OKLAHOMA CLIMATOLOGICAL SURVEY

Oklahoma Climatological Survey
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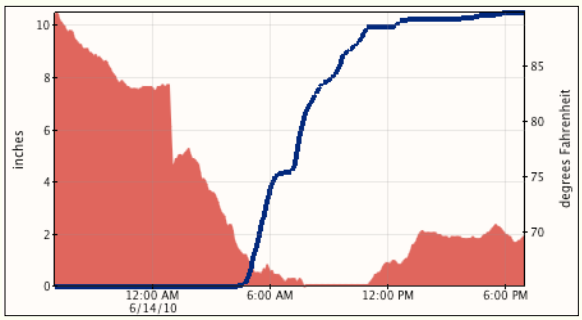
The Oklahoma Climatological Survey has a legislative mandate to acquire, process, and disseminate climate and weather data and information for use by the state's citizens.

State of the State Climate Office Report — Calendar Year 2010

The Oklahoma Climatological Survey (OCS) worked with colleagues across Oklahoma and the Great Plains to facilitate better coordination and planning with regard to the impacts of climate variability and change. For example, OCS scientists worked with the National Drought Mitigation Center at the University of Nebraska–Lincoln and the Illinois State Water Survey at the University of Illinois to complete the Drought-Ready Communities pilot project, including a *Guide to Community Drought Preparedness* (http://www.drought.unl.edu/plan/DRC.htm). OCS teamed with the City of Norman on this pilot, developing a case study for Norman based on the final project reports of the 2010 class of Applied Climatology and Meteorology at the University of Oklahoma (OU).



Observations of temperature (red) and rainfall (blue line) during the June 14, 2010 heavy rainfall event, as measured by the Oklahoma City North Mesonet site.

OCS scientists furnished data, products, and information to the Oklahoma Water Resources Board as part of the Oklahoma Comprehensive Water Plan. OCS provided frequent assessments of and context to hazardous weather events to help document event intensity and size for the Oklahoma Department of Emergency Management. At the end of 2010, OCS scientists began work on a large proposal ($4 million) to the U.S. Department of the Interior for OU to serve as host of the South-central Climate Science Center — a major new initiative that would bring researchers from the U.S. Geological Survey to the OU campus.

OCS also participated in the American Association of State Climatologists conference, the Knowledge Management Workshop and the Sectoral and Regional Assessments Workshop for the National Climate Assessment, Annual Meeting of the American Meteorological Society (AMS), the AMS Summer Community Meeting, Governor's Water Conference, OWRRI Water Research Symposium, Norman Chamber of Commerce Weather Committee, Artificial Recharge Task Force meetings, Oklahoma EPSCoR Women in Science Conference, Moore Public Schools Discovery Night, National Severe Weather Workshop, ScienceFest Oklahoma, and the Tri-County Homeschool Back-to-School night.

OCS presented for the the AMS Summer Community Meeting (*Update on the Activities of the AMS NNoN Working Group on Metadata Policy*), American Farmers and Ranchers of Oklahoma convention (*Global Climate Change and Its Implications for Oklahoma*), Bureau of Reclamation Informational Meeting on Climate Change (*Climate Variability of the Great Plains*), SAIC Regional Climate Symposium (*Global Climate Change & Its Implications for OK*), Black Sunday 75th Anniversary Conference (*The Dust Bowl: Lessons Learned ... And Lost*), Oklahoma Society of Professional Engineers conference (*The Dust Bowl: Lessons Learned ... And Lost*), Oklahoma Emergency Management Association Conference, American Society of Flood Plain Managers, and the National Weather Center Weather Festival. Our scientists taught graduate and undergraduate courses in the OU School of Meteorology, including Applied Climatology and Meteorology, Hydrometeorology, and the Honors section of Introduction to Meteorology.

McPherson served as Chair of the Metadata Working Group of the American Meteorological Society (AMS) Ad Hoc Committee for a Nationwide Network of Networks, Member of the AMS Weather and Climate Enterprise Commission, Member of the American Association of State Climatologists (AASC) Review Committee for the Dissertation Medal for Applied Climatology, and Subject Matter Expert for the Committee for Integrated Observing Systems (Office of the Federal Coordinator of Meteorology). Fiebrich served as member of the AMS Committee on Measurements and PASS Science Standards Review Committee.

OCS received funding from the Oklahoma Water Resources Research Institute for a project to develop a system for tracking plant available water based on the Oklahoma Mesonet data. The goals of the project where to (1) determine the soil properties controlling the plant availability of soil moisture at each Oklahoma Mesonet site, and (2) develop a method to calculate plant available water by integrating the sensor output and the site-specific soil properties. Funding also was received from Oklahoma State University to develop a grape black rot advisor. Internationally, OCS received funding from the Province of Québec, Canada, to continue development of software tools for Mesonet-Québec.

A new OCS director was named in 2010: Dr. Kevin Kloesel, who also serves as the Associate Dean for the College of Atmospheric and Geographic Sciences. At the end of 2010, OCS employed 32 professional staff, 6 graduate students, and 8 undergraduates. We administered 30 financial accounts with a fiscal year (July 1, 2009 to June 30, 2010) budget totaling $4.3 million.

Our Mandate

Section 1, Chapter 63, O.S.L. 1982 (74 O.S. 2006, Section 245) outlines the powers and duties of the Oklahoma Climatological Survey. Under that act, the Survey is to:

1. *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 decision makers in the state;*
2. *Act as the representative of the state in all climatological and meteorological matters both within and outside of the state when requested by the legislative or executive branches of the state government;*
3. *Prepare, publish, and disseminate periodic regular climate summaries for those individuals, agencies, and organizations whose activities are related to the welfare of the state and are affected by climate and weather;*
4. *Conduct and report on studies of climate and weather phenomena of significant socioeconomic importance to the state;*
5. *Evaluate the significance of natural and man-made, deliberate and inadvertent changes or modifications in important features of the climate and weather affecting the state, and to report this information to those agencies and organizations in the state who are likely to by affected by such changes or modifications; and*
6. *Maintain and operate the Oklahoma Mesonetwork, a statewide environmental monitoring network which is overseen by the Mesonet Steering Committee, comprised of representatives of the University of Oklahoma and Oklahoma State University according to its Memorandum of Agreement.*

Additionally, the Director is authorized to certify copies as being authentic reproductions of weather records held in the state. The Director serves as co-chair of the Mesonet Steering Committee and is accountable for executing the policies of the Mesonet Steering Committee.

Information Services

OCS served 119 million files of data and products to our customers in 2010. On our web servers alone, we served 15.8 Terabytes of information from 1.3 billion hits to our web pages. We also fulfilled several hundred detailed information requests from phone or email, generating $12,679 in revenue.

During the Summer of 2010, OCS launched a new Oklahoma Mesonet public website (see figure below) at http://weather.ok.gov. New features of the website include the following: local forecasts, enhanced radar imagery, searchable products, and thumbnail map views. The website also allows the user to view data from the closest Mesonet site by entering their zip code or town name. Along with the new public website, we released a mobile website. Users who access www.mesonet.org from a mobile device will automatically be redirected to the mobile website. The new mobile website added to the suite of information delivery systems that provide data and products to customers. Other delivery methods include our RSS feeds of news items, our Ticker email list, our state climate office page at www.stateclimate.org, and the Oklahoma Mesonet Facebook page.

During the past year, several new climate information tools were developed by the SCIPP team and evaluated with the help of stakeholders. These include the Historical Climate Trends Tool, Climograph Tool, and Historical Coastal Surge Map powered by the SURGEDAT database.

Research

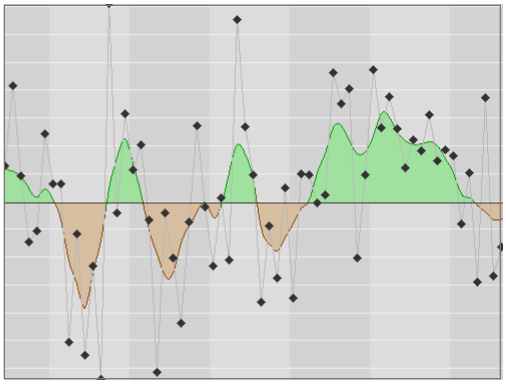
OCS's legislative mandate includes the analysis and publication of studies focused on weather and climate in the state. Projects undertaken during 2010 examined high-impact winter weather over the past decade, land-atmosphere interactions across varying spatial and temporal scales, and the evaluation of forecast tools used by the National Weather Service. Examples of scientific publications and reports include the following (OCS authors underlined):

Basara, J. B., H. G. Basara, B. G. Illston, and K. C. Crawford, 2010: The impact of the urban heat island during an intense heat wave in Oklahoma City. *Advances in Meteorology*, doi:10.1155/2010/230365.

Carter, L. M., and J. E. Hocker, 2010: Blending perspectives to collectively address climate change issues across the Western Gulf Coast and Southern Plains. Summary report of the U.S. Fish and Wildlife Service and USGS co-sponsored regional climate change workshop entitled "Climate Change: The Western Gulf Coast and Southern Plains."

Fiebrich, C. A., C. R. Morgan, A. G. McCombs, P. K. Hall, Jr., and R. A. McPherson, 2010: Quality assurance procedures for mesoscale meteorological data. *J. Atmos. Oceanic Technol.*, **27**, 1565–1582.

Klockow, K. E., R. A. McPherson, and D. Sutter, 2010: On the economic nature of crop production decisions using the Oklahoma Mesonet. *Weather, Climate, and Society*, **2**, 224–236.



League, C., W. Diaz, B. Philips, E. Bass, K. A. Kloesel, E. Gruntfest, and A. Gessner, 2010: Emergency manager decision-making and tornado warning communication. *Meteorol. Appl.*, **17**: 163-172.

Schroeder, A. J., J. B. Basara, and B. G. Illston, 2010: Challenges associated with classifying urban meteorological stations: The Oklahoma City Micronet example. *The Open Atmospheric Science Journal*, **4**, 88-100.

Sutter, D., and S. Erickson, 2010: The time cost of tornado warnings and the savings with storm-based warnings. *Weather, Climate, and Society*, **2**, 103-112.

Monitoring & Impact Assessments

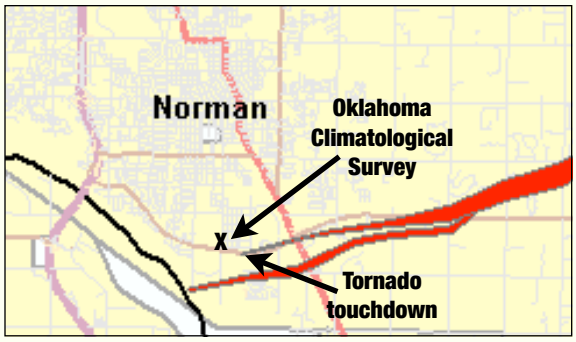
Statewide, 2010 was Oklahoma's 36th warmest and 43rd driest year since record-keeping began in 1895. The year saw El Nino-Southern Oscillation conditions transition from a strong El Nino in the first half of 2010 to a strong La Nina by year's end. Accordingly, the first half of 2010 in Oklahoma was generally wet while significant drought conditions had developed by early winter.

The significant winter weather that began in December 2009 continued into 2010. A powerful winter storm struck southwestern and south-central Oklahoma, depositing up to an inch of ice on powerlines. About 180,000 utility customers were left without power due to the storm. May started with only three tornadoes on the record books but ended with 93. The 90 tornadoes during the month tied Oklahoma's record for most in a single month, previously set in May 1999. The annual total of 102 tornadoes ranks as the third highest in Oklahoma since 1950. A strong tornado on the year's final day punctuated the tumultuous Oklahoma weather of 2010. Five major disasters or emergencies were declared in Oklahoma during 2010 (via the Federal Emergency Management Agency), placing our state second in the nation.

The Oklahoma Mesonet station in north Oklahoma City measured 11.47 inches of rain on June 14th, the second highest daily total measured by the Mesonet and 16th highest in the state's history. (A cooperative observer station in Enid measured 15.68 inches on October 11, 1973.) Almost 10 inches of this rain fell in only 12 hours and resulted in significant flooding in parts of Oklahoma City and Edmond.

The Southern Climate Impacts Planning Program began conducting interviews with various state, federal, local, and tribal officials across Oklahoma as part of a statewide climate needs assessment. The needs assessment focused on the following: (1) climate-related issues that decision-makers are currently facing, (2) those they anticipate they will face in the future, (3) the spatial and temporal scales in which they make decisions, and (4) their need for information, education, and decision-support tools. This work will support the National Climate Assessment, led by the U.S. Global Change Research Program.

OCS operates and maintains weather and climate stations in partnership with the Oklahoma Mesonet, the Agriculture Research Service, and the City of Oklahoma City (decommissioned in June 2010). In 2010, we completed 1,833 laboratory calibrations of sensors, including 386 calibrations for relative humidity, 395 for air temperature, 233 for wind speed, and 555 for soil temperature. To maintain our remote sites and sensors in the field, we conducted 502 site visits to 120 Oklahoma Mesonet stations, 35 visits to 20 Little Washita Micronet stations, and 50 visits to 15 Fort Cobb Micronet stations. We found and repaired 302 sensor or communications problems in these networks.



Path of the May 10, 2010 tornadoes near the National Weather Center, home of the Oklahoma Climatological Survey (at the X on the map). The funnel from one tornado formed over the National Weather Center. Map courtesy of the National Weather Service.

Outreach

OCS hosted 32 K-12 programs, providing education to 2,145 students and 318 teachers and adults, and conducted 20 OK-First workshops, thereby educating 232 public safety officials. To aid our law enforcement participants, we obtained CLEET (Council on Law Enforcement Education and Training) certification for our OK-First courses. We also hosted field trips for over a dozen Oklahoma schools to the National Weather Center. Training for 258 fire management professionals were conducted through 28 basic and advanced sessions.

OCS issued 18 press releases during 2010 and contributed to well over 100 print and internet stories with the state's largest newspaper. We contributed to national stories with *USA Today*, Reuters, the Associated Press, and *The Weather Channel*. Regular contributions were made to smaller newspapers as well. Almost 100 *OCS/Mesonet Ticker* emails were sent to the media, state agencies, and weather enthusiasts, providing descriptions of current weather events and their context in Oklahoma's recorded climate history. We participated in 40 SUNUP Mesonet Weather Report television segments. Outreach of OCS scientists Illston and Basara resulted in the 2010 Special Award from the American Meteorological Society for "a new paradigm for the nation's weather forecasting enterprise based on a voluntary grass-roots effort, with impressive national impact through its use in curricula at scores of universities" for work in the WxChallenge, a weather forecasting contest primarily for university and college students and faculty.

Through the OU Speaker Service, we provided the following talks across Oklahoma: *Dust Bowl: Lessons Learned... and Lost* (7 talks, G. McManus) and *Climate Change* (6 talks, McManus). Other outreach presentations covered general weather and climate for youth, climate concerns for agriculture, weather tools for crop production, weather impacts on livestock, and weather tools to reduce pesticide spray drift risk.