NOAA

CLIMATE GOAL

Understanding Climate Variability and Change to Enhance Society’s Ability to Plan and Respond

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http://www.climate.noaa.gov
AGENDA

1. Overview of NOAA’s Climate Goal
2. NOAA’s Climate Goal
3. Moving Toward A Climate Service
NOAA’s role in Climate Science

NOAA is unique in that it is involved in all aspects of the climate discipline: observations, data management, research, modeling, and the provision of climate services and information products. Examples of NOAA’s unique contributions to climate science include:

- Climate Modeling (e.g. drought forecasts, future climate scenarios, etc)
- Applied Research on Carbon and Aerosols (i.e. particles suspended in the atmosphere)
- Long-term commitment to sustain and preserve observations and data management to monitor and understand the state of the climate
- Reducing uncertainties in the magnitude of carbon uptake
- Understanding impact of climate variability and change on marine ecosystems
- Developing tools for decision-makers to assist in planning and responding to climate variability and change events
OVERVIEW: NOAA’S CLIMATE GOAL

NOAA has many leadership Roles...

- Recognized as a leader in climate variability and change science both nationally and internationally
- Leader in the implementation of the Global Ocean Observing System (NOAA contributes 51%, other US agencies 3%)
- Only agency that provides operational climate forecasts and information services (nationally and internationally)
- Only agency that provides daily information about climate to all sectors (e.g. Energy, Transportation, Health)
- Provides scientific leadership for the Intergovernmental Panel for Climate Change (IPCC)
- One of the lead agencies for the US Climate Change Science Program (CCSP) and leader for 8 of the 21 CCSP Synthesis and Assessment Products
Overview: NOAA’s Climate Goal
How It Does Business

• Program Management and Competitive Grants
  – Climate Program Office (in the Office of Oceanic and Atmospheric Research)

• Laboratories and Centers
  – OAR Earth System Research Lab, Boulder
  – OAR Pacific Marine Environmental Lab, Seattle
  – OAR Atlantic Oceanographic and Meteorological Lab, Miami
  – OAR Geophysical Fluid Dynamics Lab, Princeton
  – NWS Climate Prediction Center
  – NWS Environmental Modeling Center
  – NWS Regional/Local Offices
  – NESDIS Data Centers, Satellite data analysis

• Cooperative Institutes
  – A dozen hosted at universities across the country

• Facilities
  – Ships, Aircraft, Satellites, Supercomputers
The Climate Program Office (CPO) serves as NOAA’s focal point for all of NOAA’s climate activities.

CPO:

- Manages internal and competitive (grants) research programs
- Manages oceanic and atmospheric observing systems
- Focuses on developing a broader user community for climate products and services
- Leads NOAA climate education and outreach activities
- Participates in international climate activities
- Provides programmatic support for the Climate Goal
- Coordinates and executes the Planning, Programming, Budgeting, and Execution System (PPBES) for the Climate Goal
Overview: NOAA’s Climate Goal
Requirement Drivers

• National Climate Program Act of 1978
• Global Climate Protection Act
• Weather Service Organic Act
• National Integrated Drought Information System (NIDIS) Act of 2006
• Coastal Zone Management Act
• Clean Air Act 1990
• U.S. Global Change Research Act
• Climate Change Science Program
• Integrated Earth Observing System (GEOSS)
• U.N. Framework Convention on Climate Change
• Montreal Protocol on Substances that Deplete the Ozone Layer
Some examples of NOAA’s climate products include:

- **State of the Climate Annual Report**
- **US Climate Change Science Program (CCSP) Synthesis and Assessment Products (SAP)**
- **Online resources with climate related data and information**
- **Contributions to International Assessments (e.g. Intergovernmental Panel on Climate Change (IPCC), Ozone Assessment)**
- **Indices (e.g. NOAA Annual Greenhouse Gas Index, NOAA Ozone-depleting Gas index)**
- **Forecasts and outlooks (e.g. seasonal hydrologic outlooks, drought, temperature, seasonal malaria outlooks, experimental decadal forecasts)**
- **Resources targeted for specific external users in government and industries such as agriculture, energy, and transportation**
**NOAA’s Climate Goal**

**Mission: Understanding Climate Variability and Change to Enhance Society’s Ability to Plan and Respond**

<table>
<thead>
<tr>
<th>Program</th>
<th>Performance Objective</th>
<th>Outcomes</th>
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<tr>
<td>Climate Observations and Monitoring</td>
<td>Describe and understand the state of the climate system through integrated observations, monitoring, and data management</td>
<td>A predictive understanding of the global climate system on time scales of weeks to decades to a century with quantified uncertainties sufficient for making informed and reasoned decisions.</td>
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<tr>
<td>Climate Research and Modeling</td>
<td>Understand and predict climate variability and change from weeks to decades to a century</td>
<td>Climate-sensitive sectors and the climate-literate public effectively incorporating NOAA’s climate products into their plans and decisions.</td>
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<td>Climate Service Development</td>
<td>Improve the ability of society to plan for and respond to climate variability and change</td>
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**NOAA’s Climate Goal**

**Restructured**

<table>
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<th><strong>Old Program Structure</strong></th>
<th><strong>New Program Structure</strong></th>
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<tr>
<td><strong>Observations and Analysis</strong></td>
<td><strong>Climate Observations and Monitoring</strong></td>
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<tr>
<td>1. Observations</td>
<td>1. Climate System Observations</td>
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<td>2. Analysis of the climate system</td>
<td>2. Data Management and Information</td>
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<td>3. Data Management</td>
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<tr>
<td><strong>Climate Forcing</strong></td>
<td><strong>Climate Research and Modeling</strong></td>
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<tr>
<td>1. Monitor climate forcing gases and aerosols</td>
<td>1. Understanding Climate Processes</td>
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<td>2. Understand the cause of climate forcing</td>
<td>2. Earth System Modeling, Predictions, and Projections</td>
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<td>3. Deliver information to stakeholders</td>
<td>3. Analysis and Attribution</td>
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<td>4. Characterize observations for input into models</td>
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<td><strong>Regional Decision Support</strong></td>
<td><strong>Climate Service Development</strong></td>
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<tr>
<td>1. Design and manage activities for research and decision support</td>
<td>1. Assessing Climate, Impacts, and Adaptation</td>
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<tr>
<td>2. Provide operational climate services</td>
<td>2. Climate Services Development and Delivery</td>
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<td>3. Manage across research to application through TRACS</td>
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<td><strong>Climate and Ecosystems</strong></td>
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<tr>
<td>1. Develop biophysical indicators and models</td>
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<td>2. Monitor changes in coastal and marine ecosystems</td>
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<td><strong>Climate Predictions and Projections</strong></td>
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<tr>
<td>1. Develop operational forecasts and assessments</td>
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<td>2. Improve high-end climate/Earth system models</td>
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<td>3. Expand applied research and development</td>
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<tr>
<td>4. Define observing system requirements to improve models and support forecasts and products</td>
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Describe and understand the state of the climate system through integrated observations, analysis, and data management.

The COM Program is organized into two capabilities:

- **Climate System Observations** are critical to understanding the earth’s climate system, monitoring current climate variations and placing them into historical perspective, supporting climate information products and services, and improving climate research and modeling
  - Oceans
  - Atmosphere
  - Forcing

- **Data Management and Information**
  - **Data management services** is the acquisition, inventory, quality control processing, metadata cataloging, validation, reprocessing, storage, dissemination (access and retrieval), and archiving of data
  - **Data stewardship** is the application of rigorous processing and oversight to ensure that data sets meet the needs of research, business and industry, government, and private sector users
Understand and predict climate variability and change from weeks to decades to a century with quantified uncertainties sufficient for making informed and reasoned decisions on issues related to drought, water resources, ecosystems, health, energy, and extreme events.

The CRM Program maintains capabilities that include:

- Understanding climate processes
- Earth System modeling, predictions, and projections
- Climate analysis and attribution

Activities within these capabilities include:

- Operational forecasts and assessments
- Research and development for predictive understanding of the climate system
- Making use of observations for advancing climate modeling and research
- Measurements and understanding of non-CO2 radiative forcing agents
- Improving estimates of climate forcings and understanding their causes
- Understanding and prediction of ozone layer recovery
- Understanding of past and present climate change, and projections and predictions of future climate change
- Attribution of past and present climate variations and change
NOAA’s Climate Goal
Climate Service Development

NOAA Climate Service Development (CSD) represents the element in the climate program where input from decision makers and risk managers, with the aid of social science, drives the process of producing NOAA climate data, information, outlooks, and applications that are easily understood, useful, operationally delivered tools.

National Integrated Drought Information System
  • The goal of NIDIS is to improve the nation’s capacity to proactively manage drought-related risks

Operational Climate Services
  • NWS Climate Services Division and Regional Climate Centers provide operation climate services

Regional Integrated Sciences and Assessments (RISA)
  • The RISA program supports research that addresses complex climate sensitive issues of concern to decision-makers and policy planners at a regional level

North Pacific Climate Regimes and Ecosystem Productivity (NPCREP) Program
  • NPCREP seeks to understand climate patterns and their impact on ecosystem dynamics

Sectoral Decision Support
  • Sector based research, applications, and decisions support (e.g. Water, Coastal, Urban)

International Institute for Climate and Society
  • Enhance society’s ability to understand, anticipate and manage climate risk, in order to improve human welfare

Transition of Research Applications to Climate Services (TRACS)
  • Transition of climate information tools into user-relevant products
High-level issues from CRM Review:

1. A key challenge for the future is to improve the overall design and cooperative interactions of the many institutional components involved in the CRM Program through strategic planning.

2. The CRM Program needs to better integrate with NOAA observational and modeling efforts to improve the observing system, the models, and the predictions.

3. GFDL and NOAA management should reach a mutual agreement of the relative priorities of Climate Modeling and of ESM development. Then the various critical climate problems should be prioritized, and resources allocated accordingly.

4. NOAA needs to lead and develop the national strategy for intraseasonal to interannual climate prediction inclusive of MME, data assimilation, forecast metrics.

5. Coordination is needed between GFDL, NCEP, and other research sectors on initialization and prediction systems development for decadal prediction.

6. The coupled climate modeling activity is critical to future IPCC participation, and to other projects. A formal pathway should be defined for model components to move from the ESM to the coupled climate model.
NOAA’s Climate Goal
NOAA Science Advisory Board (SAB) Review

High-level issues from Climate Observations and Analysis (now COM) Review:

1. Need for a strategic plan to demonstrate the program’s essential nature and help management prioritize

2. Need for a broadly-understood and transparent priority-setting process that effectively engages Climate Program partners in and out of NOAA; esp. other lines of NOAA

3. The group of climate users needs to be clearly identified and prioritized, so that the climate data access/management requirements can be identified specifically for this (these) group(s)

4. Partnering with other agencies and observing networks may fill in some gaps and is important given financial constraints on climate observations

5. It is critical that ongoing efforts to sustain continuity in many records continue, and this must remain a major priority

6. The synthesis of these ocean observations and strong links to data assimilation and production of analyses and error fields are missing
NOAA’s SAB has reviewed the COM and CRM programs, the CSD program will be reviewed this fall.

The overarching comment from the SAB reviews is the lack of a strategic plan for each program that:

1. Provides a coherent, integrated structure for activities and services within each program
2. Improves the processes used to determine priorities
3. Advances the approach to engaging partners from the external communities in program activities
4. Furthers the integration of the efforts under each program within the Climate Goal under COA with one another and other activities under the Climate Goal

The potential development of a Climate Service within NOAA, may help address this issue.
Climate Services
The federal government needs a coherent, comprehensive strategy to provide authoritative climate information in an integrated and focused manner to meet evolving national needs

The demand for relevant and reliable climate information is growing

- Federal, regional, state, and local decision makers need credible climate information at finer scales
- The general public and the private sector need a clearly identified, credible point of access to the federal government’s climate resources
- The Nation’s scientific community needs a comprehensive, reliable, high quality network of authoritative information

Pending legislative proposals:

- S. 2307, the Global Change Research Improvement Act of 2007
- S. 2355, the Climate Change Adaptation Act

Administration’s views on S. 2307

- “The purpose and functions of a National Climate Service described in this bill are desirable and the Administration supports the designation of NOAA as the lead federal agency for operational climate monitoring and prediction. Most of the infrastructure and institutional capabilities required to fulfill the work of a National Climate Service currently exist, primarily within NOAA.”

Unmet Demands for Climate Information

Land managers in Western states are dealing with more prolonged periods of drought and are requesting long-term regional temperature and precipitation data and easily accessible and understandable tools (Western Governors’ Association).

A broad scope of industries face operational challenges due to climate change, including utilities, integrated oil and gas, mining and metals, insurance, pharmaceuticals, building and construction, and real estate (Lehman Brothers).
Improved understanding of the causes and impacts of climate variability and change will enable sound adaptation and mitigation strategies.

More accurate climate predictions will improve preparation for and response to heat waves, drought, coastal inundation, and other phenomena.

Policy makers and business leaders will be equipped with the most accurate and credible information to inform their decisions.

Relevant and reliable climate data will stimulate the private development of technologies and applications.

Weather and climate sensitive industries, both directly and indirectly, account for about one-third of the Nation’s GDP [editor's note: $4 trillion in 2005 dollars] ranging from finance, insurance, and real estate to services, retail and wholesale trade and manufacturing.

Moving Toward A Climate Service: Within NOAA

NOAA leadership established an internal working group, the Climate Services Development Team, with representatives from across NOAA to:

1. Define NOAA’s role for the provision of climate services within a National climate enterprise
2. Assess evolving user needs for climate information
3. Assess other private and public sector involvement in climate services
4. Begin to develop a draft Climate Services strategy for NOAA
5. Engage external community

CSDT Accomplishments

1. Completed a draft Strategic Plan for an National climate service and proposal to develop a partnership that was approved by the NEP
2. Completed an limited internal NOAA review of the plan
3. Held an external review of the plan through the SAB Climate Working Group (CWG)
4. Meeting with partners within and outside NOAA on climate services needs (e.g. RCCs, USGS, NWS-CSD)
Moving Toward A Climate Service: Strategic Plan Highlights

• Vision: An informed society responding to climate and its impacts

• NOAA will establish a National Climate Service

• Mission: To develop and deliver research, information, and services to enhance society’s ability to understand, anticipate, mitigate, and adapt to climate variability and change

• Strategic Goals:
  1. Provide Leadership for a National Climate Services Partnership
  2. Build and Sustain Comprehensive Observations and Monitoring Systems
  3. Provide State-of-the-Art Research, Modeling, Predictions, and Projections
  4. Develop, Deliver, and Communicate Valued Climate Services in Collaboration with Users
The proposed establishment, within NOAA, of a National Climate Service:

- To be the nation's identified, accessible, official source of authoritative, regular, and timely climate information
- This includes historical and real-time data, monitoring and assessments, research and modeling, predictions and projections, decision support tools and early warning systems, and the development and delivery of valued climate services

Promote the establishment of a national climate services partnership across federal agencies and inclusive of other sectors

- To become the mechanism through which the nation’s goals with regard to managing risks associated with climate variability and change are identified, and investments and activities relevant to the production and application of climate information are coordinated
- The focus of the partnership is on ensuring that highly usable, actionable, issue-focused information is produced and evaluated
- The intention is that the activities of the Service and the distributed set of resources throughout the nation (including universities, federal, state and local science and management agencies, and non-governmental organizations) work in close collaboration
Overarching message from workshop participants

– The potential of a Climate Service is enormous
– The scope of a truly successful Climate Service exceeds that of the draft Strategic Plan
– No clear implementation plan

Concluding thoughts from CWG Review team

– Deliberate pro and con analysis of more than one model for the service – Report title: Options for a National Climate Service
– Develop options through tiger teams (5-8 people - diverse representation) and a coordinating committee
– Review team will provide a suggested report format and the report must address a series of principles and objectives based on this workshop
Moving Toward A Climate Service: Next Steps

1. Incorporate and address responses from various reviews and revise internal document

2. Work with the SAB CWG to finalize the next steps and develop a plan to execute recommendations