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1. INTRODUCTION

The new NWS Weather Event Simulator (WES) is a powerful training tool that allows forecasters to replay weather events in either displaced real-time or case study mode and to interrogate archived data in detail within the AWIPS Display Two Dimensions (D2D) environment. The WES has been installed at NWS forecast offices around the country. Archiving hardware and software have been provided to every WFO to capture AWIPS data in a rotating seven day archive for replay on the WES. These data include model output, surface and upper air observations and analyses, lightning data, satellite and radar imagery. In addition, the NWS Southern Region maintains a 30 day archive of all graphical products distributed via the AWIPS Satellite Broadcast Network.

The ability to capture and review these data in displaced real-time provides a unique opportunity for forecasters at the local forecast offices to sharpen their skills related to weather forecasting, satellite and radar interpretation, and warning generation for winter weather, tropical cyclones, severe storms, flash flooding, and headwater flooding events.

The WES also allows the forecasters to examine synoptic and mesoscale precursors to an event to enhance their situation awareness skills. In addition to monitoring the development of routine and severe weather, the software also allows the forecaster to practice using the NWS warning preparation software, WARNGEN.

This presentation will provide some tips and techniques developed at local forecast offices and by support personnel to enhance WES training sessions.

2. WES SIMULATIONS

Simulations can be constructed for the WES in a number of formats targeted at a variety of goals. Complementary, but independent, simulations can be created using archived data from a single weather event.

The NWS Warning Development and Training Branch (WDTB) has identified four types of simulations: 1) *real-time simulation*; 2) *interval-based simulation*; 3) *situation awareness simulation*; and 4) *virtual reality*

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simulation (NWS Warning Decision Training Branch, 2002). An additional training option is *case study review*.

Simulations can be a total immersion experience of uninterrupted training time or broken into smaller time periods that can be run sequentially or independently, allowing the forecaster to train as time on shift permits, or in longer dedicated blocks of time. Simulation exercises may be designed as independent studies, for one-on-one training, coaching, or group training activities.

In displaced real-time mode the WES software renames the individual data files to hide them from the D2D interface. Every minute during a simulation the WES software reveals the pertinent data to the WES notification server for display using the D2D. In case study mode all of the data for a case are available for display using D2D. The time period of the data displayed is determined by the D2D clock setting.

3. WES TECHNIQUES

3.1 Archiving Interactive Products

Radar products requiring interactions with the radar product generator (e.g., cross sections, severe weather products, user selectable precipitation, etc.) or products generated using the D2D Product Maker cannot be created on the WES after the fact. However, if they are created in real-time they will be stored in the data archive for subsequent replay on the WES. Trainers may wish to plan for creation of these types of products while an event is ongoing to ensure their presence in the archive for inclusion in subsequent case studies or simulations.

3.2 User IDs and Custom Procedures in Simulations

A unique D2D user account (e.g., Apr08) can be created for a particular event or simulation. Procedures can then be constructed using that account which will load and display data at specified time periods and discussion points. When used in conjunction with a self-paced simulation guide such procedures can be used for unsupervised training exercises.

3.3 Use of HTML Simulation Guides

Simulation guides can be constructed in the form of Hypertext Markup Language (HTML) documents which can be viewed using a Web browser on the WES. Such guides can include links to supplemental information such as screen shots of AWIPS hydrology applications which are not part of the WES software, available reference materials, and links to additional training resources. By following this HTML simulation guide the trainee can be

led through the review of an event as independent study. When coupled with the D2D procedures mentioned above, the trainee's attention can be drawn to critical data and features at specific times during the event (Rydell, N. and J. D. Ward, 2002).

3.4 Developing Teletraining Simulation Guides

The VISITView teletraining software developed for use by the NWS emulates many of the D2D functions (see: www.ssec.wisc.edu/visitview/). Trainers can develop teletraining sessions which highlight the objectives and key weather features of a WES simulation. These teletraining sessions can be delivered live to a number of remote offices or recorded by the trainer for replay by the trainee at their convenience.

3.5 Practicing Sectorization of a Forecast Area

Many forecast offices divide their forecast area of responsibility during significant events into sectors based on geography, type of weather threat (e.g., severe storms vs. flooding), or individual storms. This requires coordination among the staff as storms cross sector boundaries or the types of weather threat evolve over time.

Practicing sectorization of a forecast area during an event requires the use of two WES workstations. The NWS Southern Region had purchased several WES workstations which can be loaned to our field offices for a month at a time to facilitate this type of training.

3.6 Simulating Data Outages

While the WES cannot be used to construct as wide a range of possible events as some other types of simulators (e.g., flight simulators) the trainer can use the WES to simulate a variety of possible data outages. For example, several years ago WSR-88D reflectivity data were not available at WFO Little Rock, AR, during a multiple tornado event. This could be simulated with the WES by deleting the radar reflectivity data for a particular time period from the archived data set.

4. WES TIPS

Whether used in displaced real-time or case study mode WES simulations can be made more effective by using some functions of the D2D software which are generally not used in real-time AWIPS operations.

4.1 Use of the D2D Set Time Option

In normal forecast operations the D2D clock is always set to the current time. The set time option in the D2D menu allows archived data sets to be viewed outside of a simulation. The data must be in either the case study format or the simulation start time must have been set after the period of interest. The D2D interface can then be used to view the data by setting the D2D clock to the time of interest. This allows rapid review of any weather event captured in the data archive.

4.2 Use of Multiple Work Spaces

In AWIPS typically only one D2D session is running on each monitor. The Linux WES workstation can be configured with multiple work spaces. These additional work spaces can be used for displaying HTML simulation guides as described above, or for additional D2D sessions. The user can quickly switch from one work space to another with a single mouse click.

4.3 Use of Multiple D2D Sessions

Different clock settings can be used on individual D2D screens (which can be running in different work spaces) to simultaneously display data at different time periods during an event. The data must be in either the case study format or the simulation start time must have been set after the period of interest.

The trainer should set the D2D clock to the first time point and load the desired data for display in one or more D2D sessions. The trainer can then start additional D2D sessions in other work spaces, reset the D2D clocks and load data from that time point. These multiple sessions can be particularly effective for interval-based simulations, or the quick review of a weather event which occurred the previous day.

4.4 Using Local Procedures in Foreign Cases

Offices and individual forecasters often create D2D procedures to simplify the loading and interpretation of data. These procedures are particularly of value during weather events when efficiency is important. These procedures are typically stored on AWIPS under the office's localization and also for any office for which there is back-up responsibility.

Most WES simulations, whether distributed nationally or developed by local offices for our regional library, are localized for offices foreign to that where the training is conducted. Local user accounts and procedures can be loaded into those case data directories. Most procedures will work properly with any data set.

However, procedures that display radar imagery will only work with data for one specific radar site. These procedures can be quickly converted for use with the imagery from another radar provided with a WES case by selecting "Alter..." rather than "Load" from the D2D procedure selection menu and then choosing the appropriate radar from the drop down list.

Note if the data are in stored case study mode then such procedures will always load the last images from the data set, regardless of the setting of the D2D clock. For procedures to display data for other times either the data must be in the displaced real-time format, or the procedures must have been defined while a WES simulation was running.

4.5 Viewing Longer Loops in Overviews

Particularly for events such as winter storms or river flooding, forecasters like to view loops of radar and/or satellite imagery covering several hours. This can be accomplished by loading hourly imagery in a D2D display first to get longer loops, then loading more frequent imagery in another D2D frame.

4.6 Using AWIPS Hydrology and Local Applications

Products generated by the AWIPS hydrology applications are not currently archived for use with the WES. However, these data are stored in the local AWIPS data base for 30 or more days. Trainers can recreate the pertinent screens using the set-time options in the AWIPS applications and capture them as screen shots for use in training guides. Output from other local applications can also be utilized in this manner.

5. SUPPORTING WEB SITES

On of us (BM) maintains a WES support Web site at: <http://www.srh.noaa.gov/ssd/drt-awips/html/index.htm>. All the tips and techniques mentioned in this paper are available on that site.

Support information for the WES is available from the NWS Science and Operations Officer Science and Training Resource Center at: (<http://www.comet.ucar.edu/strc/wes/index.htm>).

The NWS Warning Decision Training Branch Web site includes a PowerPoint presentation entitled: "Weather Event Simulator Best Practices" at: <http://www.wdtb.noaa.gov/workshop/wdmiv/WESBestPractices.ppt>

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7. REFERENCES

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