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WEATHER on the WEB USING WX-PORTAL

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1. INTRODUCTION

Educators who have access to the WEB often become frustrated with many of the services that offer weather information. One is either involved in many clicks and screens to display the variety of information one seeks, or, all the information is not available from one site which then involves visits to several sites and information collected in a variety of formats. This paper documents a refreshing change for educators. There is a site and a service from which one can obtain all information from just a single source, using a friendly and appealing interface called WxPortal.

WxPortal (pronounced Weather Portal) is a new and powerful way to view, analyze and explain complex weather situations. Once the educator has accessed WxPortal, (www.wxportal.com) one is able to initially set up, and then select from and combine dozens of weather layers into a single, unified web page. It is possible to generate hundreds of thousands of new weather maps every day, with more than a million images available at any given time, from this single resource site.

2. PAST PROBLEMS FOR THE EDUCATOR

The National Weather Service, through the NOAAport broadcast system, provides a one-way broadcast of environmental data and weather information to commercial users nationwide. This information, amounting to more than five gigabytes of data per day, is often incomprehensible until it's been interpreted. Some data is gridded, while other data is point-specific; some data is collected every few minutes, while other data is collected every few hours; various imagery and maps are delivered in different map projections making it impossible to overlay them on each other; and most of the raw data arrives as large tables of numbers, making it very difficult and time consuming to interpret.

3. WHY WX-PORTAL?

WxPortal solves these problems by translating complex data into simple visual information. Using one simple interface, WxPortal combines data from all formats, resolutions and time scales into a common map projection, gives users complete flexibility to overlay user-specific map layers. It also enables users to save personalized combinations and view them later with more up-to-date data. Instructors can customize forecasts and integrate high-resolution modeling, and all this does not require any special hardware or software to install or maintain.

WxPortal was built around a paradigm known as ensemble decision making. It was recognized that most people use multiple sources of information when making any important decisions. No one wants to rely on just one opinion - they look at several, see how they agree or differ, and then make a decision and judge the certainty of their decision based on the collective information.

WxPortal supports ensemble decision making by constantly ingesting raw weather data, processing the data in a unified internal format, and then generating many thousands of images per day from this data. Unlike any other product (or service), WxPortal enables educators to select from dozens of weather layers and combine them to assimilate a variety of forecasts in order to extract meaning to the lesson at hand. While perhaps on the one hand these many images may be overwhelming, they are all in the same format and are easily able to be sorted, relieving the educator of many further headaches.

4.1: ATTRIBUTES FOR EDUCATORS

One of the appealing attributes of this program is the user-friendly GUI, shown in Figure 1. Thumbprints of often-used images show along the left side, with the central area used for enlarged views. The right hand panels show selectable map choices in the form of geographic areas and overlay types. Along the bottom of the screen, information about the actual data is displayed with the right side showing time ticks where images are available – for animation and comparison purposes.

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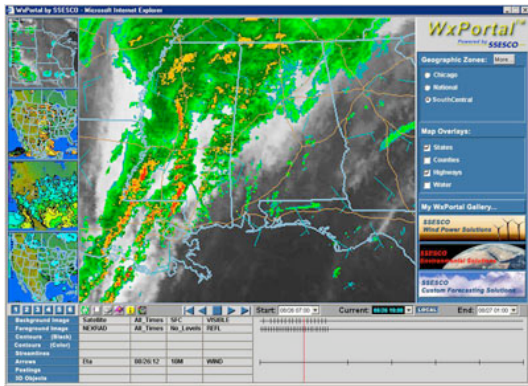


Figure 1: The Wx-Portal screen with an satellite image as background, overlaid by composite radar and model wind arrows, as an example.

The user can select simple map depictions of parameters of surface pressure, temperature, etc., or satellite imagery, radar or model output. More sophisticated overlays are possible as shown in Figures 2, 3 and 4, where topography can be included in multiple overlays, and different regions of the world can be shown.

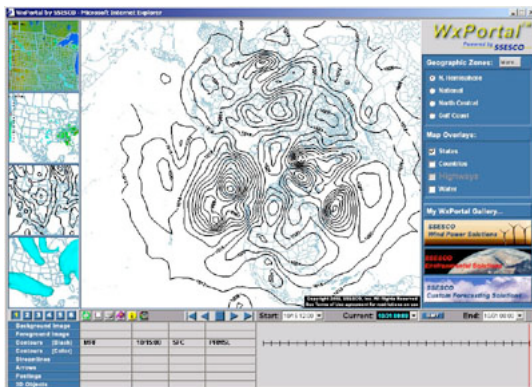


Figure 2: An image showing the surface isobaric pattern in a northern hemispheric view. Note the time line available from this model output.

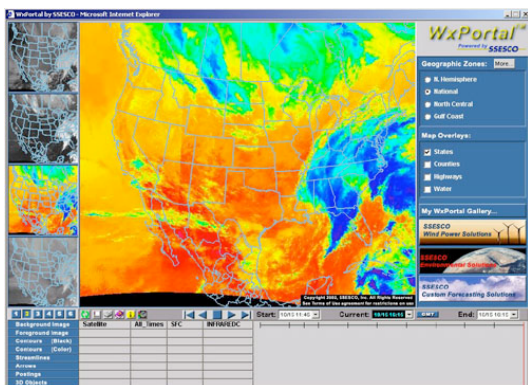


Figure 3: A colorized infrared satellite image of North America. The available imagery is shown by the time-line along the bottom right side.

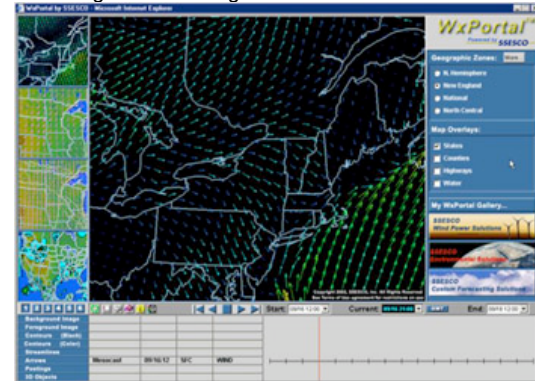


Figure 4: An image showing model output of surface winds color-coded by wind speed.

A most helpful facility of the Wx-Portal setup is not only the thumbnails of the images that appear along the left side, but one can create a customized library of images which once created the user can retrieve each time the program is launched. The user would merely have to update the frames with the latest data, and the overlays would automatically be created. An example of such a library is seen in Figure 5.

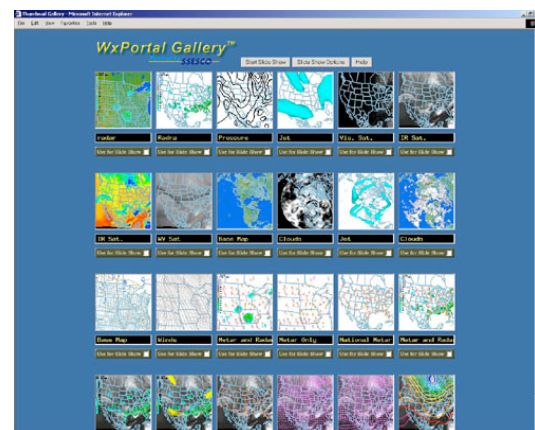


Figure 5: An image showing model output of surface winds color-coded by wind speed.

4.2: SOME VALUABLE BENEFITS

Wx-Portal provides the educator with a readily accessible tool for in-classroom use that can be customized for teaching classes or specific display uses. Within its interactive capabilities, the user can also animate through time with overlaying data being displayed at the applicable and sequential time frames. Educators could get students to enroll and setup their own individual weather observation scenarios, which could also be viewed by the instructor for evaluative purposes.

No expensive satellite stations or computer hardware is needed and student-computer labs can be used to obtain these services. Furthermore, there is nothing to install, upgrade or maintain since the program works with a standard web browser.

By far the biggest attribute is its versatility. It has saved hours of searching and downloading from different sites by integrating all of the variables into a single web interface.

4.3: FOR MORE SOPHISTICATION

While most of the parameters one would normally employ in introductory weather classes are available from the Wx-Portal site, it is possible to get any variable or combination of variables from the holding company. There would naturally be charges associated with this service, but depending upon the educators needs, this may be a small price to pay for the flexibility one would subsequently achieve. Wx-Portal is most useful for weather-sensitive businesses such as utilities, aviation, agriculture, commodity trading, and transportation industries. The service can be programmed and customized to generate graphical derivatives of specialized information so that the user, through a thumbprint library, can easily visualize these. Figure 6 gives an illustration of specific data related to a wind-energy study.

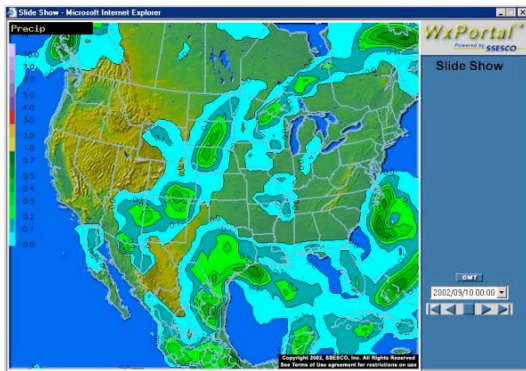


Figure 6: A depiction of precipitation with colored isohyets showing over a colored topographical background. Note from the control panel that users can set up their own slide show of images.

Figure 7 shows another example where data can be processed and displayed as a series of graphics. Using METARS, station models are drawn over the upper Midwest.

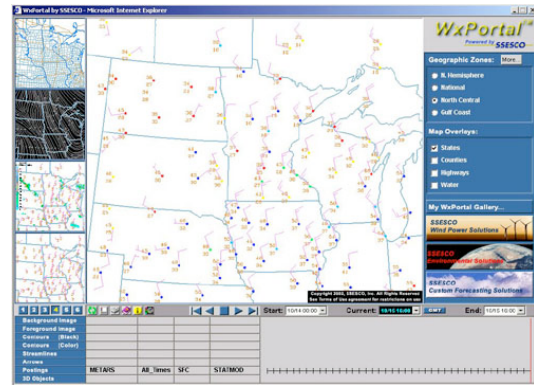


Figure 7: A display of station models for a time period over the upper Midwest..

5 SUMMARY

Wx-Portal is now a key player in the teaching and learning process at Minnesota State University. Some of the data types that are regularly acquired include model outputs from RUC, ETA, AVN, MRF and MRFMOS. Together with satellite imagery, Radar and METARS, virtually every conceivable combination of data overlays are now available as instruction tools right in the classroom. With full-screen projection, the weather classroom has truly become an electronic laboratory and the involvement of students in this coming of age has been equally noteworthy.

While Wx-Portal is delivered free to registered educational users, it should be emphasized that products and data combinations that are not in the standard package will be charged for under a subscription basis. An added requirement necessary is that the user requires Microsoft Internet Explorer 5.5 or higher for seamless operation. It can be said, without hesitation, that the best investment in time and money we have made at Minnesota State University's WALTER (*Weather Laboratory for Teaching and Educational Resources*), has been to implement Wx-Portal as our fundamental teaching and learning tool. Educators are invited to visit the facility and see where and how we utilize both Wx-Portal and EWB (the premier visualization package) in our operations. Educators can reach us at (www.mnsu.edu/weather).