

**Written Testimony to the Committee on Science and Technology,
Subcommittee on Energy and Environment
United States House of Representatives**

**Expanding Climate Services at the National Oceanic and Atmospheric
Administration (NOAA): Developing the National Climate Service**

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Thank you very much for this opportunity to share a state perspective on climate services

Background

Prior to 1973, each state had a state climatologist as a part of a long-standing climate program within the Department of Commerce, U.S. Weather Bureau. When that program was abolished in the early 1970s, states – as they were able over a period of years – established their own offices to carry on the functions of state-specific climate monitoring, research, education and service. NOAA’s National Climatic Data Center (NCDC) was an early partner in fostering state-based climate activities. NOAA data, particularly temperature and precipitation data from the National Weather Service Cooperative Observer Network and more detailed Surface Airways observations, were the primary data sources at that time for almost all U.S. ground-based climate monitoring, research and service. NCDC still remains a strong partner supporting state efforts, facilitating access to data, and enlisting our expertise in a variety of ways.

The American Association of State Climatologists (AASC) was established in the mid 1970s to professionally link the efforts of these emerging state programs, and to offer a forum for Federal partners to more easily communicate and work with states on climate-related issues. AASC is an effective organization for communicating Federal-level climate services, through State Climatologists, to the citizens and local stakeholders that we serve, within our states. It has also been an appropriate forum to communicate state-level data and information needs back to Federal agencies. While there is so much climate diversity across our country, and the challenges faced by individual states vary greatly, we share many common interests and concerns that are best addressed together. For example, access to reliable long-term climate data, best practices in data analysis, applied research strategies, means of identifying and assessing state and local climate

variability and change, effective means of outreach, and means of engaging stakeholders and assessing the impact of our efforts.

Recognizing the important role of State Climatologists, the National Climate Program Act of 1978 included language that requested federal funding for State Climate Offices to improve the consistent delivery of critical climate information to the citizens of the United States. Funds for individual state activities were never appropriated then. Still, state climate offices independently developed. The National Climate Program Act of 1978 did not directly help state climate service efforts, but it did lead to the eventual formation of Regional Climate Centers (RCC's) which have been excellent partners and assets to state climate services ever since.

Currently 48 states have State Climate Offices. Some are housed within state agencies, but most are affiliated with state universities. The majority, such as my host institution, are at Land Grant universities. Most State Climatologists are actively involved in research and teaching – collectively mentoring hundreds of future scientists and educators each year. Many of us are well connected or directly a part of our state Extension programs adding further to our outreach effectiveness.

Activities of State Climate Offices

State Climatologists (SC's) are experts on the climate of our respective states -- seasonal cycles, geographic variations and year-to-year variability. We are familiar with the climate data resources of our states over the period of instrumental record -- typically back to the 1880s. Some of us have expertise in paleoclimatology which helps provide longer perspectives about climate variability. Nearly all SC's have additional areas of expertise ranging from observation systems, agriculture, and remote sensing, to hydrology, climate modeling and climate change. We enjoy helping others find the data and information they need to address their challenges and opportunities. We often operate on a “grass roots” level, providing personalized and localized climate information to a wide range of businesses, individuals, and organizations. We don't often have the luxury of focusing our efforts on the needs and climate-affected decisions of specific user groups. Instead, we work with diverse groups -- state and local government, utilities, large and small businesses, engineers, architects, builders, consultants, attorneys, researchers, educators, media and many others -- and we do so with a local understanding of the climate and an appreciation for the needs and applications of the customers.. Rather than just providing requested data, it is customary to ask “How will you be using this information?” That simple question so often results in better service, greater trust, frequent opportunities for applied research, and better information about the types of data, models and other decision-making tools, monitoring systems, forecasts and projections needed to answer important questions.

A typical day in the life of a State Climatologist may go something like this. We may brief state agencies in the morning, do a media interview at lunch, teach a class and

answer a variety of climate information requests during the afternoon, and then give an invited talk to a community organization during the evening. We are typically passionate about our work and love sharing information with others. Our products, services and approach to outreach vary somewhat from state to state, and are customized to meet specific local needs. Products typically include addressing weekly or monthly climate monitoring and reporting (to state and federal agencies, media, etc), drought and water supply monitoring, agricultural decision support, historic climate trend analysis, information sources and tools for engineering, architecture, design and related consultants, and consultation to emergency management and law enforcement officials and to the legal profession. Some state offices have actively provided climate data and information supporting renewable energy planning for over 30 years.

Here are a few examples of specific state activities, showing the breadth of our services.

<http://www.nc-climate.ncsu.edu/>

<http://www.ndsu.nodak.edu/ndsu/ndsco/>

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

The AASC website provides quick-click access to all State Climate Office websites

<http://www.stateclimate.org/>

State Climate Offices are both users of existing federal climate data sources and providers of unique local data. State climate offices continue to rely on the National Weather Service Cooperative Network data because it is the best source for high-quality nationwide temperature and precipitation data, the only source for nationwide snowfall data, and the only source of relatively consistent century-long nationwide data on the scale of individual counties. But we are interested in any well documented, verifiable data source to help us track specific elements of the climate within our states. We are currently partnering with NOAA to improve state-level data accessibility and information products for the new modernized Historical Climate Network (HCN-M) and the recently deployed Climate Reference Network (CRN).

Driven by ever-growing demands for instantaneous weather data at a high-spatial density, many SCOs manage and maintain specialized observing networks. Best known is the Oklahoma Mesonet <http://climate.ok.gov/mesonet/> But many other state climate offices are also involved in aggressive data collection efforts to meet a variety of decision support functions. Even low tech approaches like the volunteer “Community Collaborative Rain, Hail and Snow network” <http://www.cocorahs.org> are helping gather important data while helping educate the general public about climate. The potential exists to integrate public and private data sources to achieve a national “mesonet” to serve both instantaneous weather and longer term climate service and research needs.

Real time weather data for forecasting and operations have great value but are not always suitable for climate analysis and research. The exact location of weather stations and how well they are maintained make a big difference to climatologists. Therefore, State Climate Offices give much attention to data quality and the development of quality control procedures and tools. We inform NOAA regarding our standards and expectations for climate data and information products. We also work with other federal

agencies involved in climate monitoring and research. Stream flow measurements by the USGS, mountain snow accumulation, snow water content and soil moisture measured by the USDA-Natural Resources Conservation Service, and fire weather conditions monitored by the U.S. Forest Service and Bureau of Land Management all feed in to effective climate monitoring at the state and local level.

State Climatologists receive frequent requests for statewide or more localized information and interpretation of seasonal climate forecasts and climate change projections and potential impacts. Because of the huge scale and magnitude of these efforts, most states rely on the National Weather Service Climate Prediction Center for seasonal forecast information. For climate change projections and impacts, we typically turn to the resources of the Intergovernmental Panel on Climate Change (IPCC) and the Climate Change Science Program (CCSP) as well as other state and regional assessments by public and private entities. We then communicate this information to our more localized audiences adding our knowledge and local perspective.

State Climate Office relationships with existing NOAA climate service programs

As stated earlier, the AASC has worked with NOAA's National Climatic Data Center from our very beginning and appreciate the support that has been provided to our members. We also enjoy close working relationships with Regional Climate Centers. Some State Climate Offices are co-located with RCCs. Some RCC staff have previously worked in State Climate Office settings and understand our needs. RCCs have helped State Climate Offices by reducing the need for each of our states to maintain our own independent climate databases for NOAA and other agency climate data resources. The wide variety of information available from the Western Regional Climate Center website is a good example. <http://www.wrcc.dri.edu/> Our concerns regarding access to climate data and analysis are usually heard and often addressed. For example, the RCCs are currently developing a climate data access system specifically for State Climate Office needs based directly on specifications developed by our organization

National Weather Service climate service activities have, in recent years, become much more active and visible ranging from drought monitoring, to dissemination of seasonal forecasts to timely web-accessible local climate information. Because of their public visibility and accessibility, the NWS is often the first stop on first-time users' quests for climate information. Traditionally, the NWS major field-level role in climate service was climate data collection including the operation of their nationwide Cooperative Observer Network and airport weather data collection. This has been essential for basic climate monitoring and research. With data analysis support provided through the RCCs, NWS Forecast Offices have greatly improved their own local climate service potential in recent years. This has beneficially taken some of the load off SCOs in terms of routine individual climate information requests.

AASC collaboration with Regional Integrated Sciences and Assessment teams (RISA) is a work in progress but with much potential for further enhancement. Up to this point, most states have not had RISA teams with which to partner. RISAs have benefited from the ability to focus on particular environmental applications and selected decision makers. This is in marked contrast to State Climatologists who must address the diverse needs of all stakeholders and citizens within their states. Nevertheless, where RISAs have been active for several years, including where I work in Colorado, we are finding many and effective ways to partner to improve climate services, including customized climate education, and focused research and data product development needed to address the questions of specific decision makers. A 2008 report sponsored by the Colorado Water Conservation Board, "Climate Change in Colorado – A Synthesis to Support Water Resources Management and Adaptation", is an example example of RISA-enabled state partnerships.

The presence and activities of the National Climate Program Office (NCPO), while well known at the national level, are not routinely evident at the individual state level. The NCPO has reached out to the AASC and invited our participation in several national-level planning and evaluation meetings (e.g. climate services; drought). We are represented on NOAA's Climate Working Group, their lead external advisory body, which evaluates and recommends future directions for all NOAA observing, research and outreach endeavors related to the climate system. Indirectly, we also benefit from the NCPO's support of RISAs and their sponsorship of other applied research endeavors.

The National Integrated Drought Information System (NIDIS) is a relatively new program but one that may have a large impact on State Climate Office activities. Drought-related efforts at the state level are often the most time consuming and important of all of our multi-faceted endeavors. AASC collaborations with NIDIS may have substantial mutual benefits. Here in Colorado, NIDIS is offering our office a lead role in shaping a portion of the Upper Colorado River Basin NIDIS pilot project with a focus on the drought early warning needs of several specific user groups.

The American Association of State Climatologists and the National Climate Service

In 2008, the AASC prepared a statement expressing our interest and identifying our potential role in a developing and evolving National Climate Service.

<http://www.stateclimate.org/publications/>

Our Association looks favorably on the establishment of the National Climate Service. A well-organized National Climate Service has considerable potential to focus federal resources on global, national, state and local climate challenges. We see NOAA as a logical agency to lead this effort and we look forward to doing our part. We have much to offer and much to gain. Because we work most effectively on the state and local level, and have a finger on the pulse of what many decision makers require, the AASC can add a credible local presence and voice to complete an effective National Climate Service. We are counting on NOAA, and other federal partners needed to construct an effective

service, to work well together and to recognize the essential and foundational nature of systematic climate monitoring -- maintaining and enhancing climate observing networks that simultaneously meet many needs (energy, water, agriculture, transportation, commerce, public safety, etc.)

A concluding story

In conclusion, I would like to tell a short personal story. Over 20 years ago when “Global Warming” was first appearing regularly in the national press, I was invited to speak to a meeting of the “Colorado Young Farmers” organization. These farmers were mostly in their 40s at that time and well educated. They politely listened to the presentation where we showed upward trends in greenhouse gases and discussed the possible implications and some early climate model projections of warming. Then we showed graphs of 100 years of observed data over eastern Colorado. As dryland farmers on the Great Plains, they were intimately familiar with climate variability and its impacts on their lives and livelihoods. After the formal presentation ended and as we sipped hot coffee, one of the leaders of the organization came up to me (and I will never forget this). “I guess we should take climate change seriously. When I look back at my grandpa and how he farmed I think we can change – we will change. We’ve already changed our farming practices so much. But this darn year-to-year variability . . . that’s what kills us. We appreciate what you scientists are learning about climate change, but if you can do anything to help us deal with the big changes we see from year to year, we’ll be very grateful”

With that in mind, we (the AASC) appeal to you to seriously consider the full range of potential benefits of a National Climate Service across a variety of time scales. With growing concern regarding climate variability and change in a vulnerable society, the needs for both generalized and customized climate data and information will only continue to grow and become more acute. Take the necessary time to develop the appropriate leadership structure that can incorporate the extensive expertise and service capabilities of other federal agencies and make full use of expertise and flexibility of state and university partners. Together, we can accomplish much.

Thank you very much for this opportunity to share my views and those of many of my colleagues.