building was completed in December, 1999. Today, the 2,400 ft<sup>2</sup> building serves as the offices for six members of the Measurement & Instrumentation Team in the Electric & Hydrogen Technologies & Systems Center. In addition to the outdoor laboratory areas, the SRRL houses the NREL Metrology Lab, Optics Lab, Data Acquisition Lab, and Electronics Lab.



New SRRL Building (1999)

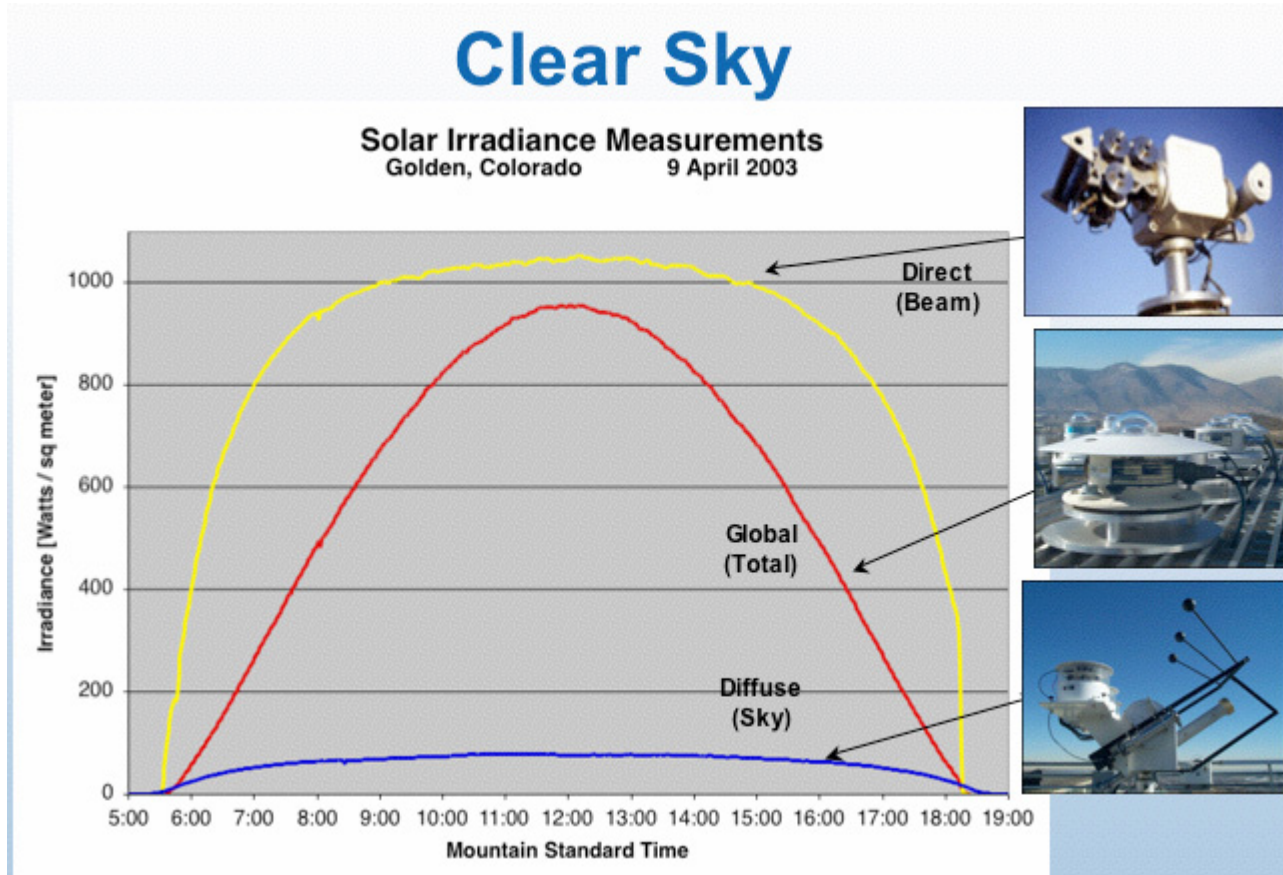


Ibrahim Reda and NOAA colleagues calibrate radiometers (2000)

April 8, 2005 marks the 20<sup>th</sup> year of continuous solar radiation measurements from SRRL. Data since that day to the minute you read this are available from our Measurement & Instrumentation Data Center ([http://www.nrel.gov/midc/srrl\\_bms/](http://www.nrel.gov/midc/srrl_bms/)). Of course, in the early years before the Internet, we could only distribute data on floppy disks, paper reports, or, for the technically savvy, 9-track tape. In January 1997, we first connected SRRL to the internet, greatly enhancing our philosophy of open and free access to this valuable scientific data set. Since then we have kept pace with internet capabilities and can now make data available to users within six seconds of the measurements.

Over the years we have added instruments and measurement systems to meet the growing research demands. Since January 2004, data for 131 parameters are available for each minute of the day and night. Samples of these research-quality measurements are described below to summarize our understanding of the solar climatology for Golden, Colorado.

**How does the amount of solar radiation vary throughout the day?**



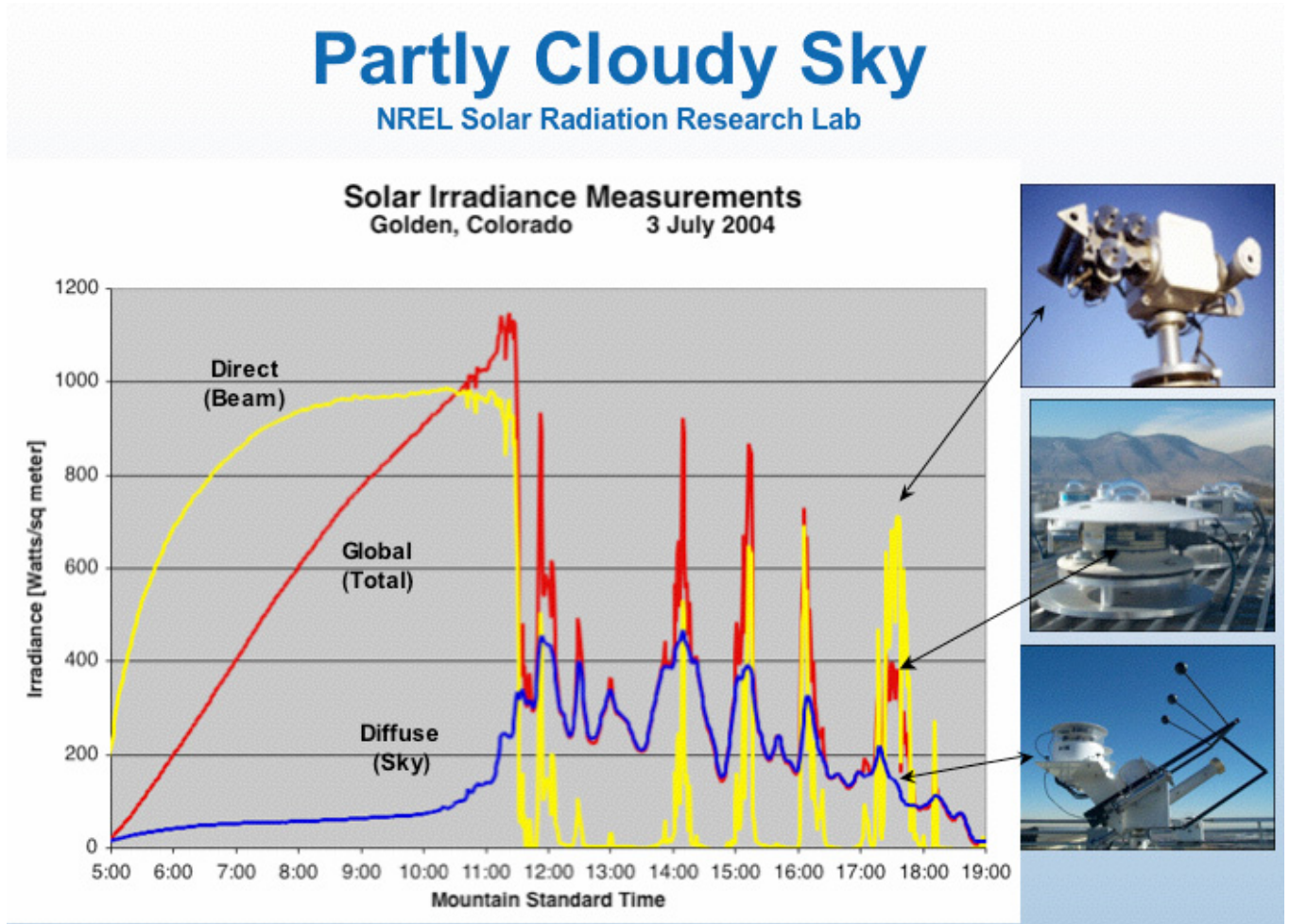
The above figure illustrates the typical daily cycle of solar radiation available for a single day and the three basic instruments (radiometers) used to make the measurements. Under clear-sky conditions, the energy amounts are predictably smooth based on the solar constant, day of the year, and location on the earth. Each solar radiation component has applications in renewable energy.

Measurement	Method	Application
Direct (Beam)	Pyrheliometer tracking the sun all day	Concentrating collectors for PV or solar thermal
Global (Total)	Pyranometer viewing the entire sky dome (as plotted) or tilted towards the south like a solar collector	Thermal performance of buildings, biomass, PV, solar thermal, and climatology
Diffuse (Sky)	Shaded pyranometer (beam is blocked by a shade ball or disk)	Daylighting, biomass, and PV

[http://www.nrel.gov/midc/srri\\_bms](http://www.nrel.gov/midc/srri_bms)



## How does the amount of solar radiation vary throughout the day? (Part 2)



Clouds can rapidly change the amount of solar radiation reaching the earth's surface. Note the increased diffuse (sky) irradiance – clouds can be bright white – and the attendant decreases in direct (beam) irradiance.

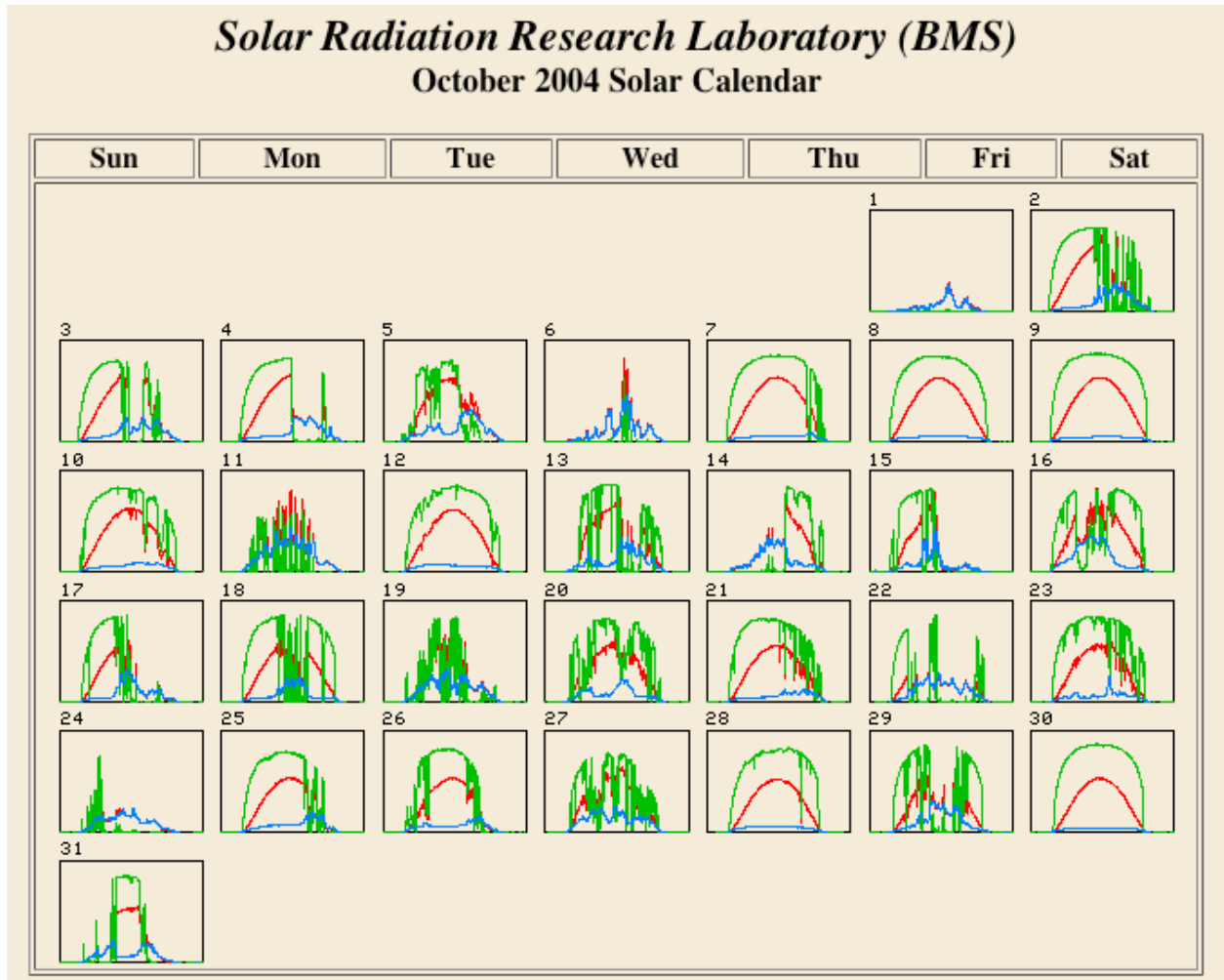
Daily variations in the amounts of solar energy components vary with the types, amounts, and distribution of the clouds, amounts of water vapor, aerosols, ozone and other atmospheric constituents, the changing position of the sun in the sky, and many other factors.



All-sky image, same view as pyranometer, showing partly cloudy scene at 11:00 MST on July 3, 2004.

[http://www.nrel.gov/midc/srrl\\_bms](http://www.nrel.gov/midc/srrl_bms)

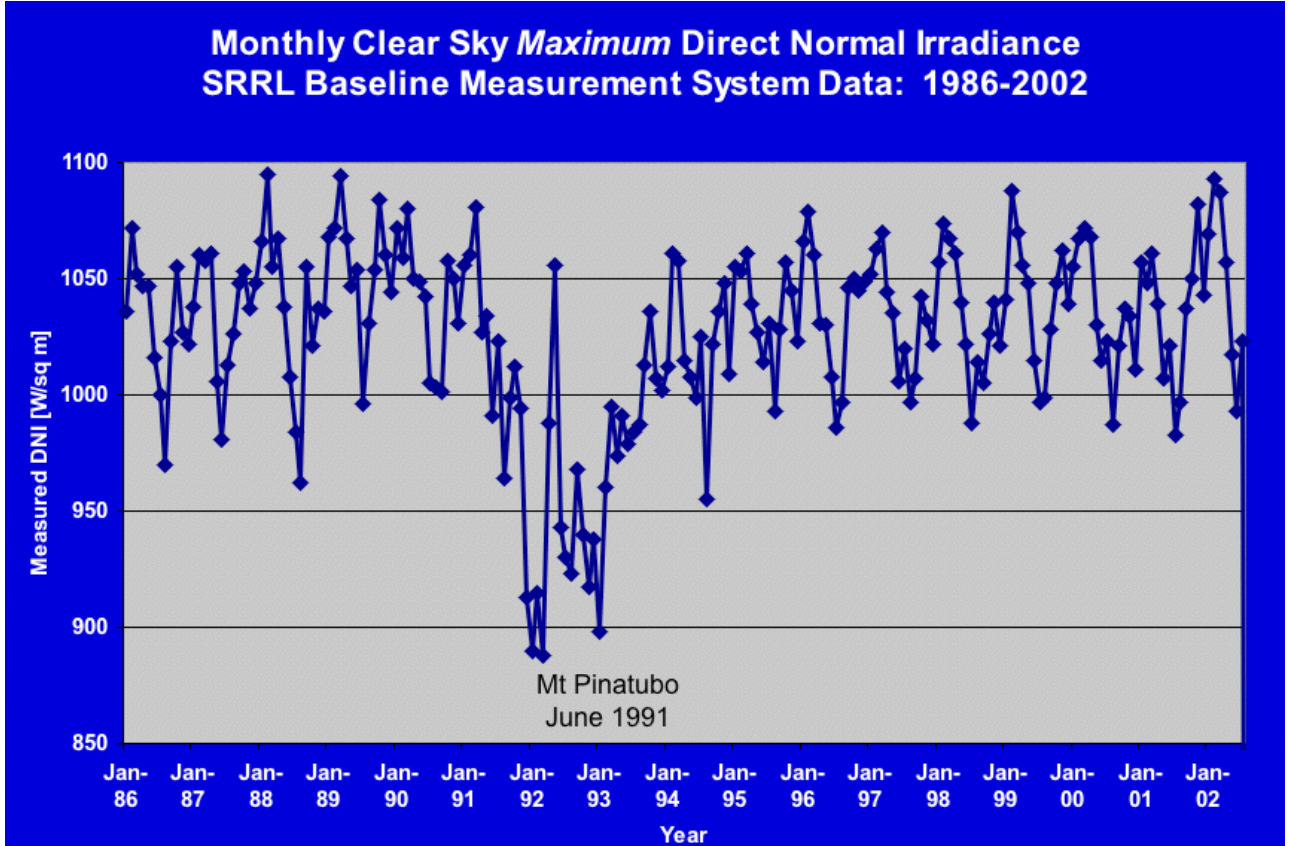
How do the amounts of daily solar radiation vary by week?



A *Solar Calendar* for October 2004 shows the variability of solar radiation. Clear-sky periods have smooth curves for direct normal [green], diffuse [blue] and global irradiances [red] (October 8 & 9). Partly-cloudy intervals are indicated by the erratic up and down energy levels (October 11 & 19). Overcast skies, with or without precipitation, can be identified by the suppressed irradiance levels in all three solar components (October 1).

[http://www.nrel.gov/midc/srri\\_bms](http://www.nrel.gov/midc/srri_bms)

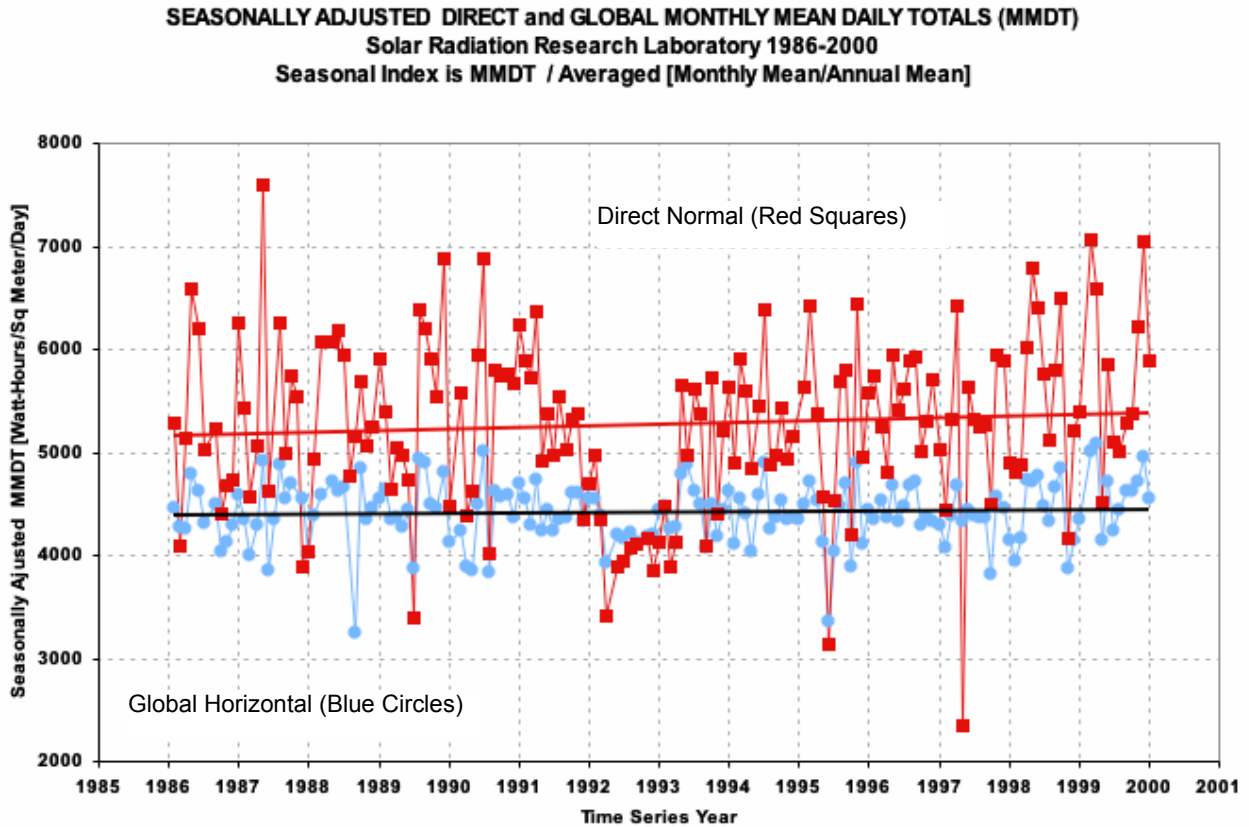
What about the variations of solar resources from year to year?



The amount of solar radiation varies with the season and from year to year. The effects of volcanic eruption are present in the SRRL measurements during 1991-1994. During this period, the global dust veil reduced the amount of direct normal irradiance by as much as 20%.

## What solar radiation climate trends can we detect?

All radiometers used to measure solar irradiance at SRRL are calibrated annually using absolute cavity radiometers traceable to the World Radiometric Reference maintained by the World Radiation Center at the Physikalisch-Meteorologisches Observatorium Davos, Switzerland. Daily maintenance procedures contribute to the research-quality of the measurements at SRRL.



Accounting for the seasonal variations in monthly mean daily totals of solar radiation, we can estimate the longer-term trends in irradiance for this 15-year analysis of SRRL data:

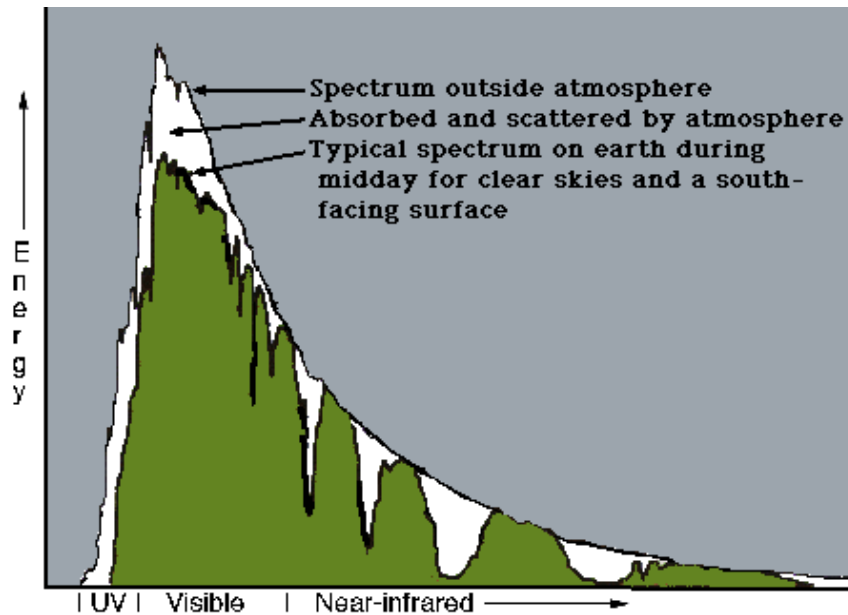
Direct Normal (Beam)	=	4.7% increase
Global Horizontal (Total)	=	2.1% increase

These trends must be considered with the estimated measurement uncertainties. I estimate a 1% to 2% measurement uncertainty for these measurements. I should also caution that extrapolating this data beyond the 15 years will not yield valid results. Significant variations from one decade to the next are common, and a sustained increase in solar irradiance such as that shown here would be climatically devastating.

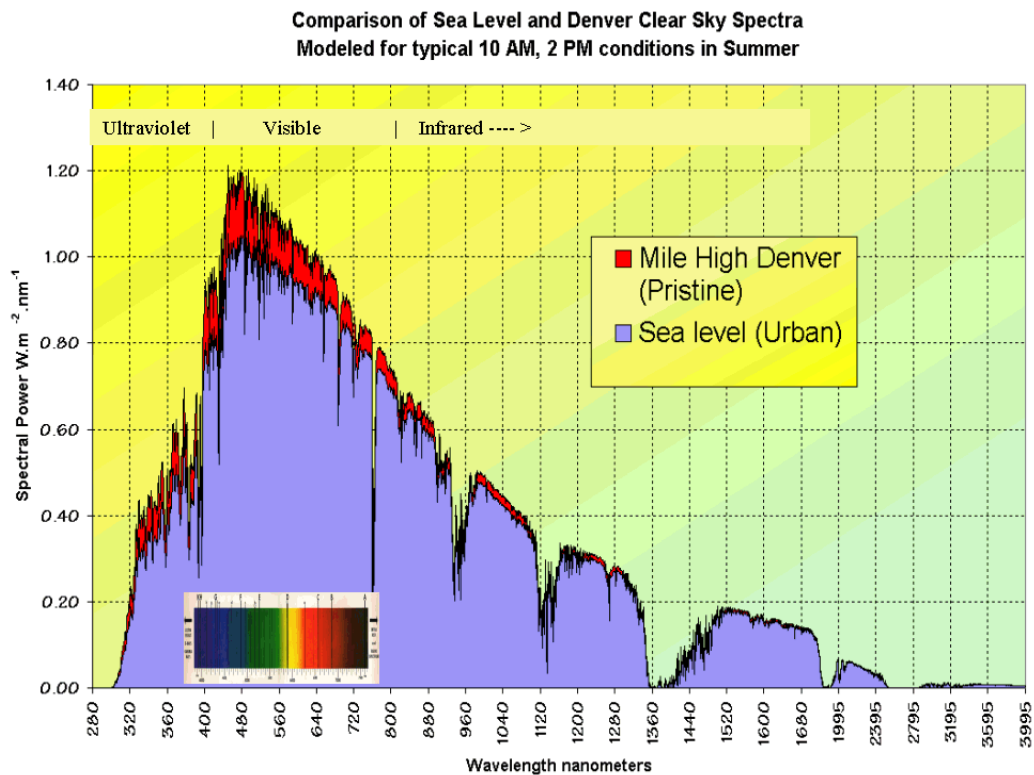
The data so far have been the integrated, or *broadband* irradiance from the sun. The *spectral distribution* of solar irradiance is another factor for renewable energy applications.

## What about the *spectral distributions* of solar irradiance?

The sun's energy is not evenly distributed over all wavelengths. The emitted radiation by the sun from space is greatest in the visible portion of the spectra. The variations of solar intensity at the earth's surface are greatly effected by the complex interactions with the atmosphere. PV devices, plants, and our eyes respond to different parts of the spectrum.



The effects of high altitude (less atmosphere) can be seen in the comparison below:



**Additional information can be found at our web sites:**

- Solar Radiation Research Laboratory (SRRL) <http://www.nrel.gov/srrl>
  - Purpose
  - Staff
  - Facilities
  - Current Research Topics
  - Past Affiliations
  
- Measurement & Instrumentation Data Center <http://www.nrel.gov/midc>
  - Current Weather Display
  - Solar & Meteorological Data from 1985 to present
  - Time-series Plots
  - Sky Images
  - Spectral Measurements
  - Wind Roses
  - Instrument Calibrations
  
- Renewable Resource Data Center <http://rredc.nrel.gov>
  - Solar / Wind / Biomass / Geothermal
  - Publications
  - Historical Data
  - PVWATTS Analysis
  - Glossary
  - Kidz Links
  - Energy Tidbits
  - Unit Conversions
  
- Geographic Information System Map Server <http://www.nrel.gov/gis>
  - Dynamic Maps
  - GIS Data
  
- Electric & Hydrogen Technologies & Systems Center [http://www.nrel.gov/eis/about\\_ehts.html](http://www.nrel.gov/eis/about_ehts.html)
  - Resource Integration Group
    - Geographic Information Systems Team
    - Measurement & Instrumentation Team
  - Energy Systems Group
    - Distributed Power Systems Integration Team
    - Hydrogen Technologies & Systems Team

# NOAA's National Climatic Data Center 2004 Highlights



Working with its partners, NOAA's National Climatic Data Center (NCDC) provided users exciting, new climate data and information in 2004. Achievements include:

- Remote Sensing and Applications Division's collaboration with NOAA Data Centers furthered the development of the Comprehensive Large Array-data Stewardship System
- NESDIS e-Government System (NeS) implemented at the three NOAA Data Centers
- NOAA's Climate Database Modernization Program projects reached all-time high
- Climate monitoring improved
- Inclusion of performance monitoring into observational networks developed
- U.S. Climate Reference Network (CRN) installed 24 new stations in 2004
- NOAA Operational Model Archive and Distribution System (NOMADS) grew
- New NCDC homepage set record for data delivered on-line
- U.S. Global Climate Observing System (GCOS) Program Office continued support of international observing activities
- New Climate and Weather Impacts on Society and the Environment (CWISE) partnership formed between NCDC and academic institutions
- New organizational infrastructure developed between NCDC and Regional Climate Centers
- NOAA's Paleoclimate Program expanded data archive
- Support for local community continued, including signature SCHOLARS program



NCDC achieved all performance measures, often exceeding them by a wide margin. NCDC offers the best products and services for a diverse group of users, and plays a prominent role in public safety, protection of property, sustainable development, environmental awareness, and homeland security. Given its motto of "Protecting the Past, Revealing the Future," NCDC recognizes its responsibility as the world's most comprehensive authority for weather and climate information. As a leader in observing how climate varies

and changes on all time scales, and its impact on the economy and society, NCDC continues to develop partnerships with the private sector, academia, and other government agencies.

NCDC is continually improving weather and climate services for customers and increasing the volume and availability of the archived data in near-real time. In addition, its on-line capabilities have been strengthened, allowing users easier search and retrieval of desired data, which increases customer satisfaction. Numerous press releases detailing the state of the climate and important trends such as the severe drought of 2004 (that was closely monitored for the Western states) were released in 2004. NOAA's six Regional Climate Centers (RCC) and the American Association of State Climatologists (AASC) have been an important complement to much of this effort.

Beyond traditional weather and climate services, NCDC information is used to support national and global disaster mitigation and relief efforts. In 2004, NCDC played a principal role in NOAA's Climate Services Program.

In 2004, AASC contributed to NCDC activities through mini-grants and the State Climate Exchange Program. Activities included:

- Providing accurate climate station history information (Iowa)
- Developing new climate divisions (Hawaii)
- Developing spatial metadata for Cooperative Network sites (Kentucky)
- Forts data set development (Midwestern Regional Climate Center)
- Enhanced quality assurance with mesonet (Pennsylvania)
- Researching variation of peak wind speed with averaging time (Missouri)
- Developing an interface for distribution of multisensor precipitation estimates (North Carolina)
- Researching impacts of land use change on dew point temperatures (High Plains Regional Climate Center)





## NOAA's Regional Climate Centers 2004 Highlights

NOAA's Regional Climate Center Program (RCC) continues to improve the use and dissemination of climate information throughout the United States in 2004. Since its start in 1984, the program has provided comprehensive regional decision support for climate, and today is affiliated with the NOAA's NCDC through six federated regional centers.

Climate information is the basis for a broad range of private- and public-sector decisions. From emergency response to long-range planning, in virtually every sector of the U.S. economy, RCCs are a vital link in providing quality, timely climatic information. More than 70 million information requests are addressed annually through RCC Web sites and on-line data systems. Additionally, the RCCs respond to tens of thousands of direct requests for data and information from citizens, state and federal agencies, and businesses in agriculture, transportation, and risk management.

In 2004, the RCCs have worked diligently to lay organizational infrastructure for:

- Climate service support
- Applied climate service for the CRN and NCDC's Climate Database Modernization Program
- Development of a prototype quality assurance tracking system for climate data
- Deployment of a climate query system for inquiries at NWS field offices that use NCDC data

### Climate and Weather Impacts:

Climate information can be extremely valuable in assessing the physical and socioeconomic impact of extreme climate and weather events. The RCCs monitor and assess the impacts of weather and climate events on a regional basis. Such assessments equip decision-makers with information needed to plan responses to future events and provide baseline information for predicting and adapting to impacts of future climate variability and change.



*Climate information helps mitigate substantial losses from roof snow loading through structural component design criteria used in about half of the U.S.*

Two examples from the Midwest include an RCC assessment of a 2004 record-setting snowstorm that caused more than **\$600 million** in damages and an analysis of the conditions that led to record high corn and soybean yields, **\$14 billion**, in the same year. Regionally relevant information generated at the RCCs is shared with both NCDC and NWS offices to ensure an integrated approach to climate analyses and planning.

*Information Delivery System:*

The RCCs are innovators in developing new methods to deliver climate information. The Applied Climate Information System (ACIS) is an Internet-based software technology developed by the RCCs to provide access to consistent, quality-controlled, real-time climate information. The importance of ACIS has been demonstrated in a pilot project with NWS at 129 National Weather Service forecast offices. ACIS is poised to become the delivery tool for climate products in support of interagency activities such as monitoring drought for agriculture and water supply.



## NOAA/National Weather Service Climate Services Division

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

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



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In 2004, NWS continues the implementation of its regional and local climate services program. In addition to continuing development of new local climate forecast products, changes to the following activities and services of the NWS Climate Services Program are highlighted.

### *Data Quality Control Activities*

Climate Services Division (CSD) continues to strengthen partnerships with external climate service data partners, including the Regional Climate Centers (RCC) and State Climatologists (SC). Recent collaborative efforts with these organizations includes continued strong CSD presence at association meetings and the development of co-produced new training tutorials regarding climate data for NWS field staff.

CSD continues to play a strong role in data and observations in the interest of ensuring the integrity of the nation's climate record. Significant efforts continue to strengthen NOAA's climate and weather data quality control process. The intent is to make organizational boundaries between the National Climatic Data center (NCDC) and the NWS transparent to data customers and the climate record. The data Quality Control (QC) process is being evaluated from an end-to-end NOAA management context and changes are being implemented as appropriate. For example, beginning in the spring of 2005, NCDC made a significant change in the way data are edited. Data that previously might have been changed because of questionable comparisons with surrounding stations will now only be flagged. This will reduce the number of station edits that were changing good data simply so that it fit more smoothly with surrounding observations. Other changes include increased front-line data quality control by NWS Weather Forecast Offices (WFO) and utilization of new web-based tools (i.e., Datzilla and Health of the Network) to ensure that data problems are identified, tracked, and fixed in a more coordinated NOAA level approach.

Efforts to improve the quality of snowfall data also continue. CSD led efforts to evaluate options for changing the format and content of snowfall reports disseminated by NWS WFOs to data users. The issue was brought to the forefront when reports of a new record Massachusetts winter snowfalls were questioned. Rapid local WFO (Boston) evaluation of snowfall totals resulted in the five highest snowfall totals disseminated being found to be unreliable. The totals had been used to request Presidential Disaster Snowstorm declaration (through the Federal Emergency Management Agency (FEMA)). FEMA has strongly encouraged the NWS to ensure that next winter's published observation site reports are clearly separated from other snowfall reports as hundreds of millions of dollars of federal snowfall relief relies on accurate snowfall amounts that are compared to climatologies developed from published NOAA stations.

## *Training*

Training regional and field climate services personnel remains a high priority. CSD has redesigned and updated much of the existing Climate Professional Development Series Professional Competency Units (PCU), including teletraining, webcasts, and website links (online at: <http://www.nwstc.noaa.gov/nwstrn/d.ntp/meteor/clipds.html> ). Redesigned training includes highlighting partnerships with AASC and recommendations to field personnel on directing customers to AASC for climate data and information.

Climate PCUs include:

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

## *Outreach Activities*

- NWS Climate Services Division is organizing a Climate Prediction Assessments Workshop to be held in Tucson, AZ in March, 2006. This workshop identifies new climate prediction applications research, promotes interactions between climate-sensitive integrated research and service communities, and assesses impacts of climate forecasts on environmental-societal interactions. For a list of past workshops sponsored by CSD, as well as links to select workshop summaries, please visit the CSD Workshops webpage (<http://www.nws.noaa.gov/om/csd/workshop/>)

### ***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@usda.gov](mailto:phil.pasteris@usda.gov), 503-414-3058
- Jim Marron, Resource Conservationist, [jim.marron@usda.gov](mailto:jim.marron@usda.gov), 503-414-3047
- Vacant, Applied Climatologist

The NWCC climate services staff and program have benefited from a long and productive relationship with the State Climatologists, the six Regional Climate Centers (RCCs) and NCDC. The WCS staff provides a vital link between state and national climatology centers and the many agricultural and natural resource issues across every part of the United States.

### ***Primary Projects***

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

### ***Climate Mapping of the United States***

The NRCS-NWCC has provided direction and substantial funding during the past 10 years to support climate mapping work performed by the Spatial Climate Analysis Service (SCAS) at Oregon State University (OSU). The USDA has many needs for updated, digital and high resolution, GIS (Geographic Information System) compatible climate map products that can be at every NRCS field office. To fulfill these needs, gridded climate coverages have been produced by the SCAS using their PRISM climate mapping system. These products have become the climate mapping standard for the U.S., and are now in NCDC's Climate Atlas of the United States (1961-2000). Primary map products include: updated 30-year mean monthly and annual precipitation, temperature (maximum, minimum and average) and dewpoint for all 50 states, as well as Puerto Rico and the Pacific Basin islands; average first fall and last spring frost dates and growing season length for the continental U.S.; and other specialized products, such as a new mean annual extreme minimum temperature map (a.k.a. plant hardiness map). These products can be obtained from:

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

A new spatial, probability-based quality control system for SNOTEL temperature and other climatological data has been developed by the SCAS for the NWCC, and will be deployed by the end of 2005.

#### ***Applied Climate Information System (ACIS)***

NWCC has been pleased to be a primary developmental sponsor of the Applied Climate Information System (ACIS) during the past 10 years. During 2005, the NRCS will create a link on the national agency webfarm that will allow all employees to retrieve the climate data and reports needed for natural resource conservation activities nationwide. <http://rcc-acis.org/>

#### ***GEM Weather Generator Development and Distribution***

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

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

The NWCC is the home of both the SNOTEL and SCAN climate networks. SNOTEL (SNOW TELEmetry network) is the premier high-elevation climate monitoring network in the western U.S. (including Alaska), with over 700 stations at key snow water locations now in operation; while SCAN (Soil Climate Analysis Network) is a network of more than 90 soil moisture and temperature (with above ground climate instrumentation, as well) stations across the U.S. <http://www.wcc.nrcs.usda.gov/>

#### ***Support for USDA Climate-Related Activities***

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

#### ***Involvement in Other Climate-related Activities***

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

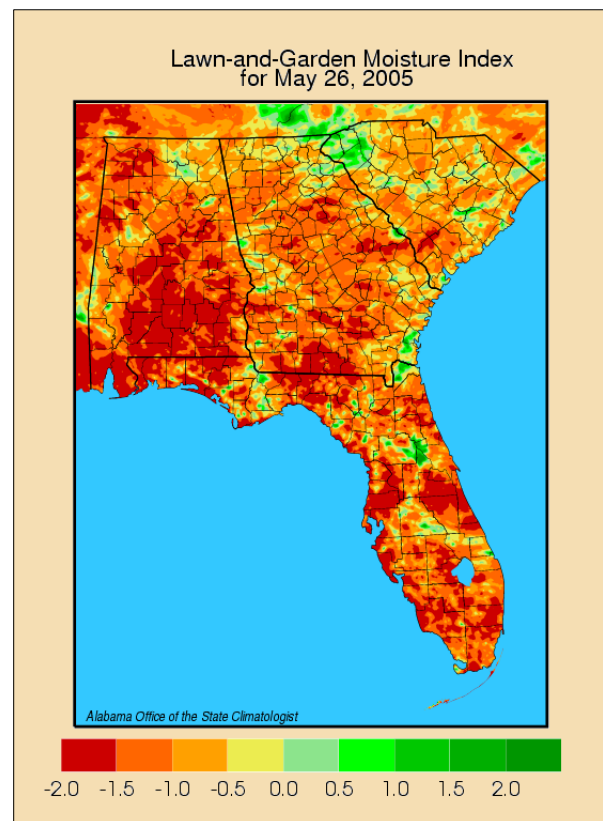
**Alabama Office of the State Climatologist**  
**John Christy, Alabama State Climatologist**  
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 Tel: 256.961.7752  
<http://vortex.nsstc.uah.edu/aosc/>

The Alabama Office of the State Climatologist, as a member of the state's Drought Monitoring and Assessment Group (MAG), participated in writing the state guidelines for assessing drought. The guidelines allow the Governor to declare one of four drought phases in each of the major hydrologic basins of Alabama. The phases are: Advisory, Watch, Warning and Emergency with appropriate actions to be taken. The indices are the following, but not limited to: Alabama Lawn and Garden Index, Crop Moisture Index, Palmer Drought Severity Index, 7-day average stream flow departure from normal, water table depth, and municipal and utility lake levels. Trigger values were included in the guidelines, but give the Governor flexibility to assess all information before declaring a particular phase.

The daily Lawn and Garden Index has been expanded to the GA, FL, and SC (SEE FIGURE)



[http://vortex.nsstc.uah.edu/aosc/lawn\\_garden\\_se.html](http://vortex.nsstc.uah.edu/aosc/lawn_garden_se.html)

Work continues on a similar product at 4 km and daily resolution for the CMI and the PDSI.

Industrial recruitment is a major task of the AOSC. The favorable weather for 24/7/365 "just-in-time" automobile assembly plant deliveries has convinced several major automotive manufacturers to locate in Alabama, with "Climate" often the deciding factor.

Interesting 2004 notes: Hurricane Ivan (Sept. 2004) was the most serious hurricane to strike Alabama's Gulf coast since Frederick in 1979. The summer of 2004 was cool and wet across Alabama, being only the 6th year since 1884 (when records began) in which not one single station notched a temperature of at least 100 F. In fact, of those 6 years, 3 have occurred since 2000 and all since 1964.



## Office of the Arizona State Climatologist

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The Office of the Arizona State Climatologist (ASC) is located within the Office of Climatology of the Department of Geography at Arizona State University in Tempe. The state climate program for Arizona was established by the Arizona Board of Regents in September 1973 in a Memorandum of Agreement between the Association of American State Climatologists (AASC) the National Weather Service, the National Climatic Data Center, and Arizona State University. In 2001, the office was officially established as the AASC Recognized State Climate Office (ARSCO) for Arizona. The purpose of the program is to: (1) manage and disseminate climatological information related to Arizona citizens and stakeholders within 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 of the ASC 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. In development is an archive method for stations within the Arizona Flood Warning System, which is maintained by the Arizona Department of Water Resources and the National Weather Service Offices within Arizona. 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 ASC maintains several service roles within the state. Representation on the Governor's Drought Task Force (Department of Water Resources), the Arizona Flood Warning System (Department of Water Resources) and the State Hazard Mitigation Team (Department of Emergency Management) headline state-level activity, in addition to work with the Arizona Department of Environmental Quality and the local utility/water provider Salt River Project. Presentations at primary and secondary schools, invited presentations to civic groups and state agencies, interviews from statewide media outlets, and the fielding of approximately 750 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).

**ARSCO Qualifications:** 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 (over 750)
- monthly statewide climate update on the web page
- beginning in Spring 2005, a monthly updated forecast for the intensity of the summertime North American monsoon

### Research:

- collaborated with local utility company (Salt River Project) on three projects: (1) to develop seasonal forecast model for the North American monsoon, (2) develop seasonal forecast model for the Central Arizona Winter Precipitation Index, (3) develop operational runoff models for Arizona watersheds
- funded by the U.S. Environmental Protection Agency to study high pollution episodes within Arizona-Mexico border towns
- funded by ASU-Motorola Great Communities program to research the microclimatic effects of an urban lake within the arid climate of Arizona
- 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 Governor's Drought Task Force, State Hazard Mitigation Team, 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
- serving the Department of Emergency Management through cooperative drafting of hazards assessment and mitigation plan
- 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

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

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

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

Patterson, Leslie, Roger A. Pielke, and Nolan J. Doesken, 2004: [Storming the State](#). Annual Report, Colorado Agricultural Experiment Station, Colorado State University, Fort Collins, CO, 2 pages.

Pielke, Sr., Roger A., 2004: [A Broader Perspective on Climate Change is Needed](#). Discussion Forum. Global Change Newsletter, No. 59, September, pp 16-19.

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

Doesken, Nolan J. and Michael A. Gillespie, 2004: [A Review of the 2003 Water Year in Colorado](#). 24th Annual AGU Hydrology Days Conference, Colorado State University, Fort Collins, CO, pp 261-272.

Davey, C.A., and R.A. Pielke Sr., 2004: [Microclimate exposures of surface-based weather stations - implications for the assessment of long-term temperature trends](#). Bull. Amer. Meteor. Soc., accepted for publication.

Doesken, Nolan J., 2004: Saving the Fort Collins Weather Station. Part 1 and 2. The Climate Station Chronicles, Edition #8 and #9, October and November.

**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:***

For 2004, the state climatologist's office traveled to many parts of the state providing information on the drought and precipitation to local and state governments, public, agribusinesses, and other businesses. Many interviews were routinely given and featured in newspapers, radio and television.

The National Drought Mitigation Center and NOAA have also used this information in their monthly updates. The Governor's water task force group was 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 and is published four times a year. The magazine 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 climate data and information to the public. Climatic elements such as, temperature and precipitation data on a daily and monthly basis from NWS cooperative weather stations across Colorado are available for users to download, the Colorado Agricultural and Meteorology Network (CoAgMet) automated weather stations are used for agriculture purposes such as irrigation scheduling, and extensive list of web resources are available for the user. Data requests from general public continue to be answered by the staff of the Climate Center. 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:***

Work began on "Evaluation of two ultrasonic snow depth sensors for NWS ASOS" project. This study compares two different sensors as well as manual and automated data. These sensors will be installed at locations where humans will not be taking side by side measurements and the need for a reliable algorithm to extract traditional measurements is very important to the integrity of the historic snow data record.

Beginning October 2004, the Colorado Water Conservation Board funded "Enhancement of the CoAgMet Electronic Weather Station Network in the Arkansas River Valley in Colorado" to provide litigation support services required for compliance with the Arkansas River Compact.

Also, Christopher Davey and Roger Pielke conducted an in-depth examination of new metrics for monitoring surface and tropospheric heating trends.

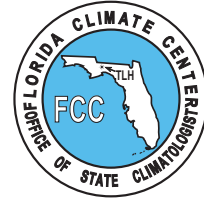
### ***Outreach:***

In addition to the climate monitoring presentations to the public, the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) Network has expanded into Wyoming, Kansas, Nebraska, New Mexico and Texas. This project encourages volunteer observers to collect rain, hail and snow data for many climate monitoring and research applications, <http://www.cocorahs.org>.

## The Florida Climate Center

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

**James J. O'Brien, State Climatologist**  
David F. Zierden, Assistant State Climatologist



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### About the Office

The Florida Climate Center is housed at the Center for Ocean-Atmospheric Prediction Studies (COAPS) in the Fuqua Research Complex at Innovation Park. Though physically located off-campus, COAPS and the Florida Climate Center are part of the Department of Meteorology at Florida State University. The office space, facilities, and equipment are provided by COAPS, but the Climate Center receives ongoing state financial support that covers the salaries of 1.5 full-time employees. The Florida Climate Center full-time staff currently consists of James J. O'Brien, the State Climatologist, David F. Zierden, Assistant State Climatologist, and Melissa Griffin, research assistant, Preston Leftwich (retired from the National Weather Service), and Dr. Mort Winsberg, author of *Florida's Weather* and professor emeritus of geography at FSU.

The Florida Climate Center 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.

### Information Services

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

A wealth of climate information is distributed through the climate center's website. Information on normals, detailed monthly and daily data sets, and links to other climate resources are all available free of charge through our website ([www.coaps.fsu.edu/climate\\_center](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. We are in the process of finalizing equally detailed heat index climatology. These new products were developed as a result of frequent requests.

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

## Research

The Florida Climate Center is 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 Florida Climate Center is a method of forecasting wildfire threat based on the Keetch-Byram Drought Index (KBDDI). 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.

## Communication and Outreach

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

The Florida Climate Center 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.

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 Florida Climate Center has participated in many extension-sponsored workshops in recent months and will continue to provide training and to promote *AgClimate* in the coming year.

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.

# Georgia State Climatology Office

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University of Georgia  
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<http://climate.enr.uga.edu>

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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: David Stooksbury, the state climatologist and assistant professor, and Pam Knox, the assistant state climatologist. A postdoctoral scientist specializing in surface and groundwater hydrology joined the office on 1 May. A student worker was recently added for a coastal climatology project. The SC office is currently interviewing students for a summer project.

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. During weather emergencies the state climatologist is on call for the Georgia Emergency Management Agency.

In the past year we have been involved in a variety of projects both within the university and within the larger climate community. In September 2004 we organized a workshop for coastal managers and commercial users of weather data on behalf of the SEACOOS (Southeast Atlantic Coastal Observing System) group. At this workshop we spent a day identifying current sources of weather data as well as primary and secondary needs for data and information products for a variety of public and private users of weather and climate data in Georgia. Unfortunately, due to the imminent arrival of Hurricane Frances, the workshop was not as well attended as we had hoped, but we had a lot of good interaction with the scientists and commercial users that did attend.

Other projects that have been undertaken in the office in the past year include a study of the weather influences on the development of equine fungal eye disease. The horse industry in Georgia has developed into a multimillion dollar industry. The fungal eye disease project is in conjunction with the UGA College of Veterinary Medicine. With the Florida State Climatology Office we are developing coastal climatologies for commercial and recreational fisheries. The Office is also a member of the Southeast Climate Consortium along with the Universities of Alabama-Huntsville, Florida, Florida State, Miami, and Auburn. Our role in the SECC is in the impact of ENSO on water resources and forestry.

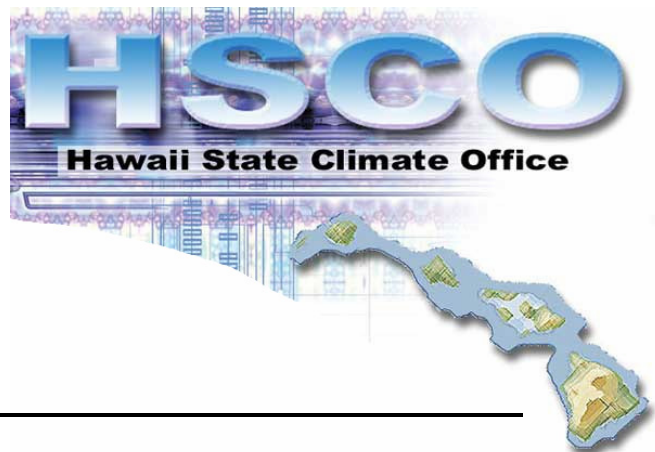
Our biggest project for the next year will be the development of a mesonet of weather stations around Georgia. Ultimately, this mesonet will be similar to the Oklahoma Mesonet in scale and data flow. This project has been undertaken as a cooperative effort with the National Weather Service and the National 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 is undergoing review by a committee of interested agency representatives. In the summer and fall of 2005 a large number of the most promising sites will be surveyed and the metadata captured for final assessment by the site survey selection committee. Once the best sites in each 20x20 mile grid have been surveyed and evaluated, the committee will provide recommendations on sites to the National Weather Service for their approval.



## **Pao-Shin Chu, State Climatologist**

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During the past year, the Hawaii State Climate Office (HSCO) has undertaken several funded research projects. One of these projects was to provide digitized precipitation and storm data for the Waianae Coast on Oahu, Hawaii for the NOAA Coastal Services Center (CSC) and the Hawaii Coastal Zone Management program within the Department of Business, Economic Development, and Tourism. These data enabled the CSC to compute annual, monthly, and daily storm precipitation data on spatial grids. The Waianae project was to develop a tool for examining relationships between land cover, nonpoint source pollution, and erosion. A list was compiled of all rainfall stations west of the Waianae Ridge from Kaena Point to Nanakuli. Stations were chosen with 10 to 29 years worth of data and fewer than five years of data missing and no single year having more than five months of data missing. The total number of qualifying stations came to 13 and they were plotted using ESRI ArcGIS and MATLAB to show where the stations were located topographically. We found Waianae is an extremely dry region in which standard deviation for a month often approaches the mean precipitation. The main rainfall contributors to this region are midlatitude fronts, kona storms, and upper level lows during the cool season. Storm events that are a combination of the above storms were also found to occur, causing extremely high rainfall. To arrive at our conclusions we used rainfall data from our HSCO, surface synoptic charts, Local Climatological Data for Hawaii and NCDC Storm Data, NOAA Environmental Satellite Imagery, and NOAA-CIRES CDC Reanalysis Products.

Last year we received a small grant from NCDC to reestablish climatic divisions for the Hawaiian Islands. The objective was to determine whether the 16 divisions proposed by the NWS/Office of Hydrologic Development (OHD) on the basis of the extreme 24-h rainfall events were appropriate. Historically, climatic divisions are on mainland U.S. are defined using monthly data and, on average, each state is divided into seven divisions with no more than ten. Moreover, in the OHD analysis each island is treated as a separate entity. It is necessary to consider collectively common features among islands, given their close geographic proximity and their similar climate patterns. Recognizing the limitation of this investigation due to the availability of funds, our pilot study suggests seven climate divisions may be appropriate for the State of Hawaii. This is based on previous knowledge of the different climates in the islands and our simple statistical analysis of monthly rainfall records for 356 stations during a common 35-year span.

Currently, we are updating the *Climatologic Stations in Hawaii* for the Kauai County. The aforementioned publication was produced by the Hawaii Department of Land and Natural Resources in 1973. It was a useful reference for many years because it lists the location of all rainfall stations, elevation, period of records, recorded data format (e.g., monthly or daily), among others. Thirty-two years have passed since the report was published and there have many changes in observational

records. A multitude of stations have either been added or discontinued since 1970. At the present, the report is not only obsolete in information, but lacks the functionality of modern technology. The maps are extremely difficult to read and are sometimes inaccurate. Our update will include GIS maps of current active and historical stations as well as updated rainfall contours that will take into account the past 20 years of low rainfall in the islands. It is our hope that station information for the other three counties in Hawaii can be updated for research, real estate development and water management interests.

In addition to the research projects the HSCO has continued to provide data and general climate information to researchers, lawyers, architects, environmental companies, state agencies, students, and even vacationers. We also assisted Hawaii Department of Business, Economic Development & Tourism to update their annual State Data Book.



## *Idaho State Climate Services*

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Clara Chaffin, Assistant Climatologist

Dr. Wenguang Zhao, Research Scientist

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

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

- Climate Presentations to local elementary schools

## Jim Angel, State Climatologist

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

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

### Communication Capabilities

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

### Information Services

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

### Research

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

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

## **Outreach**

The Illinois State Climatologist Office outreach activities include:

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

## **Monitoring and Impact Assessment**

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

## Iowa State Climatologist Office

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**Harry J. Hillaker, State Climatologist**

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

### Information Services:

The Iowa State Climate office maintains archives of daily NWS co-op and first order station data back to the beginning of records. This would include the regular NCDC reports such as *Iowa Climatological Data*, *Local Climatological Data*, *Hourly Precipitation Data* and *Storm Data*, as well as the original observations. Access to a multitude of federal, state and private weather and climate data archives are also maintained. The office is normally open from 8:00 a.m. to 4:30 p.m. weekdays to answer weather and climate related inquiries. With nearly 130 years of continuous operation the Iowa SC Office has an unusually large archive of original federal and state books, reports and manuscripts from the 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 an NCDC funded project, "A Detailed Station History for Selected Co-op Stations in Iowa, 1900-2004" was initiated. This project involves collection of all available documentation of the co-op station history for 25 long-term Iowa co-op weather locations.

Numerous small, informal, non-published research activities are also conducted in response to customer requests.

#### Outreach:

The office maintains very open communication with the news media with a total of 510 news media contacts this past fiscal year (July 2003-June 2004). 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 2,556 inquiries were answered during the past fiscal year. Most inquiries were received from the news media (20%), government agencies (17%), attorneys (10%) and insurance (8%). 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 site and made available at that site after publication of each month's report.

The Iowa State Climate Office works closely with the National Weather Service in monitoring the co-op and ASOS data networks so as to improve the quantity, quality and timeliness of Iowa climate observations. The office was honored to nominate several excellent NWS co-op weather observers for the prestigious NWS John Campanius Holm Award. A record four Iowa observers received this award during the past year. Finally, the Iowa SC participated in the NWS Central Region's first Climate Services Workshop in Kansas City in July 2003 and attended the AASC annual meeting in Portland, Oregon in August 2003.

#### Monitoring and Impact Assessments:

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



**Kansas State Climatologist  
Mary Knapp, State Climatologist**

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The Weather Data Library, which serves as the home for the Kansas State Climatologist is based in the Department of Communications, College of Agriculture at Kansas State University. The operation is funded by Kansas State Research and Extension. The Weather Data Library currently consists of one full-time position (State Climatologist) and two part-time undergraduate positions. This has been a very active year for the Weather Data Library. The various activities will be divided into four categories: basic operations, service/outreach, research activities, and liaison activities with National Weather Service Office, Regional Climate Centers, and state agencies.

Day- to-day operations: over 1600 requests for information were handled. In addition, weekly reports were prepared for Kansas Ag Statistics, the Kansas Water Office, and the National Weather Service. Monthly reports were prepared for 74 regular customers. The web site is maintained with regular updates on precipitation by counties, evapotranspiration data, and growing degree information. Maps are also prepared on a monthly basis to show precipitation by water basin.

***Outreach Activities***

Presented at a series of 5 winter profit seminars with a total of 700 participants. Gave presentations at a number of drought seminars in Northwest, KS. Presented at 3 regional NWS conferences at Hill City, KS; Columbia, MO, and Boulder, CO. Began radio program called “Weather Wonders”, a minute-long feature that covers different weather and climate topics, ranging from definitions, historical events, or unusual phenomena. Currently, we are producing 3 segments a week. Distribution started with one local radio station, and now covers 15 stations state-wide.

Another aspect of outreach has been participation in the annual field day. The field day consists of 15 stations covering various scientific and research topics, one of which was covering Kansas climate. There were 600 middle school students and 30 teachers in attendance at the field day.

### ***Research Activities***

Participated in research project: Road Weather Forecast Quality Analysis, KTRANS Project Number KSU-04-5, KDOT Project Number RE-0340-01, which was designed to evaluate the forecasts used in road maintenance decision process. Also collaborated with Steve Doty on station histories for Atchison, Leavenworth, and Manhattan, KS. Was notified of funding for a FIBR grant that will be on going from 2005-2007. My component looks at weather variables and their impact on flowering process of the Arabidopsis thaliana.

### ***Future***

Direction and focus of the Weather Data Library is an on-going concern. The College of Agriculture appointed a task force to look at operation and recommend a plan of action. The report recommended expanding support to include a full-time research climatologist, in addition to the State Climatologist position; a full-time technician, to service the automated weather stations; a graduate student and two undergraduate positions. This would more than double the operational support to the office. Things looked very favorable for the research climatologist position, but the position was redefined at the last minute due to the death of another faculty member. Recommendations of the task force are still being supported by various departments within the College of Agriculture, with increase in operational budget and supported deemed critical.

The Kansas Water Office has also taken the lead on the formation of a Kansas Mesonet. This proposal is circulating through various state offices. Finally, Kansas has joined the CoCoRaHS program. This year will be a period of expansion. I'll be working with NWS personnel from the Dodge City and Goodland offices in support of the program.

# The Kentucky Climate Center

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## **Dr. Stuart A. Foster, State Climatologist**

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The Kentucky Climate Center observed its 27<sup>th</sup> year of operation after reinstating the position of state climatologist in Kentucky in 1978 following a five-year period when the function had been disbanded. 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 has significantly enhanced its service role over the past year in an effort to better meet the needs of Kentuckians in business and industry, education and research, government, and a range of other pursuits. 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 launching a new site on the World Wide Web and contributing to a new almanac to be sold across Kentucky.

A new website was recently launched at the end of May 2005 to provide easy access to a broader range of climatological information relating to Kentucky. A distinguishing feature of the new site is the inclusion of interactive graphics created as java applets that enable users to both view graphs of historical information and extract data or summary statistics from the graphs using mouse-over operations. The website includes two sections that will be the focus of continued development. Climate Watch provides access to current climate conditions and selected historical information that adds context to the current observations. Links to the Midwestern Regional Climate Center, the National Weather Service, the National Drought Mitigation Center, and other sources are embedded in Climate Watch. The site also includes a new Visual Climate Explorer built upon an ArcIMS map server interface. The Explorer embeds the GeoProfile metadata for a growing number of observing stations across Kentucky and provides links to interactive climate graphs. Content and capabilities of the Explorer will be enhanced through collaboration between the Kentucky Climate Center and Western Kentucky University's GIS Center.

The Kentucky Climate Center was recently invited to provide content on weather and climate for publication of the premier edition of Clark's Kentucky Almanac and Book of Facts 2006. Content includes an overview of Kentucky's climate by season, information about natural hazards, summaries of weather and climate for recent years, and a compilation of weather records for Kentucky.

## **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 completed or ongoing from the past year is summarized as follows. The *GeoProfiles Initiative* to develop enhanced spatial metadata for climate stations using GIS technology has continued, and completed publicly available elements of GeoProfiles have been incorporated in the Visual Climate Explorer available on the Center's new website. These metadata are being used to assess the effects of instrument exposures on climatic time series. In conjunction with the its *Geohazards Initiative*, the Kentucky Climate Center developed an interactive, online graphical database of historical natural disasters that have impacted the 10-county Barren River Area Development District. The graphical database has been used in a regional natural hazard mitigation planning process funded by the Federal Emergency Management Agency. Research within the *Hydroclimatic Studies Initiative* addressing precipitation variability, particularly in the context of drought and flash flooding in Kentucky, has continued in conjunction with the NWS and Mammoth Cave National Park. In addition to these internal research initiatives, the Kentucky Climate Center has also been a participant in the Station History Project led by NCDC and hosted a project meeting on October 19-20, 2004. Ongoing research through the Kentucky Climate Center has contributed several new station histories from Kentucky and California as part of this effort.

## **Outreach**

The Kentucky Climate Center expanded its outreach over the past year. As a reflection of the expanding partnership with the NWS, the Kentucky Climate Center participated in the Customer Partner Workshop hosted by the NWS Jackson Office and the Climate Extravaganza hosted by the NWS Paducah Office. The Kentucky Climate Center also hosted its 1<sup>st</sup> Climate Services Symposium on May 16<sup>th</sup> and 17<sup>th</sup> of 2005. The Symposium included first-day sessions addressing the delivery of climate services, the development and operation of environmental monitoring networks, and perspectives on drought monitoring and policy. The second day included a round-table discussion on drought monitoring in Kentucky. These outreach efforts were in addition to ongoing outreach through media interviews, service on statewide committees, and hosting elementary and middle school students.

## 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 relevant weather conditions and to place these conditions within historical and geographical context. The MN\_SCO also provides quantitative summaries of historical climate conditions, allowing users to make informed decisions about future activities.

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

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

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

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

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

***Communication Capabilities:***

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

***Information Services:***

- Web site – the MN\_SCO Web site receives visits from approximately 3200 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 also offers online data entry capability to volunteer precipitation observers.
- phone – the MN\_SCO answers approximately 50 phone calls per week from customers with climate questions.
- e-mail – the MN\_SCO answers approximately 40 e-mails per week from customers with climate questions.

***Research:***

- high spatial density snow fall data collected by the MN\_SCO “Snow Rules” project were analyzed to identify the potential influences of Lake Superior and terrain changes on snow fall patterns in northeastern Minnesota.
- techniques were devised for merging cubic splines with exponential functions to interpolate daily normals from monthly normals which are bounded by zero.

***Outreach:***

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

***Monitoring and Impact Assessments:***

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



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Dr. Michael E. Brown, Assistant State Climatologist

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

- 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.

- “Severe Weather in Mississippi.” New Site High School, Prentiss County, MS. (Presentation coincided with the passage of Hurricane Ivan through Mississippi, so it was really timely and exciting)
- “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.” 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.
- “Weather Features: Analysis and Forecasting.” Workshop for Careers in Research, Environment, Science, and Teaching (CREST) sponsored by Mississippi Lignite Mine, Ackerman, MS.

Research activities this past year included investigating the effects of high temperatures on yield of soybeans in Mississippi, 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, climatological influences on occurrences of West Nile Virus in Mississippi, and climatological controls of tick infestations in Mississippi. One of last year’s projects, development of an evaporation dataset for the southern region, was completed and the results were sent to each SC in the region as well as both the SRCC and the SERCC. A paper on use of wind data collected at SCAN sites in Mississippi was reviewed by the SC for publication.

Special activities this past year included a presentation at an honors day for coop observations in the state hosted by the WSO Jackson, MS, and sponsoring a presentation for Mississippi State University students about the NWS Student Volunteer Program.

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

Your Resource for Climate and Weather Information



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## Missouri Climate Center

### Patrick Guinan, State Climatologist

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The former State Climatologist of Missouri, Dr. Adnan Akyuz, accepted a position as a Climate Research Outreach Specialist with the National Weather Service in October 2004. Adnan is based at the Central Region Headquarters in Kansas City, MO.

## 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. Additionally, a drought and agricultural weather web site exists for the citizens of Missouri;
- An agricultural weather forecast is developed every morning and e-mailed to all the county extension offices in Missouri;
- Over 2000 lines of data arrays are collected daily from a network of 28 automated weather stations and posted on a server.

### Information Services:

- Submitted numerous press releases and updates 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 impending or continuing drought status reports for Missouri to the National Drought Mitigation Center;
- Fulfilled hundreds of requests for climate information and provided climatological expertise to numerous individuals;
- Submit weather and soil information published in a national bulletin **Weekly Weather and Crop Bulletin**: <http://www.usda.gov/oce/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 three 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;
- Featured in the April 2005 cover story of The Furrow, “Put The Weather To Work”, a John Deere publication with nationwide circulation;
- 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;
- Developing an automated system that will capture, process, format and deliver timely weather and soil information to concentrated animal feeding operations
- Methodology for the retrieval and posting of weather and streamflow data within 80-km of National Park Service units found in the Heartland Network;
- Using automated e-mail and site specific weather to encourage weed scouting;
- Providing real-time weather status to 10 weather stations in the Commercial Agriculture Automated Weather Station Network for Integrated Pest Management;
- Support graduate students researching on Missouri’s climate.

**Outreach: Education, awareness, and contact activities:**

- Missouri Academy of Science conference;
- Regional Climate Services Conference;
- Hundley-Whaley Farm field day;
- Crop Management Conference;
- Computers on the Farm conference;
- In Service Education for regional agronomists;
- 38<sup>th</sup> annual Irrigation Conference;
- Southwest Missouri Irrigation Conference;
- Soils and Crops Conference;
- Cass County Winter Integrated Pest Management Workshop;
- Indian Grove Educational Club;
- Ag-Marketing Teleconferences;
- Integrated Pest Management Teleconferences;
- Missouri Drought Assessment;
- Information resource for the following media outlets: Missouri Net, Brownfield Network, Cooperative Video Group, and numerous local television, radio, and newspaper outlets across the state.

**Nebraska State Climate Office**  
**Al Dutcher, State Climatologist**

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**Accomplishments 2004**

- Managed the climate services division of the State Climate Office and High Plains Regional Climate Center. I personally performed 580 full service requests, which includes 151 media contacts. . In addition, I presented 20 talks, submitted 12 articles, conducted 44 Market Journal weather segments, performed 9 CIT radio spots, and submitted 24 two-week hard print outlooks to Heartland Express. For a complete listing of presentations, interviews, and publications, please see attachments.
- Represented the state Climate Office at the American Association of State Climatologists (AASC) in Ithaca, New York. Presented a talk on using the AASC list-servers. Completed the application process for State Recognized Climate Office by the AASC. Awaiting final confirmation of ARSCO status.
- Provided expertise on current climate conditions to the Climate Assessment and Response Committee as requested. Submitted sub-committee report from the Water Availability and Outlook Committee to the CARC. Briefed the Governor on the current drought status. Worked with state and federal authorities on drought delineation status for Nebraska, including providing data to state and local FSA offices to get drought approval/aid status from the USDA.
- Revamped autopilot routines from HPRCC On-Line to ASIS formats for Nebraska Agricultural Statistics Service personnel and University of Nebraska CropWatch editors in order to provide real time graphical monitoring of climate conditions on defined time scales. Developing new autopilot programs using ASIS data to monitor insect development based on GDD analysis for university entomologists.
- Converted office data analysis to the ASIS system. Completing almost all non-AWDN data requests with the ASIS system instead of the HPRCC On-Line. For AWDN requests, all non-ET or autopilot generated analysis is generated with the ASIS system.
- Continued to work with local NWS offices to relay climate information and observations to the state and federal authorities concerned with drought issues within the state of Nebraska

- Provided monthly, then quarterly activity reports to the HPRCC director concerning climate service activities, including revenue generated, user activities, request processing techniques, media contacts, presentations, and publications.
- Finished the binding project of serial publications within the Climate Services office prior to the expected move to Hardin Hall.

## **2004 INTERVIEWS AND OUTREACH**

Radio: 13

Television: 54

News Print: 14

Publications: 13

Talks, Presentations, and Meetings: 21

## New Hampshire State Climate Office

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<http://www.unh.edu/stateclimatologist/>



### 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. Despite recent staff turnover, the NHSCO continues to be an active State Climate Office and an important part of the climatological community in New Hampshire and northern New England. The NHSCO has recently applied for ARSCO status and hopes for a decision before for 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, beginning May 15, 2005, can use a new on-line interface available on the NHSCO webpage to submit their data requests. The NHSCO is currently negotiating with a private land owner to install wind direction and wind speed measurement instrumentation onto one or more new cell phone towers in the Durham, NH area. If successful, these data will be collected wirelessly and archived using the same web interface as the on-campus 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 opportunities associated with the NERON automated cooperative station network in New Hampshire.

### 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 key member of the New England Integrated Sciences and Assessment (NEISA) project, sponsored by the Office of Global Programs at the National Oceanic and Atmospheric Administration (NOAA). The goal of NEISA is to engage in climatological research designed to address stakeholder vulnerability to climate change and climate variability across New England. The activities of NEISA are currently centered on analyses of interannual linkages between climate, air quality, and human health in New England. The NHSCO is playing an active role in this project 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 salary/stipends, professional travel, and equipment. It is anticipated that the role of the NHSCO in NEISA will expand as the project also begins to focus research attention on New England snowfall patterns and

prediction. Several peer-reviewed publications with NHSCO staff as primary authors are expected to emerge from the NEISA project.

A new project, also sponsored by NOAA through the State Climatologist Exchange Program, will begin in June 2005 as a case study focused on analyzing variability among different local climate data sources. The research will include a comparison of climate data collected at the two CRN stations, the NWS cooperative station, and the NHSCO maintained on-campus weather station at UNH, all located in Durham, NH, for the period 2002-2004. The project's primary goal is to identify statistically significant discrepancies that may exist in the three-year data record of the CRN stations as compared to the longer-term cooperative station, with the UNH station serving as a "control" data source. The findings will be summarized in a report to NCDC and published on the NHSCO website.

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. The NHSCO also 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.

## **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.

Effective May 15, 2005, the NHSCO will have a new web presence at <http://www.unh.edu/stateclimatologist>. The website will 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. The website will feature historical climate summaries and products for New Hampshire, but will include 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 for the Northeast U.S. 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. Additionally, a new CGI interface will 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 August 2004, the State Climatologist has conducted some 25 interviews with newspapers such as the *Boston Globe*, *Manchester Union-Leader*, and *Eagle Tribune*. He has also appeared on *New Hampshire Outlook* on New Hampshire Public Television and is regularly contacted by WMUR Channel 9 in Manchester, NH. The most prominent topic discussed was the unusually high snowfall amounts during the 2004-2005 across much of New Hampshire. Other interviews focused on specific weather events, climate change, climate impacts on fall foliage, 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 Meteorological Society and Association of American Geographers, as well as regional meetings of the New England Water Works Association and the Northeast Agronomy Society of America. The State Climatologist also maintains an active role as a participant with the U.S. Drought Monitor and is a member of the (currently inactive) New Hampshire Drought Task Force. The NHSCO has also been invited to take an active role on the UNH campus with the GLOBE and Sustainability Climate Initiative programs.

## Office of the New Jersey State Climatologist

Center for Environmental Prediction  
NJ Agricultural Experiment Station  
Cook College, Rutgers University  
c/o Department of Geography  
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### Dr. David A. Robinson, NJ State Climatologist

Keith Arnesen, Assistant State Climatologist  
Chad Shmukler, Technical Director  
John Read, Technical Assistant  
Nicole Sims, Student Assistant

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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. Over 500 media interviews were given in the drought year of 2002.

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

### **Communication capabilities**

- Ingest, process, archive and disseminate historic and real time climate data.
- Maintain numerous web sites related to the ONJSC mission  
<<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 350 media interviews each year.
- Presentations to schools, civic organizations, Liberty Science Center, etc.
- Conference presentations to the NJ Mosquito Control Association, the NJ Emergency Preparedness Conference, the NJ Teachers Science Convention and others.
- The NJ State Climatologist is a member of the Consortium for Atlantic Regional Assessment advisory committee, the NWS StormReady Community Program advisory board, the NOAA Integrated Surface Observing System ad hoc advisory committee, and the AMS Applied Climatology Committee.

### **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.



## **New Mexico Office of the State Climatologist**

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<http://weather.nmsu.edu>

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The New Mexico Office of the State Climatologist was created in 1978 within the New Mexico Department of Agriculture. This position was authorized but not funded by the state legislature. In 1989, the current state climatologist, Dr. Ted Sammis, was assigned the position as an extra duty to his regular research and teaching activities at New Mexico State University. Though funding was not associated with the duties of state climatologist, the Agriculture Experiment Station paid for student help and provided funds for the operation of the state climate network. A memorandum of understanding between the New Mexico Department of Agriculture and the Agriculture Experiment Station of New Mexico State University, signed in 1997, officially transferred the responsibilities of the state climatologist from the Department of Agriculture to the Agriculture Experiment Station. In July of 2004, the state legislature voted to fund an enhancement initiative for the office of the state climatologist. With these funds, the New Mexico Climate Center was able to hire a full-time Assistant State Climatologist and computer programmer.

The purpose of the New Mexico office of the state climatologist is to assist the state's efforts to understand and respond to natural and man-induced climate processes, to cooperate with federal government activities relating to climate studies, and to promote and disseminate a general knowledge of the climatology of the state. To serve these purposes, climate center collects daily climate data from automated climate stations around the state. In 2004, the system was expanded to include approximately 160 stations, 27 of which are operated by the New Mexico Climate Center. The climate center maintains a web site that processes the climate data from the automated stations and makes it available to the public. Last year, more than 6000 requests per day for climate information were answered at the Internet web site. An additional 300 more requests were answered by phone and email.

In addition to processing climate data and responding to requests, the New Mexico Climate Center supplies information on irrigation scheduling of native, landscape, and commercial crops; heat and cooling degree-day calculation for the construction industry; economic irrigation software; and teaching material on soil and land use, instrumentation, and irrigation science. The climate center also provides a variety of web based tools that use climate data for making management and engineering design decisions in the area of agriculture, hydrology, construction, health and economic development.

By New Mexico law, the duties of the state climate office do not include research activities. However, research is conducted by climate center staff in conjunction with University research programs. This research uses the climatic information provided on the center's website for studies involving crop improvement, pest control, and irrigation/water management. This past year, climate center staff and members of the Agronomy and Horticulture Department at New Mexico State University used remote sensing data and local weather inputs to develop a model for estimating pecan consumptive water use.

The New Mexico Climate Center has also worked in cooperation with the Colorado Climate Center, to bring CoCoRaHS, the Community Collaborative Rain, Hail and Snow Network to New Mexico. Currently, over 170 observers registered in our state after only a few months of involvement in the program. The state climate office plans to work with other state agencies to further expand precipitation observations across the state.

**State Climate Office of North Carolina**

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**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, Meteorologist  
 Robb Ellis, Climate Services Assistant  
 Bic Fort, Administrative Assistant

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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 2004 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 7000 unique visitors each month, an increase of 75% since last year.
- NC CRONOS database now allows access to real-time and recent historical observations of hourly, daily, and monthly weather and climate data. Internal users have access to the complete database. Other enhancements include:
  - Observations dating back to 1948 have been added based on National Weather Service primary gages
  - Add evaporation estimates (Penman-Monteith and Priestley-Taylor), degree day, and other derived measurements to CRONOS interface

- Completed online publication of winter storm climatology, developed jointly by SCO and UNC-CH (Chip Konrad)
  - Developed tropical storm climatology and online mapping tool
- NC ECONet continues to expand and improve the quality of environmental observations. There are now 27 stations in this network.
  - Additional evapotranspiration sensors were deployed at six new locations in the summer of 2004 bringing the total such sites to 19. By summer of 2005, all Agricultural Research Stations with ECONet gages will monitor evapotranspiration.
- 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.
- SCO provided hundreds of hours of service to federal, state, and local government agencies. These agencies included NC Department of Transportation, US Environmental Protection Agency, NC Division of Air Quality, NC Division of Water Quality, NC Division of Water Resources, NC Division of Forest Resources, NC Division of Emergency Management, NC Department of Justice, NC Department of Agriculture and Consumer Services, US Geological Survey, NC Flood Warning Program, NC Flood Mapping Program, US Army Corps of Engineers, and county economic development agencies.

### **Educational Outreach**

- Last year the SCO hosted seven undergraduates, each with individual projects.
- SCO continues its 3 year partnership with Centennial Campus Middle School and annually hosts 4 middle school student interns.
- Provided presentations to K-12 classes and community organizations on regular basis. SCO staff was frequently requested for Earth Day activities at local elementary schools.
- SCO is a primary member of the NC Climate Change Education Partners, a group of educators whose focus is to educate the public on the science of climate change. SCO helped to organize a panel discussion in May 2004 that got lots of attention from legislators and the media. Sethu Raman and Peter Robinson were 2 of 4 members on that panel.

### **Research**

- Four graduate students (MEAS) worked at the SCO on topics related to weather and climate in NC. Topics include east coast cyclogenesis, severe weather, agriculture meteorology, mesoscale weather, and air pollution. Results were presented in professional meetings and international journals.
- SCO staff and students co-authored 4 professional meeting presentations, 5 invited presentations, published or communicated 6 scientific papers for peer-reviewed journals and 2 SCO reports in 2004.



**Oklahoma Climatological Survey**

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<b>Dr. Ken Crawford</b>	<b>Director and State Climatologist (on temporary assignment)</b>
Dr. Renee McPherson	Acting Director
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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Based on a solid record of creative achievements, model service to the citizens of Oklahoma, and a growing national influence, the 38 full-time staff and 23 student employees of the Oklahoma Climatological Survey (OCS) completed another exemplary year of outstanding productivity. The combined group accomplishments clearly kept OCS among the nation’s premier climatological offices and sustained the international reputation of the Oklahoma Mesonet.

During 2004, the Oklahoma Mesonet celebrated its 10th anniversary and its 3 billionth observation. Enrolled State Senate Resolution No. 42 noted that “the State of Oklahoma recognizes the importance of the indispensable services and economic benefits that the Oklahoma Mesonet provides for the State of Oklahoma and its citizenry” and announced that Thursday, March 11, 2004 was designated as “Oklahoma Mesonet Day” in the State of Oklahoma. Later in 2004, the American Meteorological Society selected the Oklahoma Mesonet for a Special Award for “serving Oklahoma and the meteorological community by providing high-quality data and information products used to protect lives, reduce costs, facilitate cutting-edge research, and educate the next generation.”

The excellence of OCS’s products and services continued during 2004, with the creation of four seasonal climate summaries, 12 monthly climate summaries, county climate summaries for all 77 counties (on CD-ROM), a weather briefing web portal for public safety officials, and enhanced agricultural models (through OCS’s partnership with Oklahoma State University and OSU Extension Services). OCS developed hazard summaries of tornadoes, thunderstorms, winter storms, flooding, drought, excessive heat, wildfires, landslides, expansive soils, earthquakes and dam safety for the state’s Enhanced Hazard Mitigation Plan (approved by FEMA). The Oklahoma College Public Relations Association awarded OCS their Award of Achievement – Special Publication 2004 for its series of OCS fact sheets.

OCS completed a major upgrade to the Mesonet’s communication, processing, and dissemination system during 2004, resulting in a significantly reduced latency from measurement to availability of quality-assured data on the web (~12 minutes to ~5 minutes) and an increase in the time resolution

of data distribution (from every 15 minutes to every 5 minutes). This upgrade — the most encompassing since the installation of the Oklahoma Mesonet — included a complete replacement of power systems and communications at all remote sites, repeaters, and OLETS bases; optimization of all data ingest, automated quality assurance, and product generation code; and replacement and optimization of OCS server hardware and software. These changes took place under the severe restrictions of an operational environment and were completed without any significant data outages and without reducing either regular or emergency visits to any of the 116 Mesonet sites.

Dr. Ken Crawford, OCS Director, began a two-year term as President of the American Association of State Climatologists. In addition, he began an Intergovernmental Personnel Action from the National Weather Service to lead the modernization of the cooperative observer network. Dr. Crawford was named Program Director of the Integrated Surface Observation System (ISOS) Program Office effective June 1, 2004. His primary responsibility is to implement the COOP Modernization Plan in a sound and technologically wise manner that produces the best value to NOAA, the NWS, and the United States. Dr. Crawford was authorized to prototype an Operations and Monitoring Center by building upon the mature ingest and data quality assurance capability of the Oklahoma Mesonet.

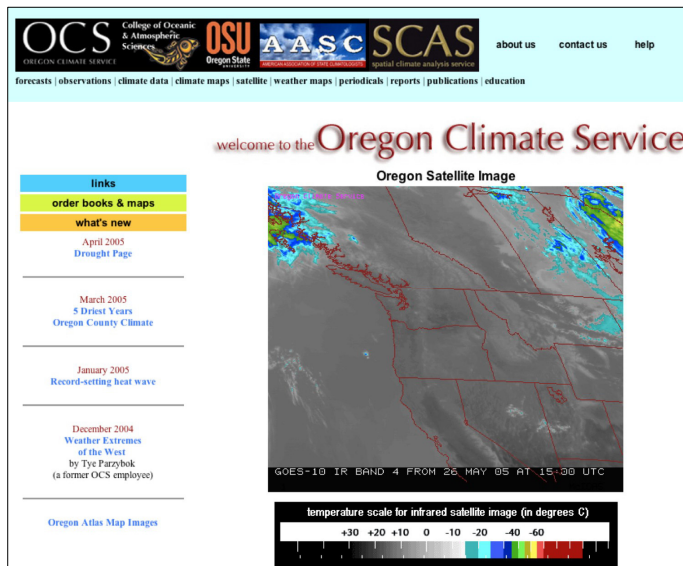
New research grants funded during 2004 included “Quantifying the Structure of the Planetary Boundary Layer In and Around Oklahoma City” (PI: Basara; \$274,433; NASA) and “Remediation and Restoration Monitoring at the Tar Creek Superfund Site” (Co-PI: Basara; \$888,570 total; \$154,718 for OCS; USGS). OCS’s Summer Research Internship Program also was developed and initiated with the purpose of providing opportunities for University of Oklahoma meteorology undergraduates to gain research experience. Five students were selected competitively to participate during Summer 2004.

OCS conducted full-course training, refreshers, and assistants workshops, held at 12 different locations across the state, for Oklahoma public safety officials. In support of these and other customers, OCS upgraded its WeatherScope visualization software to include frame-based animation, data archiving, support for proxy server authentication, cursor tracking, PNG-based data sets, and support for line shapefiles. OCS instructors also led the Second and Third COMET Symposium on Processes in the Planetary Boundary Layer in Boulder, CO. Final course evaluations resulted in a score of 4.71 (out of 5) — the highest score ever for a COMET course.

In the end, OCS again met its primary mission to acquire, archive, process, and disseminate, in the most cost-effective way possible, all climate and weather information that is or could be of value to policy and decisions makers in Oklahoma.

**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  
 Christopher Daly, Research Professor  
 Wayne Gibson, Programmer/GIS Manager  
 Matt Doggett, Research Assistant  
 Eileen Kaspar, Office Manager  
 Joseph Smith, Research Assistant

Wolf Read, Undergraduate Assistant  
 Melanie Mitchell, Undergraduate Assistant  
 Cadee Hale, Undergraduate Assistant  
 Kelsey Kuykendall, Undergraduate Assistant  
 Sean Daly, Undergraduate Assistant  
 Emily Gibson, Undergraduate Assistant

**Linkages**

OCS acts as the liaison with:

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

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

## Services

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

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

## Spatial Climate Analysis Service (SCAS)

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

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

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

- Monthly grids of temperature, precipitation and dew point for the period 1895-current for the 48 contiguous states (updated monthly)
- Development of a spatially-based quality control system for SNOTEL sensors, for USDA Natural Resources Conservation Service
- Development of GIS tools for estimating Probable Maximum Precipitation (PMP)
- Temperature and precipitation mapping at 30 arc-seconds (about 800 m.) for the western United States, for USDA Natural Resources Conservation Service



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The Pennsylvania State Climate Office continues to expand its database by incorporating observations from networks within the Commonwealth. Approximately 60 new hourly reporting stations are being enfolded into the office's relational database. When combined with hourly reports from the FAA and Pennsylvania's DEP and DOT, there are over 225 observations of temperature, dew-point and wind each hour. The State Climate Office has also improved its archived visualization products, satellite and radar imagery files for easy retrieval.

The vision for a Pennsylvania Mesonet remains a high priority for the State Climate Office. Current work with the Geospatial Technologies Director in the Governor's Office of Administration has led to a thorough assessment of virtually all of the state's agencies needs for climate and weather data. Whereas the interim solution will likely include several vendors and their products, the long-term answer is a state owned and maintained mesonet. The State Climate Office in conjunction with the Center for Environmental Informatics is developing a methodology for selecting new sites for an expanded environmental observation network.

***Information Technology Capabilities:***

- Approximately 3400 unique visitors per month through 2004
  - 4433 unique visitors in August alone (maximum)
- Approximately 5 million hits during this year
- Transfer of ~ 58 gigabytes of data
- 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. This upgrade allowed the office to use the old server as a back-up system with a primary focus on development and testing.

***Information Services:***

- A new Interactive Data Archive for daily observations and access to Mesonet hourly reports provides users with a wide selection of data and value added services. A collaborative effort

with the Northeast Regional Climate Center has brought evapo-transpiration data to the users and is part of a water budget project.

#### ***User Base Growth:***

- The number of site visits has increased significantly during the last year and our collaboration with various state agencies should support that trend. During the next year, we will track the specific users and amount of data downloaded for a better profile of our clientele. A quasi-monthly newsletter has a subscription list of over 150 with 50-60 regularly retrieving the latest newsletter.

#### ***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.

#### ***Climate Office Projects:***

- A new metadata profile of the additional 60 hourly reporting sites will be completed later this summer. Application of on-line data to specific user needs is under design. A shared regional database (with New York and New Jersey) continues to be developed along with products that bridge state borders.

#### ***Special Projects:***

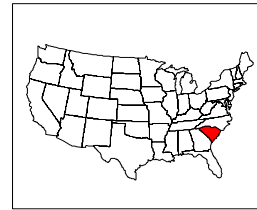
- Collaboration with experts in the College of Agricultural Sciences has led to the development of environmental data monitoring systems for Wheat Scab, Corn Rust, Gypsy Moths and the European Corn Boer. A real-time water budget for the Spring Creek Water Shed in collaboration with Pennsylvania's DEP is still being developed with completion extended to early 2006. The Climate Office is working with AURORA, a consortium of DOT agencies, to develop a portable quality assurance program for roadway weather information systems. The GeoSpatial Technologies Office of the state requested assistance from the climate office to define the state's user needs for climate and weather information.

#### ***Selected Presentations:***

The Climate Staff presented a poster on their work in developing a local water budget to the ANREP meeting in Morgantown, WV in May, 2004. A presentation was also given to a Susquehanna River Basin Commission Meeting at Millersville University last spring. Presentations were also given at the NWS Winter Weather Workshop in November (State College) and at the Pest and Lime Fertilizer Conference in January (University Park). An invited presentation was made to the CropCast Agricultural Conference in Chicago during April, 2005.

## South Carolina Office of Climatology

South Carolina Department of Natural Resources  
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Columbia, SC 29201  
Ph: 803/734-9568 Fax: 803-734-9573  
Email: mizzellh@dnr.sc.gov  
<http://www.dnr.state.sc.us/climate/sco>



### Hope Mizzell, State Climatologist

Wes Tyler, Assistant State Climatologist for Service  
Jason Caldwell, Severe Weather Program Liaison  
Gaye Leonard, Administrative Assistant (Part-time)

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Since its creation in 1986 by the South Carolina General Assembly (Section 49-25-10 et seq., Code of Laws of South Carolina, 1976, as amended), the Office of State Climatology (SCO) has represented the State in all climatological and meteorological matters within and outside South Carolina. 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.

**ARSCO Qualifications:** The following describes the ways in which the SCO addressed each of the ARSCO qualifications during 2004:

#### Communication Capabilities:

- Created a new SCO web site that provides a more user-friendly and manageable layout for accessing information. Numerous products were revised to ensure access to the most up-to-date information. The web site now includes a Tropical Weather Information Center developed based on survey results from county emergency managers.
- Email Notification System used for severe weather notification and disseminating long-range climate projections was expanded to over 300 recipients.
- Produced the first-ever South Carolina Weather Calendar. The *2005 South Carolina Weather Calendar* includes a unique South Carolina weather picture for every month, daily weather statistics, and monthly feature stories. The calendar serves as a unique and educational way to promote the SC State Climate Office and generate additional revenue while informing the public about South Carolina's weather. The *South Carolina Wildlife Magazine* staff assisted with graphic production.
- Provided around-the-clock weather briefings to numerous State agencies and the State Emergency Operations Center during the winter weather events of January and February and during the very active 2004 tropical season. This included 24-hour staffing of the State Emergency Operations Center during tropical systems Gaston and Charley.

#### Information Services:

- An average of 50 monthly phone and email requests for climate data and 30,000 information retrievals from the SCO web site were received. During significant weather events, such as the active tropical season, these numbers tripled.

- Media inquiries averaged 20 per month and tripled during periods of severe weather. Staff created a video segment used by S.C. Educational Television to promote the office and our role in weather preparedness.
- As a function of the Drought Response Program correspondence was sent to over 2,000 water systems informing them of the South Carolina Drought Response Committee's Incipient Drought Declaration during June 2004.
- Compiled weekly a "South Carolina Weekly Weather" publication. During the growing season the publication is sent to 500 subscribers through the USDA SC Agricultural Statistics Service.

#### **Research:**

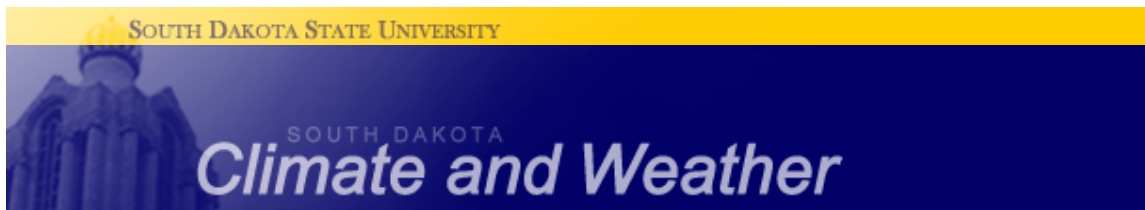
- American Geophysical Union Monograph, **Water: Science, Policy and Management**, was published. Our solicited chapter on the "Integration of Science and Policy during the Evolution of South Carolina's Drought Program" was included in the section focused on exploring examples of how science interacts in different ways with the policy and management community.
- Served as a cooperating institution in the Carolinas Integrated Sciences and Assessments (CISA) project, which focuses on integrating climate science and water management in North and South Carolina.
- Continued development toward a climate-hydrology-atmosphere model prediction system (CHAMPS). CHAMPS is a modeling effort to improve precipitation and temperature outlooks and provide additional forecast tools for tropical and winter weather events, flooding episodes, and droughts.

#### **Outreach:**

- Staff member serves as commissioned law enforcement officer to assist SCDNR during weather emergencies.
- Continued assisting water systems during their adoption and implementation of their Drought Management Plans and Response Ordinances.
- Provided approximately 50 annual presentations to various governmental, private sector, and civic organizations such as serving as moderator and presenter at the 13<sup>th</sup> North America Lake and Watershed Conference, presenter at 7th Annual SC Association of Hazard Mitigation Conference, presenter at quarterly meetings of the South Carolina Agricultural Commission and South Carolina Food and Agricultural Advisory Council, and presenter at Surfside Beach Hurricane Awareness Conference.
- Press releases were issued for Severe Weather Awareness Week, Hurricane Awareness Week, and Winter Weather Awareness Week.

#### **Monitoring and Impact Assessment:**

- Maintains a network of climatological observers throughout the State that supports the National Weather Service's Cooperative Observer Network.
- Prepared event summaries for: January 24-26, 2004 Frozen Precipitation Event, February 25-27 Frozen Precipitation Event, Tropical Systems Bonnie/Charley, Tropical System Frances, Hurricane Gaston, Tropical System Jeanne and a 2004 Tropical Season Summary. Staff also submitted an entry for the Institute for Southern Studies SC Encyclopedia Project on South Carolina.
- Resurrected the South Carolina Annual Weather Summary publication to summarize the highlights of the past year's weather.



**South Dakota State Climate Office**

**Dennis Todey, State Climatologist**

Chirag Shukla – Climate Data Specialist

Agricultural Engineering Department  
South Dakota State University  
AE 213 Box 2120  
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Tel: 605-688-5678 Fax: 605-688-6764  
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<http://climate.sdstate.edu>

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The South Dakota Office of Climate and Weather is part of the Cooperative Extension Service of South Dakota State University. It has overlapping missions of providing science-based information and data 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 main communication tool for data continues to be the state climate web site. New features added this year were new climatologies of frost and freeze dates across the state. Spatially interpolated maps and tables freeze dates for many different cut-offs were added to the web site. Another feature added to the site were monthly and annual wind roses for all airport stations in the state (ASOS and AWOS).

The state climate office responded to the cool summer of 2005 by adding several degree day accumulators and maps for real-time reporting stations in the state. These were used extensively by the state climatologist and producers to track the shortfall of degree days throughout the growing season.

The state climate office continues its efforts to fill gaps in the state observing network as many locations in the state are poorly represented with any type of current weather information. Equipment for 24 new weather stations was delivered in December 2004 to be placed at 24 sites around the state during the summer of 2005.

The state climatologist gave talks to over 25 producers, interest groups, and schools on drought situations, climate outlooks, weather safety and expansion of the state observing network. Over 100 special data requests were handled in addition to regular data served on the climate web site. Dr. Todey also provided weekly drought updates to the state drought task force and general climate updates to agronomy educators during the growing season.



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



## TEXAS CLIMATIC BULLETIN

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

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

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

### **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 2004, about 300 electronic climate requests were received and answered. The Office has also received approximately 150 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**

The Office of the State Climatologist conducts a limited amount of research itself and collaborates with other groups and agencies on campus. Present research activities include an investigation into the direct meteorological causes of summertime drought in Texas. The Office is also developing techniques for monitoring the development of meteorological drought across Texas using animation and innovative accumulated precipitation measures.

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

## **Outreach**

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

## **Monitoring and Impact Assessments**

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

## **Future Plans**

The Office of the State Climatologist has been promised sustained funding by the Texas Commission on Environmental Quality, but actual funding has not been received as yet.





## Office of the Washington State Climatologist

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### **Philip Mote, State Climatologist**

Mark Albright, Associate State Climatologist  
Rob Norheim, Assistant State Climatologist  
Josiah Mault, Student Assistant

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Washington joined rest of the West and finally entered a drought this year. For much of the winter, mountain snowpack was stuck at about 20% of average, and farmers were warned that water would be curtailed. As every State Climatologist knows, there's nothing like a good drought to generate media interest in the office, and we fielded telephone calls from reporters at the rate of 1-5 per day for about two months - until it began raining in earnest, in late March.

The Office of the Washington State Climatologist expanded in number this year, hiring Josiah Mault as a student assistant. Josiah is a junior at University of Washington majoring in Atmospheric Sciences and is an avid weather buff, with a backyard weather station and his own web site. He will be working full time for us this summer on various projects. This is an exciting development for us, as we have previously been essentially an all-volunteer office, and this expands our capabilities in being proactive.

With funding from the state Department of Ecology, OWSC is undertaking an expansion of its web site, aiming to provide more helpful geo-located guides to data of various types. Spurred by discussions with users at Ecology and elsewhere, the site will catalogue data by variable and time resolution - so for example, if someone wanted wind roses, the map would show where they are available. We hope to have a beta version of this site to show at the AASC meeting.

In short, we are developing some long-term capabilities - what remains is to secure some longer-term funding from the State.





## Wisconsin State Climatology Office

John Young, Director  
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Madison, WI 53706

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<http://www.aos.wisc.edu/~sco/>

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

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

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

The mission of the SCO includes:

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

## **INFORMATION SERVICES**

**Website:** The SCO maintains and continues to expand its website <http://www.aos.wisc.edu/~sco> which provides a variety of climate information and data to the citizens of Wisconsin, scientists and various interested parties. During 2004, the number of requests made to this website has increased, with nearly 515 successful requests made per day. Some of the special features that appear on the site include:

- Season Pages. The winter page appears to be a fairly popular page, especially for those wanting snow information. Climatologies of the summer holidays were prepared and posted.
- Climate Watch: A section with extensive graphics of contemporary conditions.
- Climate History: Additional graphics have been prepared and updated for observed climate variability by year and locations have been added.

## **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. Approximately 59 data requests per month were made during 2004 from the public, the media, industry (e.g., legal, insurance), and governmental agencies.

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

**OUTREACH** – The SCO is continuing to make its presence more widely known to the residents of the state of Wisconsin. In addition to interviews with the electronic and print media in the state, the staff has given lectures at service groups, universities and business conferences. The Director helped co-host the NOAA 29th Annual Climate Diagnostics and Prediction Workshop held in Madison in October 2004.

## **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**  
**Jan Curtis, State Climatologist**

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



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**Communication Capabilities:**

Entering the fifth year of drought over Wyoming, I continue to travel across the state providing direct feedback on drought conditions to farmers, ranchers, businesses, and tourist stakeholders. I am routinely featured in state newspapers and provide numerous radio and television interviews. Through the Governor's drought task force, I serve as the central authority by providing official word on drought, climate, and water resources related issues and data. My interagency support includes issuing monthly climate summaries used by the National Drought Mitigation Center and NOAA in their monthly updates.

**Information Services:**

Working with the Wyoming State Geological Survey, this climate office helped with the compilation of climate data that will be used in the state's disaster preparedness plan. Working with the Wyoming Office of Homeland Security, we have supplied local area emergency management coordinators with Pocket PCs that provide environmental resources data and GPS capability to local officials.

- a) Server Statistics: State Climate Office/WRDS servers: (hosts nine Federal & State Agencies)
- b) Data requests via phone, fax, email, and letter are handled with minimal charge within 48 hours. Of course, much of our data are directly accessible via our website for free.

**Research:**

Revision to the 1986 Wyoming Climate Atlas was completed and is now available on-line with frequent updates and additional new sections. Hard copies are available for sale and contain a CD with raw and compiled data and graphics.

We are also continuing our work with Nolan Doesken, Colorado Climate Office, to expand CoCoRaHS in Wyoming and several Rocky Mountain and Great Plain States. As of the end of 2004, we had over 125 volunteers in Wyoming and with the state's Farm Services Agency as a co-sponsor in CoCoRaHS; we anticipate participation to double in 2005. Work continues on an Internet

Mapping Server to display the data. This server will allow users to zoom and pan and also to add various layers such as roads, rivers, and aerial photography.

**Outreach:**

Overall, the Wyoming State Climate Office continues to support local, state, and federal agencies and stakeholders with timely and accurate data and services. Our sponsor, the Wyoming Water Development Commission has just received funding for a 5-year, \$8.65M cloud seeding study (initiative) in which we expect to provide some support. Additionally, our relationship with the University of Wyoming and in particular to our administrative supporter, Civil and Architectural Engineering is expected to improve with the establishment of the Cline Distinguished Chair in Engineering, Environmental and Natural Resources.

# 2004 Annual Meeting Agenda & Minutes (Summary)

## AGENDA

Annual Meeting of the American Association of State Climatologists (AASC)

August 10-13, 2004

Cornell University, Ithaca, NY

### Tuesday, August 10

#### **Emerson Hall: room 135**

1:00-4:00pm NWS Climate Prediction Workshop: Barbara Mayes, NWS

#### **Bradfield Hall: 11th floor**

5:00-8:00pm Registration and Icebreaker

### Wednesday, August 11 (J. Willard Marriott Executive Education Center Amphitheater)

7:30am Registration. Coffee and danish

#### Dave Robinson, NJ (Chair)

8:00am Opening session

Welcome: Susan A. Henry, Dean, College of Agriculture and Life Sciences, Cornell University  
Welcome and logistics: Dave Robinson, NJ; Art DeGaetano and Keith Eggleston, Northeast  
Regional Climate Center  
President's report: Dave Robinson, NJ

8:30am Committee Reports

ARSCO: Jim Angel, IL  
Drought Impact Categories, Roger Pielke, CO  
*The State Climatologist*, Derek Arndt, OK  
AASC list serve: Al Dutcher, NE  
Partnership activities: Dave Robinson, NJ

9:15am Cooperative Observing System Modernization update: Ken Crawford, OK

10:00am Break

10:15am Coop Modernization: continued

11:00am Mesonet Reports:

Alaska, California, Delaware, Mississippi, Missouri, New Jersey, North Carolina, Oklahoma  
and South Dakota

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

#### Lesley-Ann Dupigny-Giroux, VT (Chair)

1:30pm Historical local weather and climate data and data gathering

NWS Buildings 1900-1910: Steve Doty, Information Manufacturing Corporation  
Weather observing in Abilene, TX: 1910-1944: Tina Cargile, Cape and Son, Inc.  
Ancillary historical climate data in Vermont - a CDMP project: Lesley-Ann Dupigny-Giroux, VT

2:45pm CoCoRaHS demonstration: Nolan Doesken, CO

3:00pm Break

3:15pm State climate office updates (10 minutes each)  
Florida: Jim O'Brien  
South Dakota: Dennis Todey  
Maryland: Ken Pickering  
Oklahoma: Derek Arndt  
North Carolina: Ryan Boyles  
Mississippi: Charlie Wax  
Kentucky: Stuart Foster

4:25pm Adjourn meeting

5:00pm Buses depart for evening event  
6:00pm Dinner cruise on Skaneateles Lake

#### **Thursday, August 12 (J. Willard Marriott Executive Education Center Amphitheater)**

7:30am Coffee and danish  
Informal forum on state climate issues of the day:  
topics could include funding, outreach, research or others of your choosing

##### Roger Pielke, CO (Chair)

8:00am Reports from Partners  
NCDC: Tim Owen  
NWS: Bob Livezey  
NRCS: Greg Johnson

9:30am Are there spurious temperature trends in the U.S. climate division database?: Barry Keim, LA

9:45am New U.S. climate divisions for monitoring and prediction – A progress report: Klaus Wolter,  
NOAA CIRES Climate Diagnostics Center

10:00am Break

10:15am Regional Climate Center reports, including an ACIS update

11:00am 2004 Overview of the Climate Database Modernization Program: Joe Elms, NCDC

11:15am Accessing station history via the Internet: Paul Frascione, NCDC

11:30am State updates  
Missouri: Adnan Akyuz  
Alaska: Peter Olsson  
Virginia: Pat Michaels

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

##### Paul Knight, PA (Chair)

1:30pm Prototype SC-RCC partnership: Art DeGaetano and Keith Eggleston, NRCC; Paul Knight, PA,  
and Dave Robinson, NJ

1:45pm NWS Climate Services outreach activities: opportunities for AASC participation:  
Barbara Mayes, NWS

2:00pm Building NOAA/AASC partnership through training: Bob Leffler, NWS and Tim Owen, NCDC

2:15pm Uncertainty in rainfall estimation maps: brief discussion led by John Nielsen-Gammon, TX



2:30pm Snow measurement project: Nolan Doesken, CO

2:45pm Break

3:00pm Business Meeting

4:30pm Adjourn business meeting

5:00pm Buses depart for evening event

6:00pm Tour of Wagner Vineyards

7:00pm Dinner and entertainment

**Friday, August 13 (J. Willard Marriott Executive Education Center Amphitheater)**

7:30am Coffee and danish

Continuation of yesterday's informal forum on state climate issues of the day, perhaps also including a continuation of the rainfall estimation map uncertainty issue

Ken Crawford, OK (Chair)

8:00am State updates

Vermont: Lesley-Ann Dupigny-Giroux

Hawaii: Pao-Shin Chu

Utah: Esmaiel Malek

Guam: Mark Lander

Louisiana: Barry Keim

California: Kelly Redmond

New Hampshire: David Brown

Delaware: Dan Leathers

Texas: John Nielsen-Gammon

Wisconsin: Ed Hopkins

New Jersey: Dave Robinson

9:50am Break

10:15am Local-regional climate variability and change (15 minutes each)

Trends in temperature and snowpack in the Pacific Northwest since 1930:

George Taylor, OR and Greg Johnson, NRCS

Hot times in Alaska: Martha Shulski, Alaska Climate Research Center

Couteau, SD climate variability: Dennis Todey, SD

Microclimate of a desert playa: evolution of annual radiation, energy and water budget components: Esmaiel Malek, UT

Detection of regional climate shifts in tropical cyclone series: a Bayesian analysis:

Pao-Shin Chu, HW

Measuring rainfall in the highland interior of Pohnpei's rain forest, Mark Lander, Guam

Issues in assessing local climate variability: effects of instrument exposure on temperature observations: Stuart Foster, KY

noon Adjourn AASC Meeting

1:00-4:00pm Northeast Regional Climate Center - Northeast State Climatologists meeting

## BUSINESS MEETING MINUTES

August 12-13, 2004

The 29th annual business meeting of the American Association of State Climatologists was called to order by AASC president David Robinson (NJ). After a short welcome, Dave clarified the proxy vote rule, which allows voting by designated representatives of eligible state climate offices and the regional climate centers with eligibility determined by dues payment.

### OLD BUSINESS

The published minutes of the last annual meeting (in the *State Climatologist*) were accepted unanimously. Mark Shafer of the Oklahoma Climate Office was thanked for his work in organizing the publication. Ryan Boyles of North Carolina Climate Office was also acknowledged for his assistance in this effort and Ryan volunteered to publish the 2005 edition. Two points were made by the meeting chair that the deadline will be earlier (April, 2005) due to the earlier annual meeting in 2005 and a state's report could also serve as its ARSCO annual report provided it covers the required elements.

The proposed 2004-2005 AASC budget was presented by Paul Knight. An amendment was proposed by Ryan Boyles and seconded by Steve Hilberg (Midwest Regional Climate Center) that the expenses associated with the annual meeting guest speaker be incorporated into the registration fee. After a short discussion, this amendment and the budget were approved unanimously.

The composition of the AASC's executive committee was discussed and Roger Pielke of the Colorado Climate Office proposed that a representative of the National Weather Service, specifically the Chief of the Climate Services Division, be made an ex-officio member. John Nielsen-Gammon of the Texas Climate Office seconded this motion. After a discussion, it was agreed to have the current AASC president finish the word-smithing of Article V, section 2. The vote was 26 in favor, no opposed and no abstentions.

A proposed climate services journal for the AASC and the potential of adding an applied climatology editor and new emphasis to the AMS Journal of Applied Meteorology were discussed. Dave Robinson requested suggestions on a possible editor for the AMS journal and a committee within the AASC to consider the timetable, frequency and content of the AASC climate services journal. After some deliberation, the following volunteered for the committee: Dennis Todey (South Dakota), Ryan Boyles (North Carolina), George Taylor (Oregon) and Tony Bergantino (Wyoming) with a suggestion that the immediate past president (Dave Robinson) serve as the committee chair.

**NEW BUSINESS** An upgrade to the AASC web site was discussed. It was proposed that the Oklahoma Climate Office lead the redesign of the site with Derek Arndt as the focal point. Tim Owen (NCDC), Ryan Boyles (NC) and Jim Zandlo (MN) volunteered to serve on the web page committee with Derek.

Dave Robinson encouraged the membership to write an article for either EOS or BAMS describing the purpose of the AASC. It was also suggested that a generic AASC PowerPoint presentation promoting the AASC be created for use by its members.

The origins and criteria for AASC's Helmut Landsberg award were discussed along with criteria for honorary membership. It was decided that the new Nominating Committee be commissioned with the task of recommending nominations for either or both awards.

Dave Robinson then presented a proposal submitted anonymously by an AASC member to create an award for a worthy dissertation in the applied climatology discipline. After some discussion, it was recommended that the full AASC membership be given a copy of the proposal (see the last document in the minutes) to review it with further action waiting until the next meeting.

The afternoon meeting concluded with a discussion on the voting timetable for new officers, but this was tabled until Friday morning.

The meeting resumed shortly before 8:00am on Friday, August 13. Dave Robinson explained the dilemma of a potential six-year commitment for the president-elect unless the president-elect only served one-year president elect. John Nielsen-Gammon raised the issue of the composition of the executive committee as a result of this change. After further clarification, it was moved that the president elect be elected in odd years and only serve one year before becoming president. The vote was unanimous in favor of this amendment with no further discussion.

The issue of dues payment by some state climate offices was then discussed. Jim Zandlo (MN) mentioned specific restrictions placed on his office. Further discussion was focused on the joint AMS-AASC meeting next year and the potential complications of dues being included in the registration costs. It was recommended that the executive committee find a flexible approach to this matter.

Steve Hilberg (MWRCC) asked about the tangible benefits of associate membership in the AASC. Roger Pielke (CO) expressed that all members should pay annually and Ryan Boyles (NC) also favored a required annual payment for associate members. Jim Zandlo suggested that there would be a service climatologist membership for the AASC with an attesting certificate. It was agreed that this issue would be taken into consideration by the executive committee.

New associate members were then nominated from the floor. They include:

David Legates – Delaware Associate Climatologist  
Laura Edwards – Western Regional Climate Center  
John Hayes – Salem State College  
Jim Weyman – Service Climatologist  
Gary Hoffert – Service Climatologist  
Warren Knapp – NRCC Director Emeritus  
Brian Ayers – Pennsylvania State Climate Office  
Chad Bahrmann – Pennsylvania State Climate Office  
Andrea Bair – National Weather Service Western Region  
Mike Brewer – Climate Services Division (NWS)  
Michael Brown – Mississippi State Climate Office  
Stephen DelGreco – NCDC  
Joseph Elms – NCDC  
Paul Francione – Information Manufacturing Corp.  
Daniel Graybeal - NRCC  
Holly Hartmann – University of Arizona  
Douglas Kluck – NWS – Central Region

Robert Leffler – Climate Services Division  
Robert Livezey – Chief of Climate Services Division  
Glenn Lussky – NWS  
Sergio Marsh – NWS – Eastern Region  
Barbara Mayes – Climate Services Division  
Victor Murphy – NWS – Southern Region  
Mike Wyatt – NWS

All were accepted as associate members and will receive a letter of greetings from the AASC executive committee.

The next meeting in Savannah, GA from June 20-25, 2005 was discussed. Details of joint AMS-AASC presentations and a poster session allowing AASC members to exhibit their office accomplishments were suggested, perhaps sponsored by one of the meeting vendors. A brochure about the AASC was also recommended. Dennis Todey volunteered to explore the options of hosting the 2006 annual meeting in South Dakota and the Oklahoma Climatological Survey volunteered to host the 2007 annual meeting.

The Nominating Committee will consist of the following three volunteers; Al Dutcher (NE), George Taylor (OR) and Barry Keim (LA). They are commissioned to nominate candidates for the following positions: Secretary/Treasurer (2005-2007), President-Elect (to serve as president elect in 2005-2006 and president 2006-2008), honorary members and possible candidates for the Landsberg Award. All these would be presented at the next meeting.

With no other new business, Dave Robinson concluded the annual meeting with remarks of appreciation for the opportunity to serve as president.

Submitted by – Paul Knight Secretary/Treasurer  
September 27, 2004

**August 2004**

**A proposal:  
AASC Applied Climatology Dissertation Medal Purpose**

**Purpose**

The AASC Applied Climatology Dissertation Medal is given each year to a recent recipient of the Ph.D. degree in North America or US territories whose research is considered unusually important to applied climatology.

**Eligibility**

To be considered for the AASC medal, a nominee's Ph.D. must have been awarded within the 3 years prior to the medal submission date (January 15) and most or all of the thesis must have been published in a recognized journal.

**Nominations**

Nominations are solicited from North American and US territories universities. The department chair should submit an original and seven copies of a letter of nomination, supporting the selection and discussing the extent of independence exhibited by the nominee in the choice and execution of the dissertation research.

Eight reprints of the thesis (as published in a recognized journal, galley proofs will also be accepted) must accompany the nomination.

Nominations received for the current year's competition remain under consideration for each subsequent year of eligibility.

**Due Date**

Letters of nomination and the required reprints must be received in the offices of the AASC on or before **15 January 2005**.

**Selection**

The award recipient will be selected by the Medal Committee appointed by the Executive Committee. If, in the opinion of the Committee, none of the nominees is sufficiently outstanding, the award will not be given for the year in question. In February or March, the secretary of the AASC will communicate with the nominee and, if the medal is accepted, it will be announced in the spring of award year.

**The Medal**

The medal consists of a plaque and a check for \$500. The award includes paid attendance at the AASC annual meeting.

# NCDC Climate of 2004 Across The United States

## NOAA REPORTS WET, WARM YEAR FOR THE U.S. IN 2004 Hurricanes, Wildfires, Drought, Snowpack and Flooding All Notable

2004 ranked as the 6th wettest year on record for the contiguous United States, and was warmer than average, according to scientists at the National Oceanic and Atmospheric Administration's National Climatic Data Center in Asheville, N.C. The findings are based on historical records dating back to 1895. While parts of the West remained in drought, rainfall was above average in 34 states, especially in the South and East, partly due to the effects of tropical storms and hurricanes, which impacted 20 states. NOAA, The National Oceanic and Atmospheric Administration, is an agency of the U.S. Department of Commerce.

### A variable year for temperature in the U.S.

- NOAA scientists report that the average temperature for the contiguous United States for 2004 was 53.5° F (11.9° C), which is 0.7° F (0.4° C) above the 1895-2003 mean, and the 24th warmest year on record. The mean annual temperature in three states (Washington, Idaho and Oregon) was much above average, with 33 states being above average, 11 contiguous states near average and only one state (Maine) below the long-term mean.
- Alaska's annual temperature was 1.8° F above the 1971-2000 average for 2004, the 4th warmest year for the state, since reliable records began in 1918. Alaska had a record warm summer with a statewide temperature of 4.6° F (2.6° C) above the 1971-2000 mean. May, June, July and August were all record breaking for the state. Much of the west coast also had record or near record temperatures for the summer of 2004. In contrast much of remainder of the contiguous U.S. was relatively cool during June-August, including several cities in the Upper Midwest that had afternoon high temperatures in the low 50s during the middle of August.
- Spring temperatures across the U.S. were above average in all states, except Florida, which was near normal for the season. Fall was warm across much of the mid-section of the country, but the West remained near average. Winter began relatively warm in November and early December for states from the Upper Midwest to the East Coast.

### Hurricanes in South and East

- A major feature of the climate in the U.S. in 2004 was the number of landfalling tropical systems. Nine systems affected the U.S. including six hurricanes, three of which were classified as major on the Saffir-Simpson Scale of hurricane intensity. Four of the six hurricanes affected Florida, making it the only state since 1886 to sustain the impact of four hurricanes in one season (Texas also had four hurricanes in 1886). Hurricane Charley in August was the strongest hurricane (category 4 at landfall) to strike the U.S. since Andrew in 1992 and caused an estimated \$14 billion in damage. Hurricanes Frances, Ivan and Jeanne quickly followed Charley in September.
- Hurricane Gaston also impacted the U.S. in August making landfall in South Carolina. In total, the hurricane season cost the U.S. an estimated \$42 billion, the most costly season on record. That record has been calculated back to 1900. While there was extensive wind damage in Florida and other coastal locations, flooding was the major impact further inland. Frances impacted the Southeast and southern Appalachians after a wetter-than-average summer, causing

millions of dollars in flood damage to the region. Shortly thereafter Ivan traveled a similar path through the mountains and led to widespread flooding, loss of power and landslides.

### Drought and Snowpack

- In contrast to the excessive rainfall in the East, much of the West began the year with a long-term rainfall deficit. A four-to-five-year drought in parts of the West intensified during the first half of 2004 as precipitation remained below average. Drier-than-average summer conditions coupled with warmer than normal temperatures in the West exacerbated the drought conditions still further during June-August. Short-term drought relief occurred in the fall as two large storms impacted the West during October. The first major snowfall of the season was associated with these storms for the Sierra Nevada. As of early December, snowpack is above average in Utah, Arizona and Nevada, but significantly below average throughout much of the Northwest as well as the eastern slope of the Rockies. Near year's end, moderate to extreme drought continued to affect large parts of the West, including Montana, Idaho, Washington, Oregon, Wyoming, California, Arizona and Colorado.

### Wildfires

- Although the wildfire season got an early start in the western U.S., and record warm temperatures combined with less-than-average precipitation raised fire danger across the West through the summer, the season concluded as below average for the contiguous U.S. However, a record number of acres were burned in Alaska in 2004. Alaska and the adjacent Yukon Territory of Canada saw a rapid increase in fire activity in June, which was sustained through August consuming over 6.6 million acres in Alaska. In Fairbanks, on 42 of the 92 days of summer, visibility was reduced from smoke associated with the wildfires. This compares to the previous record of 19 days in 1977.

### Global Conditions

- The average global temperature anomaly for combined land and ocean surfaces from January-December 2004 (based on preliminary data) was 0.97° F (0.54° C) above the 1880-2003 long-term mean, making 2004 the 4th warmest year since 1880 (the beginning of reliable instrumental records). Averaged over the year, land surface temperatures were anomalously warm throughout western North America, southern and western Asia and Europe. Boreal fall (September-November) as well as November were warmest on record for combined land and ocean surfaces.
- Other notable climate events and anomalies across the world in 2004, include an active tropical season in the Northwest Pacific, with Japan sustaining ten tropical storm landfalls, exceeding the previous record of six; below normal monsoon rainfall for India, especially in the Northwest part of the country; flooding in Northeastern India from monsoon rains in June-October; a rare hurricane in the South Atlantic in March; and an extensive and severe heat wave in Australia during February.
- Sea-surface temperatures in much of the central and east-central equatorial Pacific increased during the latter half of 2004 as weak El Niño conditions developed. Though global impacts have been slow to develop, NOAA's Climate Prediction Center expects the current El Niño to persist through early 2005, bringing drier-than-average conditions to Indonesia, northern Australia and southeastern Africa.