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FX-Net; An Expandable Fire Weather Workstation

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System Overview

FX-Net National is the most recent version of an Internet-based meteorological workstation that is being developed at NOAA's Forecast Systems Laboratory (FSL). FX-NET provides AWIPS-like displays on a remote laptop. By leveraging recent AWIPS workstation developments, the system is now able to deliver forecasting information for any location in the lower 48 states, Hawaii and Alaska. As in previous versions, this information includes satellite imagery, model forecasts and observations (Wang and Madine, 1998). Significant improvements to the FX-Net system include access to nationally and locally oriented scales and radar products for each of the WSR-88D sites. More powerful interactive functionality, such as a user-defined vertical cross-section capability, has also been implemented. The client, which emulates the AWIPS D2D interface, runs on readily available PC hardware over network bandwidth as low as that which is available with phone line based modems. These recent developments have led to an FX-Net server that can now provide relatively low-cost service to a large number of Internet-connected clients.

FX-Net National is a request based, client-server system intended to be an extension of the D2D capability, not a PC version of the AWIPS workstation. The server is primarily responsible for data management (i.e. time matching of products) and for creation and delivery of these product files. Written in C++, the server is a modified AWIPS workstation. Rather than support the local display of products, it uses the D2D software to produce and encode files in response to a product request by the client. As is the case for any real-time AWIPS workstation, the server must be collocated with an appropriately localized FX-Net-flavored AWIPS data server. The client runs as a Java application on a PC. After retrieving products via the Internet, it allows a user to locally interact with the information. Connections to the server are only maintained during the request and retrieval of products.

The technology that enables FX-Net to deliver large AWIPS files over a small communications link is the appropriate encoding and compression of the imagery into displayable products. The sizes of image files are significantly reduced, when compared to standard compression formats, through the use of FSL-developed compression programs (Madine and Wang, 1999). When constrained by modest bandwidth, FX-Net is able, in a reasonable amount of time, to deliver products with

much better resolution than those that are typically available on Web sites.

Expanding FX-Net for Use in Operations

The FX-NET technology was successfully demonstrated in an operational mode during the 2002 Winter Olympics in Salt Lake City where Western Region servers supported eight remote Olympic venue sites for two months. From this operational demonstration an agreement with the National Weather Service's Western Region built an operational trial system for their Incident Meteorologists (IMETS) to use during the FY02 fire season. The success of that preliminary trial led to the installation of operational FX-Net systems in the Western, Southern, Pacific and Alaska Regions in FY03. During the FY03 fire season up to 32 IMETS were deployed in the field using FX-Net over a variety of communications systems ranging from satellite to low-bandwidth dial-up phone lines. The requirement that the system support any type of communication link at any speed was validated during its rigorous use this fire season. This operational version of FX-Net saw the system expand beyond the AWIPS database to allow the addition of localized data such as lighting products, and additional satellite data required for the Alaska and Pacific Regions. The addition of new data sets and specialized tools to the client software allows many customization options.

During FY02 the National Interagency Fire Center (NIFC) began experimental use of FX-Net in support of their Interagency Predictive Services Program's role in supporting fire management programs. FY03 saw the deployment of FX-Net systems to all the Geographical Area Coordination Centers (GACC's) and the NIFC headquarters in Boise, Idaho. Specialized tools such as additional line thickness and colors, and GIS data sets were added to the NIFC version of the FX-Net Client.

Future fire weather plans include the expansion of the FX-Net product set to include fire weather models and graphics for integrated displays with the current AWIPS product set.

Future Expansion for FX-Net

FX-Net is currently working with a number of University, State and Federal Air Quality programs to incorporate Air Quality Models, such as the WRF/Chem model. FX-Net currently displays the atmospheric chemical measurements used by Air Quality researchers at Plymouth State College and the University of New Hampshire. Select dispersion models, such as smoke plume forecasts are currently under evaluation for inclusion into the FX-Net system.

An expanded version of FX-Net would have many advantages for fire weather researchers in the same way universities, such as Plymouth State and Colorado State University have when using the system for air quality and satellite analysis investigations. Obviously, fire weather is not limited to any one location, and therefore a localized forecaster workstation product limited to one radar or model would not do the job. The flexibility of the FX-Net system will be able to serve fire weather researchers with the palette of radar products, models and any additional data sets that may be incorporated for them to address fires in any area.

Future development will allow researchers to view retrospective weather, dispersion

and air quality cases with the same interface as the real-time system.

Summary

FX-Net is used extensively in the operational fire weather community. Its use has expanded from research and use as a teaching tool in universities and laboratories to a reliable, flexible and highly expandable operational forecasting tool. Future development will extend its use to include an all-hazards, field deployable system to a retrospective research tool.

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