15A.2 The National Oceanic and Atmospheric Administration (NOAA) Climate Services Portal: A New Centralized Resource for Distributed Climate Information

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ABSTRACT

With the rapid rise in the development of Web technologies and climate services across NOAA, there has been an increasing need for greater collaboration regarding NOAA's online climate services. The drivers include the need to enhance NOAA's Web presence in response to customer requirements, emerging needs for improved decision-making capabilities across all sectors of society facing impacts from climate variability and change, and the importance of leveraging climate data and services to support research and public education.

To address these needs, NOAA (during fiscal year 2009) embarked upon an ambitious program to develop a NOAA Climate Services Portal (NCS Portal). Four NOAA offices are leading the effort: 1) the NOAA Climate Program Office (CPO), 2) the National Ocean Service's Coastal Services Center (CSC), 3) the National Weather Service's Climate Prediction Center (CPC), and 4) the National Environmental Satellite, Data, and Information Service's (NESDIS) National Climatic Data Center (NCDC). Other offices and programs are also contributing in many ways to the effort. A prototype NCS Portal is being placed online for public access in January 2010, http://www.climate.gov. This website only scratches the surface of the many climate services across NOAA, but this effort, via direct user engagement, will gradually expand the scope and breadth of the NCS Portal to greatly enhance the accessibility and usefulness of NOAA's climate data and services.

1. BACKGROUND

Societal concern about the impacts of climate change and variability is growing. Also, uses of climate data and services in the business sector and by the public are expanding. Citizens in public and private sectors require easy access to credible climate science information and climate services to help them make informed decisions affecting their lives and livelihoods. Climate influences almost every sector of society and affects up to 40 percent of the United States' $10 trillion annual economy.

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(NRC report, 2003 entitled "Satellite Observations of the Earth's Environment. Accelerating the Transition of Research to Operations.") As the leading provider of climate, weather, and water information to the nation and the world, NOAA is a logical source for citizens to turn to for climate information. NOAA must expand and improve the way it communicates, educates, reaches out to, and engages with public stakeholders to better meet the nation's needs for timely, authoritative climate data and information. In *Engaging NOAA's Constituents: A Report from the NOAA Science Advisory Board* (SAB EOE Report, 2007), the SAB reported that NOAA's current engagement activities (Education, Communication, Outreach and Extension) are so diffuse that they are almost invisible to the public, and this adversely affects NOAA's ability to serve society.

Citizens are increasingly going online to seek credible, authoritative climate information. However, users report having difficulty locating and using NOAA's online data, products, and services. Resolving this online accessibility issue will be one of the NCS Portal's main benefits. The use of portal technology and emerging data integration and visualization tools provide an opportunity for NOAA to bring together multiple datasets from diverse disciplines and sources. This integrated approach facilitates the delivery of a more comprehensive picture of climate in the context of affected resources, communities, and businesses. Additional benefits include wider extension of NOAA's data to other media such as television and free-choice learning venues, thereby increasing public exposure and engagement.

The NCS Portal will be guided by interactive public dialogs, users' requests, and other audience engagements. NOAA will use new Web technologies to serve climate data and products in formats that are readily usable by targeted segments of society. The full NCS Portal's scope, product content, and functionality will evolve based on user needs and expectations for climate data and information. User feedback on products and services available through the NCS Portal will also provide important insights into user applications and climate information needs that can help guide the future evolution of NOAA climate services.

In addition to data and products, the NCS Portal will offer a broad array of climate communications,

outreach, and educational materials that demonstrate NOAA's leadership in climate science research, observations, modeling, and service to society. The Portal will serve four key segments of society: (1) decision makers and policy leaders; (2) scientists and applications-oriented data users; (3) educators; and (4) business users and the public. Our goal is for the Portal to become the "go-to" website for NOAA's climate data, products, and services for all users.

2. CURRENT STATUS

After three workshops led by NCS Portal partners during the August 2008 through June 2009 period, the prototype of the Portal is being placed online in January 2010. Initially, this prototype Portal only scratches the surface of the volumes of climate data and information services available across NOAA. However, it will continue to expand and evolve via interaction with users and increased collaboration with additional NOAA personnel as well as our partners outside the agency.

There are four main components of the NCS Portal:
1) A "*ClimateWatch* Magazine," designed to provide magazine-style content to engage users in various topics associated with climate science. Through storytelling and rich visual treatments, this online publication will provide popular presentations of long-term issues like climate change, near-term topics such as ENSO, and major climate events such as drought.
2) A "Data and Services" section to provide user-friendly access to climate data and services across NOAA. This is a huge undertaking given the volume of datasets, products, and services currently available. Complete FGDC metadata records are required for inclusion in this section of the Portal. The aim is to make our products available, easily accessible, standards based, and extensible.
3) An "Understanding Climate" section to provide current information regarding the state of climate science knowledge about climate variability and global climate change. The synoptic overview information about climate presented in this section is designed to serve as an easy point of reference for policy leaders, decision-makers, and the public.
4) A "Climate Education" section to provide information resources, professional development opportunities, and tools for educators, both for use in the classroom and in free-choice learning venues.

3. CLIMATEWATCH

ClimateWatch includes three sections: 1) Articles, 2) Images, and 3) Videos; each designed in a popular style to be appealing and understandable to a wide audience of readers, using minimal technical jargon and a storytelling technique. For example, a current article focuses on Richard Feely (the story's protagonist, from NOAA PMEL) and his decades-long campaign to monitor and understand ocean acidification. Another article focuses on the NOAA Climate Scene Investigators (CSI) team's work to understand how climate oscillations, such as El Niño, may have affected particular weather patterns in the United States.

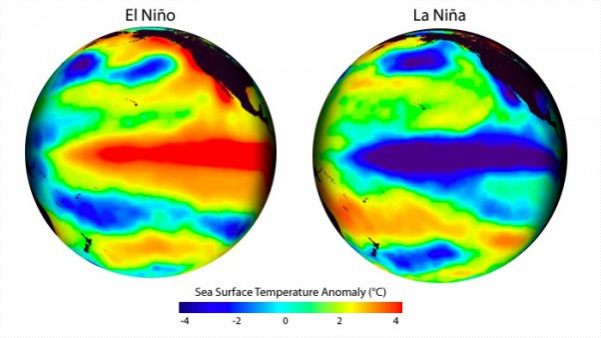

Figure 1. ENSO Sea Surface Temperature Anomaly.

The *Images* section provides various climate-related data visualizations to engage users with easily understood "pictures" of interest. An example is one providing a visualization of August 2009 global temperatures.

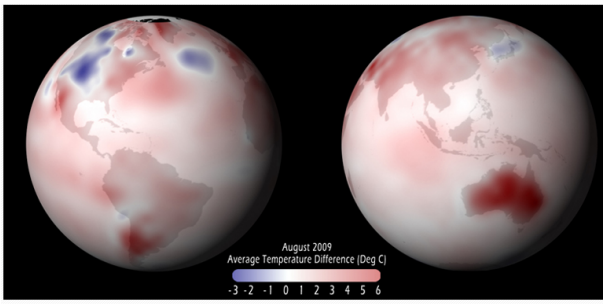

Figure 2. August 2009 Global Temperatures.

The *Videos* section includes interviews with various climate scientists concerning a broad range of topics. See below for a current example.

Figure 3. Interview with Chris Landsea, NHC.

4. DATA AND SERVICES

In "Data and Services," we provide various avenues into NOAA's datasets, products, and services. Again,

as mentioned above, the initial content is very shallow and highlights some of the most popular datasets, products, and services. The scope of this section will be growing with time.

Figure 4. The Data and Services Interface.

The five pathways to follow are described below. Note that as the NCS Portal evolves, the section names and organization shown here may change with time:

1) *Past and Present Climate* focuses on US and global reports and summaries of climate information, often featuring maps and images to enhance the understanding of the data. The aim is to allow users to preview a product, with descriptive information and direct links to the product if they wish to access it.

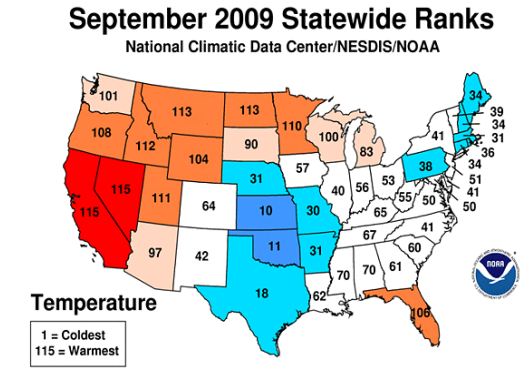

Figure 5. Example of Climate Report – Sep 09.

2) *Outlooks* provides easy entry to the Climate Prediction Center's outlooks and projections for various time periods in the future.

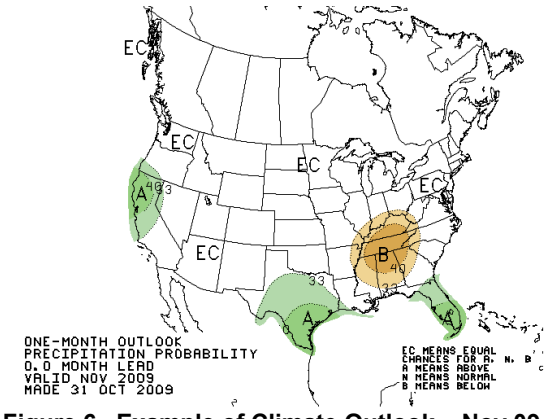

Figure 6. Example of Climate Outlook – Nov 09.

3) *NOAA Partnerships* provides a NOAA-programmatic entry into climate-focused offices and labs within the agency as well as partners' websites.

Figure 7. Map Showing NWS Regions.

4) *Serving Society* allows users to see various communities and sectors that benefit from climate products and services, the ways in which they benefit, and the datasets/products most useful to each sector. This section will continue to evolve and expand to include additional sectors.

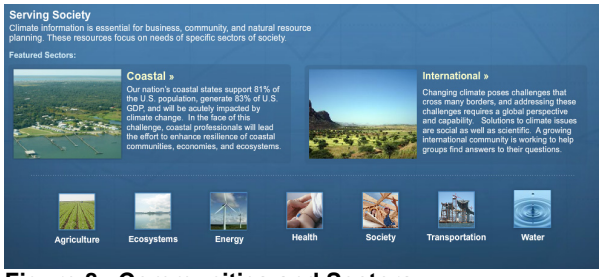

Figure 8. Communities and Sectors.

5) The *Data Library* provides a direct pathway to various datasets and products, using search, browse, and interactive map functions. For example, the GIS-based map allows for direct access to datasets of interest.

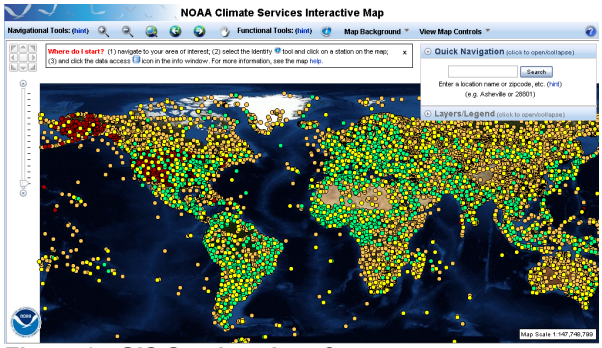

Figure 9. GIS Services Interface.

5. UNDERSTANDING CLIMATE

This section provides current information regarding the state of climate science, climate variability, and global climate change. Policy leaders, decision-makers, and the public will find the synoptic overviews about climate presented in this section to be a useful point of reference.

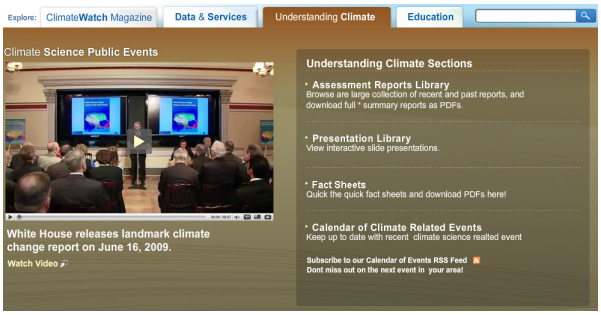

Figure 10. The Understanding Climate Interface.

6. EDUCATION

The Education section provides teaching resources and lessons for educators, both for use in the classroom and in informal free-choice learning venues. These materials were specifically selected in accordance with the essential principles and fundamental concepts presented in the *Climate Literacy Guide* published by the U.S. Global Change Research Program. This section also presents climate-related professional development opportunities for educators seeking to use the subjects of climate variability and change as an integrated approach to teaching science disciplines. Other visitors will also be served here, such as students at various educational levels seeking reference resources to assist them in their coursework.

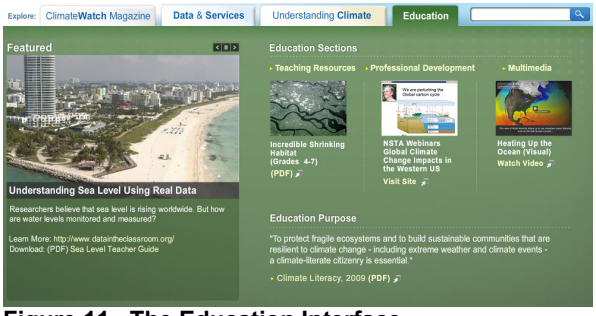

Figure 11. The Education Interface.

7. ADDITIONAL COMPONENTS

The NCS Portal homepage (and a common thread through all pages) includes access to graphical representation of various climate change and climate variability parameters, a tool to display past weather for a given day from over 10,000 global locations, and a NOAA news feed of climate-related press releases.

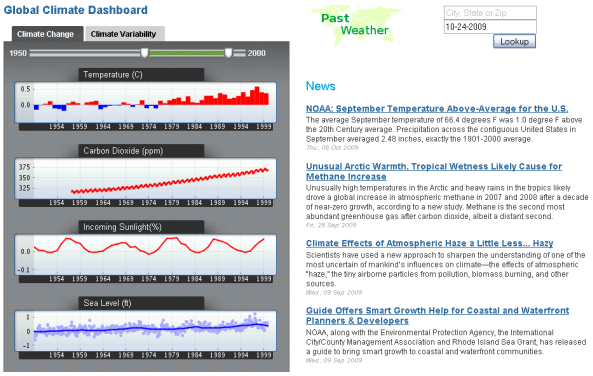

Figure 12. Additional Components of the Portal.

8. SUMMARY AND ACKNOWLEDGEMENTS

At this time, the NCS Portal prototype only scratches the surface of the many climate datasets, products, and services available across NOAA. This effort will gradually transition from a prototype to an operational status over the next year. Our plan is to actively gather user feedback through focus groups, usability studies, and informal communications. Over the next several years, we will expand the NCS Portal's scope and functionality in a user-driven manner to greatly enhance the accessibility and usefulness of NOAA's climate resources. As this effort continues to expand in future years, partners from outside of NOAA will become involved in this effort. The NCS Portal will be a central component of NOAA's commitment to enhancing the access to and extensibility of climate data and services, timely articles and information, education resources, and tools for engagement and decision-making. The URL is: http://www.climate.gov

We wish to acknowledge the dedicated staff, hard work, and donated resources of the NOAA partners mentioned above, along with other contributing agencies and organizations involved in this effort. A list of the key contributors appears below:

- **National Weather Service**
  - Climate Prediction Center
  - Climate Services Division
  - Office of the CIO
- **National Environmental, Satellite, Data and Information Service**
  - National Climatic Data Center, including the IDEA Center
  - NOAA Regional Climate Centers
- **Oceanic and Atmospheric Research**
  - NOAA Climate Program Office
  - Earth System Research Lab
- **National Ocean Service**
  - Coastal Services Center
- **NOAA Office of the CIO**
- **NOAA Office of Education**
- **NOAA Information Architect, Office of the Under Secretary**