NOAA National Weather Service
Climate Services

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MEETING OF
ADVISORY COMMITTEE ON WATER INFORMATION’S (ACWI’S)
SUBCOMMITTEE ON HYDROLOGY (SOH)
January 29, 2009
Outline

- Overview of NOAA NWS Climate Services
- NOAA Data Collection Efforts
- User Access to Data
- Latest Research Activities
- National Climate Services
NOAA & Climate: The Present

- NOAA is a leading provider of reliable weather, water, and climate information to the Nation and the globe
- NOAA’s products are the result of a vigorous research program and a growing operational capability
Overview of NOAA NWS Climate Services

NOAA Climate GOAL

Matrix Link

NWS

NCEP

EMC

CPC

OCWWS

CSD

Regions

WFOs/RFCs/WSOs

Focal Points

Regional Manager

FY 2001

FY 2003

NESDIS

OAR

NOS

NMFS

NCDC

CPO, ESRL, GFDL

CSC, OCM, CWISE

RCCs ARSCOs

RISAs IRI
Overview of NOAA NWS Climate Services

Examples of NWS Climate Services Partners:

- NOAA (NESDIS/NCDC, OAR, NOS)
- National Drought Mitigation Center
- Regional Integrated Sciences and Assessments (RISAs)
- Regional Climate Centers (RCCs)
- State Climatologists (AASC)
- UCAR
- Academia
- Other Government Agencies

Drought Monitor is an example of partnership: local staff provides data and local assessments, NCDC makes analysis, NDMC monitor impact, CPC produces the Drought Monitor and Outlook.
Overview of NOAA NWS Climate Services

- **NWS**: provides weather, hydrologic, and climate forecasts and warnings for the United States … for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure.

- **CSD**: Ensure NWS is equipped to develop and deliver an end-to-end suite of climate variability and change products through strategic planning, user engagement, data stewardship, policy development, integration of research and assessments, partnerships, outreach, and training.

- **CPC**: Deliver climate prediction, monitoring, and assessment products for timescales from weeks to years to the Nation and the global community for the protection of life and property and the enhancement of the economy.
Overview of NOAA NWS Climate Services

- National: Climate Services Division and Climate Prediction Center
- Regional: Climate Services Program Managers (CSPMs)
- Local: ~250 Climate Services Focal Points (CSFPs) at WFOs and RFCs
- Climate expertise at all levels
- Standardized climate web pages
- Established relationships and partnerships
- Trust, credibility, and recognition in services
NWS Climate Services Programs and Initiatives

• **Examples of National Climate Programs and Initiatives**
  - Monitoring climate variability
  - Climate assessments and diagnostic discussions
  - Climate forecasts
  - Climate Test Bed

• **Examples of Regional and Local Climate Programs and Initiatives**
  - Bridging climate user needs and product requirements
  - Climate observing system and data records
  - Local climate data and forecast products
  - Local climate outreach
  - Training climate services staff
NOAA Data Collection Efforts

- Foundation for all climate services
- Nearly 18,000 sites (COOP, ASOS)
- NWS local offices monitor, observe, collect, analyze, quality control, and transmit data for the climate record
- NWS data allows for:
  - Modeling
  - Archiving
  - Research
  - Products
  - Analyses
  - Assessments

Sectors for Climate Data Uses

- Agriculture
- Consulting
- Contractor / Construction
- Energy
- Engineering
- Insurance
- Lawyer / Legal
- Meteorology
- Retail / Manufacturing
- Tourism
- Transportation
- U.S. Media
NOAA Data Collection Efforts

Data Stewardship – to ensure timely, reliable, high quality data to support the continuity of the climate record

- Online Data Tools:
  - xmACIS – powerful, internal, limited access data mining tool integrating NOAA software and data bases. NOWData is the public version
  - ThreadEx - Standardized method for threading data sets

- Data Quality Assurance/Quality Control (QA/QC) Tools (limited access)
  - Health of the Network – identify local data errors
  - Datzilla – data problem reporting and tracking

- Paperless surface weather observation data entry
  - WxCoder (PC-web based) and IVROCS (telephone based)

- Standardized, coordinated data quality control across NOAA and its Climate Services partners
User Access to Data

Public interactive access to “past weather“:

NOWData: NOAA Online Weather Data

- 3900 sites (ASOS, COOP)
- 9 summary products, 9 variables, 3 time periods
- Powered by the Applied Climate Information System (xmACIS) in partnership with the Regional Climate Centers and NCDC

User Access to Data

Public interactive access to “past weather”

Other online data products:

- Last 3 month daily data
- Last 5 year monthly/daily
- This year record events
- Last year monthly site, regional and state summaries

User Access to Data

- Extended Range Outlooks: (6-10 and 8-14)
- Long Range Outlooks (Monthly and 3-Months)
- Assessments: Hazards, Drought, MJO, Global Ocean
- Special Outlooks: Hurricane, Winter, African Rainfall
- Bulletins: Climate Variability, Stratospheric Ozone, Weekly Weather and Crop

http://www.cpc.ncep.noaa.gov/
Product Suite and Services: National Examples

Temperature and Precipitation Forecasts

- 3-Month Outlooks released monthly with 0.5 month lead for 13 3-month periods (categories: Above, Below, Near Normal and Equal Chances)

- 6-10 / 8-14 Day Outlooks released daily with 6/8 day leads (categories: Above, Below and Normal)

http://www.cpc.ncep.noaa.gov/
Product Suite and Services: Local

Local 3 Month Temperature Outlooks:

- Local information
- Multiple user centric formats
- Dynamic text interpretation
- Benefits and limitations
- Long term forecast evaluation
- Trained staff support

http://www.weather.gov/climate/l3mto.php
Fact sheets on Climate Change

- Comprehensive summary on science of Global Climate Change
- IPCC and CCSP report facts
- Climate Change related products:
  - Range of climate variability for climatology period and full records
  - Current rate of trends in climate variables ([http://www.cpc.noaa.gov/charts.shtml](http://www.cpc.noaa.gov/charts.shtml))
  - Impacts of other climate phenomena on trend adjusted climate variables

Other NOAA line offices that provide information on climate change:
- National Climatic Data Center
- Earth System Research Laboratory
- National Oceanographic Data Center
- Geophysical Fluid Dynamics Lab

Product Suite and Services:
Climate Change Issues
Latest Research: Motivation

- Products misinterpretation, lack of verification information, confusing and inconsistent language (Hartmann, 2002)
- Skill is variable for different seasons, areas and forecast periods
- Growing demand for Climate Change information
- Impacts and applicability of climate products
Latest Research: User Requirements

CSD activities bridging NWS user needs and product requirements

- Annual Climate Prediction Application Science Workshop (CPASW): March 24-27, 2009, Norman OK
- Feedback option for local climate forecast products
- Annual NWS local offices reporting of local climate users needs
- Regional Integrated Sciences and Assessments (RISAs) findings and reports
- American Association of State Climatologists (AASC) annual meetings
# Latest Research: User Requirements

<table>
<thead>
<tr>
<th>Location</th>
<th>State</th>
<th>Climate Focus Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen</td>
<td>SD</td>
<td>Outlooks, daily climate data, historical data, and ENSO information, etc.</td>
</tr>
<tr>
<td>Gaylord</td>
<td>MI</td>
<td>Climate Data: daily/monthly/seasonal/annual data, degree days, etc.</td>
</tr>
<tr>
<td>LaCrosse</td>
<td>WI</td>
<td>Climate Data Information, Climate change, ENSO</td>
</tr>
<tr>
<td>Bismarck</td>
<td>ND</td>
<td>Data: temperature, precipitation, extreme events, long-term records</td>
</tr>
<tr>
<td>Farmington</td>
<td>MN</td>
<td>Data: Aviation weather, thunderstorms, wind directions/speeds/gustiness, snowfall, and severe weather, climatology of icing, turbulence, and jet stream winds</td>
</tr>
<tr>
<td>Cheyenne</td>
<td>WY</td>
<td>COOP data and forms Monthly Precipitation reports Data</td>
</tr>
<tr>
<td>Dodge City</td>
<td>KS</td>
<td>NA</td>
</tr>
<tr>
<td>Denver/Boulder</td>
<td>CO</td>
<td>El Niño, MJO, drought, climate data</td>
</tr>
<tr>
<td>Duluth</td>
<td>MN</td>
<td>Data: rainfall, temperature, relative humidity, winds Cold weather snow, thunderstorm, hot weather, drought Climate Change</td>
</tr>
<tr>
<td>Johnston</td>
<td>IA</td>
<td>Coop. and ASDS data: Wind, Temperature, Heat indices, Precipitation, Rainfall, Snowfall Record information, Daily climate data, Interesting facts about climate, etc. Forensic data</td>
</tr>
<tr>
<td>White Lake</td>
<td>MI</td>
<td>Primary data, and monthly &amp; seasonal outlooks</td>
</tr>
<tr>
<td>Davenport</td>
<td>IA</td>
<td>max/min temp and precipitation (rain/snow/depth); accumulations to date and comparisons to normal and records, CPC outlooks, general info, climatological summaries of significant weather by emergency managers (e.g., # of tornado days, # of days with freezing rain, etc.)</td>
</tr>
<tr>
<td>Pleasant Hill</td>
<td>MO</td>
<td>Historical climate information Seasonal outlook information</td>
</tr>
<tr>
<td>Grand Forks</td>
<td>ND</td>
<td>Data: snowfall, precipitation, degree day, wind and temperature data</td>
</tr>
<tr>
<td>Sioux Falls</td>
<td>SD</td>
<td>Observed data Extreme records: rank of observed vs. historical record/percentiles from normal Long range outlooks (temp/precipitation) ENSO information/correlations with possible expected future weather</td>
</tr>
<tr>
<td>Hastings</td>
<td>NE</td>
<td>Winter weather records Forensic Weather Data 30 year climate normals and freeze information Sunshine data for economic development purposes. Long range outlooks (temp/precipitation) ENSO information/correlations with possible expected future weather Wind rose data for Grand Island average annual precipitation and compared to rainfall</td>
</tr>
</tbody>
</table>
The National Oceanic and Atmospheric Administration (NOAA) has formed the Climate Test Bed (CTB) to accelerate the transfer of research and development into improved NOAA operational climate forecasts, products, and applications. The CTB will routinely serve as a conduit between the operational, academic and research communities. This facility is located at the National Centers for Environmental Prediction in Camp Springs, MD. CTB personnel include scientists from NCEP and from other NOAA and non-NOAA organizations participating in the CTB.

Mission Statement

To accelerate the transition of scientific advances from the climate research community to improved NOAA climate forecast products and services.

Vision

To significantly increase the accuracy, reliability, and scope of NOAA's suite of operational climate forecast products to meet the needs of a diverse user community.
Climate and Society

- Socio-economic impacts of climate are well documented
- Total market damages to the U.S. due to climate change estimated at $80B - $181B annually (NCDC)
- $20.4B loss of property due to sea level rise (NCDC)
- Climate linked to high-impact weather events (i.e., flooding, drought, wildfires, severe weather, hurricanes)
- Decision support services are critically important to users for climate change and variability information
- Water resource decisions
- Infrastructure planning
- Wind energy
- Adaptation and mitigation strategies
- Insurance industry / insurance rates
US House Has Recognized National Needs

- Dingell-Boucher Bill (discussion draft)

- SEC. 605. CLIMATE CHANGE ADAPTATION SERVICES

- “(a) NATIONAL CLIMATE SERVICE.—The Secretary of Commerce, acting through the Administrator of NOAA, shall establish within NOAA a National Climate Service to serve as a clearinghouse to provide State, local, and tribal government decision makers with access to regionally and nationally relevant information, data, forecasts, and services relating to climate change impacts and adaptation.”
US Senate Has Recognized National Needs

• Pending Legislation
  o S. 2307 – Global Change Research Improvement Act of 2007
    • Establishes a National Climate Service within NOAA that “shall produce and deliver authoritative, timely and usable information about climate change, climate variability, trends, and impacts on local, State, regional, national, and global scales.”

• NOAA’s Role is Essential
  o Administration’s views on S. 2307
    • “Most of the infrastructure and institutional capabilities required to fulfill the work of a National Climate Service currently exist, primarily within NOAA.”
National Climate Service
4 Options

A Coordinating Committee, through the NOAA Science Advisory Board, has been established to integrate the analyses of four Tiger Teams tasked to identify the pros and cons of four specific models:

- **Federation**: Partners in which members retain capabilities but are coordinated by leadership

- **NCS with NOAA Lead**: NCS with NOAA as the lead agency with specifically-defined partners

- **Federally-sponsored Non-profit**: Non-profit with a legal relationship with a department or agency of the federal government

- **National Weather and Climate Service**: Expand NWS into a National Weather and Climate Service

http://www.sab.noaa.gov/Reports/