

A Vision and Model for NOAA and Private Sector Collaboration in a National Climate Services Enterprise

A Report to the
NOAA Science Advisory Board

By the
Climate Working Group
and the
Environmental Information Services Working Group's
Climate Partnership Task Force

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Introduction

The impacts of climate variability—on the scale of seasons to decades—are an increasingly significant focus in the strategic planning of a wide range of public and private activities, but the information required to anticipate the range and likelihood of climate variability currently is dispersed, of varying quality, and often difficult to access.

The weather services enterprise provides an interesting contrast and a model for a national climate enterprise. In weather services, NOAA and the National Weather Service, private sector firms, and academia (including federally sponsored research organizations) all cooperate to enhance understanding of the atmosphere and to develop and deliver new capabilities, products, and services. The advance of technology and computer capabilities combined with the collaboration stimulated by the recommendations of the *Fair Weather* report¹ have made the weather services enterprise increasingly effective and a source of national pride and advantage. The private sector component has been growing in size and effectiveness, creating jobs, and moving research and product development risks from the public to the private sector.

In considering the possibility of establishing a strong climate services enterprise, the NOAA Science Advisory Board (SAB) recognized that NOAA climate research already enjoyed much stronger ties with academia than the development of products and services did with the private sector. Thus the SAB asked its Climate Working Group (CWG) and the Environmental Information Services Working Group (EISWG) to create a Climate Partnership Task Force to examine how collaborative arrangements between NOAA and the private sector could be focused and managed to strengthen national climate services.

Thus the considerations of the Task Force and this report focus on a vision and a model for the interactions between NOAA and the private sector in a national climate enterprise. The Task Force recognizes that the academic sector is, and will continue to be, a critical component of the climate services enterprise, however the focus here is solely on NOAA and the private sector.

The study process and the charge to the Task Force provided by the SAB is provided Appendix A along with a brief account of the accelerated study process. The results and conclusions of the study are presented as statements of Findings and Recommendations with no additional comment. The Task Force believes these statements provide sufficient guidance for the SAB to forward to NOAA as an approach for partnering with the private sector, along with academia, to start

¹ National Research Council, 2003. *Fair Weather: Effective Partnerships in Weather and Climate Services*, National Academy Press, Washington, D.C., 220 pp.

the implementation of a strong climate services enterprise In both weather and climate, NOAA as the federal partner is the key component of the partnership. It has the responsibility to gather the observations, to produce analyses of data and archive it for future use, to convert the observations into forecasts, outlooks, and projections of future conditions, to make it readily accessible, and to use all of this information in countless ways for the national benefit.

The critical vision of this report is that NOAA and the private sector will become true partners, enhancing each other's contributions to the climate services enterprise and thereby enhancing the management of climate risk and opportunity and of mitigation strategies for the impacts of climate variability. And thus the vision and theme of this report is that:

**NOAA will engage and empower
the private sector as a partner
in creating climate products and services
and delivering them to the nation**

The Climate Partnership Vision and Model (Charge 1)

- NOAA and the private sector will join in a vigorous and dynamic partnership to document and predict climate variability and to develop and deliver climate services that serve a broad range of activities on all scales.
- NOAA will help to support the development of private sector capabilities while the private sector experience with clients will help to drive NOAA priorities and activities.

Summary Findings

- A successful climate partnership and effective climate services will enhance the management of climate risk and opportunity, thereby providing a return on the federal investment in climate information in the form of improved decisions about climate variability and its impact on public and private activities and as a stimulant to economic vitality.
- The success of the private sector in delivering climate services and products, and evidence of their adoption and application by the user community, will be a notable NOAA success that serves as a model for other federal activities.
- The continuing fiscal austerity of the nation and federal budgets mandates that the private sector must now, more than ever, be empowered to contribute innovation and efficiency in service and product delivery. Private sector success is NOAA success. A successful private sector will be a strong ally and advocate for NOAA in the years and decades to come.
- A successful partnership will require that NOAA and the private sector develop a mechanism for sharing plans and priorities, for bringing the needs of private sector clients to NOAA's attention, and for ensuring that both parties are working cooperatively toward shared goals.

Summary Recommendations

- 1-1 NOAA and the private sector must develop a process to define roles and priorities for the management of climate information, of services and products, and of clients to be served. Together, they must establish an evolving process for discussing and resolving these issues as they arise with advances in climate science, with increased understanding of the impacts of climate variability, and with the resultant needs of both the public and private sectors for climate information.
- 1-2 NOAA and the private sector each have largely unique responsibilities to advance a dynamic and innovative climate services enterprise. Whenever possible, the private sector should take the lead in creating and delivering

new climate products and services, thereby expanding opportunity, creating jobs, and shifting risk from the public to the private sector.

NOAA Responsibilities

- Provide ready, robust, and reliable access to all climate information, forecasts, and simulations;
- Recognize that the private sector can bring a broad range of contributions to climate activities ranging from research to observations to value-added products and services;
- Involve and engage the private sector in the development of NOAA datasets, analytical procedures, and simulation;
- Provide extramural opportunities for innovation and business development in the private sector by using existing mechanisms and creating new approaches;
- Recognize that the feedback to NOAA that the private sector can provide from its customers will be critical in ensuring the relevance of NOAA's climate activities;
- Establish policies and processes for encouraging collaboration with the private sector. An external advisory group could help to define such processes to ensure that the collaboration will expand the return from government information through the growth of new business.

Private Sector Responsibilities

- Recognize that NOAA has unique and critical roles in the provision of climate services for the public good;
- Provide customer feedback to NOAA that will guide the continuation, modification, and establishment of observation networks and computer modeling and that can be used as part of the justification for funding requests;
- Partner with NOAA in finding innovative approaches to improved computation and communication of climate information and forecasts;
- Serve as an effective and enthusiastic advocate for the climate enterprise and for enhanced climate services.

Lessons Learned in Weather (*Charge 5*)

Findings

- The roles of the public and private weather sectors have evolved and have been clarified as a result of advancing technology and a commitment to collaboration by both sectors.
- Open access to publicly-funded data and information is essential to the success of the weather partnership. Early collaboration in planning and developing new capabilities is critical.
- The current NWS mission statement is very explicit about its core mission to protect life and property and to enhance the national economy.
- Both providers and users must collaborate to understand how to formulate and take advantage of probabilistic forecasts.
- The NWS is shaping its future with a business plan that focuses on identifying core services and their cost. The NWS recognizes that its culture must evolve as its business changes.

Recommendations

- 5-1 NOAA and the private sector should develop a mission statement for climate services that distinguishes between services delivered by NOAA for the public good and those that are the responsibility of the private sector and the other components of the national climate partnership.
- 5-2 The private sector must assist in the development of NOAA priorities for climate information and products.
- 5-3 NOAA and the private sector must collaborate to develop a process for directing users to appropriate sources for existing climate products and services and for guiding them to new products and services as they become available.
- 5-4 The climate services partnership must develop a strategy to assist users and providers to understand the utility of various data sets, products, and forecasts, with an emphasis on the use of statistical and probabilistic information in decision-making.

Private Sector Engagement (Charge 3)

Findings

- Careful planning and collaboration should allow a climate services partnership to develop more efficiently and effectively than the somewhat stressful evolution of the weather services partnership over the past 25 years. Despite the stress, the evolution has been successful and today the private component of the weather enterprise generates some \$5 billion in revenue compared to an annual budget of approximately \$1 billion for the National Weather Service.
- A wide range of industries and governments is affected by climate variability and require climate information on a variety of temporal and spatial scales. They include agriculture, energy, recreation, insurance and finance, health care, retail, construction, transportation, water and resource managers at various levels of government, planners in the private and public sectors, and resource managers and planners for Native American communities.
- Existing Federal funding mechanisms are inadequate to provide strong incentives to the private sector to collaborate in climate research and development leading to new products and services.
- The private sector increasingly obtains observations relevant to climate services. This data may also be of importance to NOAA's climate mission and could augment publicly-funded data.
- The collaboration between the NWS and the private sector has become increasingly effective. The NWS assembles observations, produces forecasts, and then makes much of the information available in graphical form on a variety of NWS Internet sites or as voluminous digital files on operational servers available via the Internet.

Recommendations

- 3-1 NOAA and the private sector must collaborate in developing a strategy and a plan for identifying and describing climate datasets and forecasts, for archiving and ensuring the integrity of the data, and for making it readily available on reliable operational servers. The plan should take account of climate data sets at other agencies (such as NASA, DoE, USGS, NSF, USDA, and EPA).
- 3-2 NOAA should create funding mechanisms that will engage the private sector as collaborators in managing and analyzing climate data sets, in development of computer models for predicting climate variability and

long-term trends, and in designing and implementing new observational capabilities.

- 3-3 The climate partnership must consider how climate data obtained with private sector financing can be made available for broader purposes without compromising its value to its owners.
- 3-4 NOAA and the private sector must agree on a strategy and a mechanism for structuring the climate enterprise. The planning process must be open, transparent, and designed to advance the enterprise for NOAA and the private sector. NOAA must provide the leadership to initiate this process.

Private Sector Contributions (*Charge 2, part A.*)

Findings

- NOAA cannot meet the accelerating demand for climate information alone—it must involve the private sector.
- A variety of activities require climate information on increasingly finer temporal and spatial scales. Only the private sector will be able to meet these expanding needs for new information on urban and meso-scales.
- Transforming climate information into business value or public goods requires understanding and experience already available in the private weather sector.
- NOAA has not established a consistent and effective process to engage the private sector in research and in moving research into the economy.
- A strong partnership between NOAA and the private sector will stimulate private sector initiative, create jobs, contribute to economic vitality, and meet the national need for climate-related decision support.
- The private sector component of the weather enterprise has long been an important National Weather Service partner in refining and distributing weather and climate information to customers and consumers. Recently, the private sector has used technological advances to develop and implement new observational capabilities that can augment NOAA observations and serve customers directly.

Recommendations

- 2-1 NOAA and private sector executives must embrace the reality that a strong and enabling partnership is mandatory to meet the accelerating demand for climate information.
- 2-2 NOAA must recognize that its efforts and investments to strengthen the climate partnership will be amplified many times in the growth of private sector climate partners and in the increasing value of their services throughout the private and public markets for climate services.
- 2-3 The climate partnership must create effective and economically efficient strategies to integrate the increasingly diverse surface observations and networks. A business model in which participants share data, as well as the costs of creating, processing and disseminating it, should be developed in ways that will prove advantageous to both the public and private sectors.

Conclusion

- NOAA should empower the private sector by facilitating open and easy access to its weather and climate data and information, and it should engage the private sector as an innovative research partner in developing new observations, computer models, services, and products.
- The private sector possesses the capabilities, customer relationships, and the motivation to join with NOAA to provide the nation with superb and effective climate services and products efficiently and economically. The entire nation will benefit through improved management of both the risk and opportunity created by climate variability and through enhanced economic vitality.

Some Activities That Depend on Private Sector Climate Products and Services

Agriculture planning and operations

Architectural and engineering design

Commodity future trading and risk
hedging

Emergency management

Energy demand and supply

Federal, state, and local policy
development and planning

Financial risk management with
weather derivatives and catastrophe
bonds

Fisheries

Insurance and re-insurance

Investment decisions

Litigation and insurance claims

Personnel and property risk
management

Renewable energy: planning and
operations

Site selection and planning

Transportation (air, land, sea)

A Sample of Private Sector Climate Products and Services (*Charge 2, part B*)

Monthly and seasonal forecasts of temperature, precipitation, and other variables

Forecasts of seasonal risk from severe weather, including tropical cyclones

Historical analysis of climate data: normals and extremes, storms and severe weather

Instruments and observing systems for climate monitoring (land and sea surface, satellites, radar...) and monitoring atmospheric constituents

Analysis of revenue or expense fluctuations owing to weather or climate variability

Focused and specialized climate data sets

Analysis of satellite data and images

Basic and applied research in climate variability and climate change

Downscaling of climate projections

Analysis and interpretation of climate change projections

A First List of Firms Providing Climate Products and Services (*Charge 4*)

1 Source Consulting, Inc (MD)
3TIER Environmental Forecast Group (WA)
AccuWeather (PA)
ADNET Systems Inc. (MD)
AECOM (CA)
AER (MA)
AeroComp (CA)
Aerospace & Marine International Corp (CA)
AirDat LLC (NC)
AIR Worldwide (MA)
Atmospheric Technology Services Company LLC (OK)
AWS Truepower LLC (NY)
AWIS (AL)
Ball Aerospace & Technologies Corp (CO)
Carl Larry Peabody (TX)
Climate Forecast Applications Network (GA)
Climatological Consulting Corp (FL)
CLS America, Inc (MD)
Computer Sciences Corp (VA)
DB Consulting Group (MD)
DBS Weather Impact Corp (FL)
DeTect Inc (FL)
Earth Networks (MD)
EarthInfo (CA)
ERM Group (FL)
ESRI (CA)
Evans Weather Consulting (FL)
Freese-Notis Weather (IA)
Geomett Technologies (MD)
Global Imaging (CA)
Global Science & Tech, Inc. (MD)
Golden Gate Weather Services (CA)
Harris Corporation (FL)
International Environmental Data Rescue Org (MD)
IPS MeteoStar (CO)
ITT Corp (NY)
Kipp & Zonen (NY)
Lockheed Martin (MD)
Mayacamas Weather Consultants (CA)
MDA EarthSat Weather (MD)
MSI Guaranteed Weather LLC (KS)
Murray & Trettel, Inc (IL)
Noblis, Inc (VA)
Northrop Grumman (VA)
Orbital Sciences Corp (VA)
Paul Fransioli (NV)
Peter Leavitt (MA)
Prescient Weather Ltd (PA)
Raytheon Company (VA)
RenRe Energy Advisors Ltd (TX)
RMS (CA)
Sailing Weather Services (MA)

Science Applications International Corp (VA)
SeaSpace Corp (CA)
SGT, Inc. (MD)
StormCenter Communications, Inc. (MD)
Telvent DTN (MD)
TRC Environmental Corp (CT)
Unisys Weather Information Services (PA)
Vaisala (CO)
Vieux, Inc (OK)

Weather Decision Technologies (OK)
Weather Modification Inc (ND)
Weather Research Center (TX)
WeatherBank, Inc (OK)
WeatherBill (CA)
WeatherBiz (CA)
WeatherBug (MD)
WeatherFlow Inc (VA)
WindLogics Inc (MN)
World Climate Service (PA)
WSI (MA)

Appendix A. Process and Charge

The SAB determined that a task force composed of experienced professionals was needed to consider how NOAA might engage with the private sector to ensure the success of a climate services enterprise. Thus, Terms of Reference, including a Charge, were developed for a Climate Partnership Task Force and two co-chairs were chosen, one each from the SAB's Climate Working Group and the Environmental Information Services Working Group. Eight other members were chosen to represent the broad expanse of industries which climate variability impacts.

The following is the Charge of the CPTF:

1. Propose a vision and a model for how NOAA climate services could interact with industry.
2. Identify potential private sector contributions to creating effective partnerships for providing the nation with effective and efficient climate services.
3. Identify possible mechanisms through which the private sector might engage with the development and implementation of new approaches to NOAA climate services.
4. Compile a starter list of US companies providing climate observations, products, and services.

5. Identify the lessons learned from private sector engagement on the weather time scale that would apply to climate and identify ways in [which] the approach for climate should be different from that for weather.

Since the SAB believed that there was some urgency to receive recommendations from the CPTF, it made a conscious decision to accelerate the process in order to get results in about six months, beginning in mid-February 2011. The expert work of the Climate Partnership Task Force began in mid-April via teleconferences and e-mail exchanges, followed by an in-person meeting in early June. The result of that meeting was a draft report that was then circulated to the CPTF members, sent to the chairs of the CWG and the EISWG for summary comments from their members, returned to the CPTF co-chairs for adjudication, who then finalized the draft report and prepared a presentation for the SAB.

The CPTF co-chairs presented a summary of the report at the July 20th quarterly SAB meeting in Ann Arbor, Michigan and were provided with comments and recommendations from the SAB members and NOAA executives. This final report was then prepared by the CPTF and transmitted to the CWG, the EISWG and the SAB chair in early August

Appendix B. Member Listing

Climate Working Group

Antonio J. Busalacchi (Chair)

University of Maryland

Richard (Rit) E. Carbone

National Center for Atmospheric
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John A. Dutton

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James Hack

Oak Ridge National Laboratory

Holly C. Hartmann

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Daniel J. Jacob

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Molly K. Macauley

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Rutgers University

Steven W. Running

University of Montana

J. Marshall Shepherd

University of Georgia

Robert A. Weller

Woods Hole Oceanographic
Institution

Eric F. Wood

Princeton University

Environmental Information Services Working Group

Nancy Colleton (Co-chair)

Institute for Global Environmental
Strategies

Walter F. Dabberdt (Co-chair)

Vaisala

Phillip E. Ardanuy

Raytheon Information Solutions

Helen A. Brohl

U.S. Department of
Transportation

Eric Grimit

3TIER, Inc.

Jeffery K. Lazo

National Center for Atmospheric
Research

Ronald McPherson

American Meteorological Society

Barry L. Myers

AccuWeather, Inc.

Peter P. Neilly

The Weather Channel
Companies

Warren Qualley

Harris Corp.

Kelly T. Redmond

Desert Research Institute

Eugene A. Stallings

EASPE, Inc.

John Toohey-Morales

ClimaData Corp.

Joel M. Widder

The Oldaker Group/The Oldaker
Law Group

Julie Ann Winkler

Michigan State University

Robert S. Winokur

Office of the Oceanographer of
the Navy