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CREATING INTERACTIVE GRAPHICAL OVERLAYS IN THE ADVANCED WEATHER INTERACTIVE PROCESSING SYSTEM (AWIPS) USING SHAPEFILES AND DGM FILES

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OVERVIEW

Two examples of local AWIPS applications that create graphical overlays interactively are presented here:

1) Anvil Threat Corridor Forecast Tool (Anvil Tool) using shapefiles
2) AMU Trajectory Map Maker (Trajectory Tool) using DGM files

SHAPEFILE PROPERTIES

- Shapefiles are used by the National Weather Service (NWS) to view background maps in AWIPS. They are also a source of data for creating geographic, entity upper-levels (EGUL), used by Parametrics to describe areas under a warning, watch, or advisory.
- NWS offices usually obtain Shapefiles from the AWIPS map database (http://www.nws.noaa.gov/eprod) and rarely modify or create their own maps.
- Shapefiles can be created or modified with GIS software (e.g., ArcGIS), third-party software libraries (e.g., Shapefile C Library) or a custom program.
- A shapefile stores the geometry and attribute information of the spatial features in a data set. The shapefile is stored as a set of vector coordinates. The features can be a point, polygon, or polylines.
- A shapefile contains a main file, index file, and a DBASE table.
  - The main file contains a record for each spatial feature (e.g., counties shp).
  - The index file contains the offset of each record from the beginning of the main file (e.g., counties.idx).
  - The DBASE table contains records for each attribute (e.g., counties.dbf). Attributes are commonly used to describe or label spatial features.
- Each point in a shapefile is represented by two double-precision coordinate values, in the order X, Y, where X represents the longitude and Y represents the latitude.
- A polygon consists of one or more rings. A ring is a sequence of four or more connected points that form a closed loop. The first and last vertext of a ring must be the same.
- A polyline is an ordered set of vertices and consists of one or more parts.

DGM FILE PROPERTIES

- The Denver AWIPS Risk Reduction and Requirements Evaluation (DARE) Graphics Metatile (DGM) was created specifically for AWIPS and is not as well-known as an alternative to shapefiles. DGM files can be opened in two-byte integers.
- The command to set the drawing color is ignored by AWIPS.
- With the exception of color tables, AWIPS graphics colors can only be changed manually in the D2D application. Color tables are used for the "deep graph" display, such as profiler time-height displays. Deep graphics cannot be overlaid on images or have graphics displayed on top of them.
- Each DGM command is represented by a unique "opcode" in hexadecimal format.

Most useful DGM commands:

- Draw Linked Vectors: opcode = 0x0100. Draw Unlinked Vectors: opcode = 0x0200.
- Draw Text: opcode = 0x0300.
- Select Absolute Addressing: opcode = 0x0400 (TT = FF for frame addressing, TT = 00 for normal addressing. Normalized) is the default.
- Select Relative Addressing: opcode = 0x0500 (TT = FF for frame addressing, TT = 00 for normal addressing)
- Set Frame Size: opcode = 0x0600 (TT = 0000, g = 1 for absolute coordinates in minutes of longitude/latitude, g = 2 for absolute coordinates refer to an offset from the central point in seconds of longitude/latitude.

REFERENCES


ADVANTAGES OF DGM FILES

- DGM files are easier to create than shapefiles.
- DGM files are not static and can be looped in D2D just like any other data product.
- Unlike shapefiles, DGM files can be created directly in AWIPS.

ADVANTAGES OF SHAPEFILES

- There is pre-existing software that can be used to create or modify shapefiles.
- There is a large repository of shapefiles for use as maps, such as the AWIPS map database.
- The lines and points in a shapefile can be very precise since latitude/longitude points are stored with double-precision.
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14. ABSTRACT
Graphical overlays can be created in real-time in the Advanced Weather Interactive Processing System (AWIPS) using shapefiles or DARE Graphics Metafile (DGM) files. This presentation describes how to create graphical overlays on-the-fly for AWIPS, by using two examples of AWIPS applications that were created by the Applied Meteorology Unit (AMU). The first example is the Anvil Threat Corridor Forecast Tool, which produces a shapefile that depicts a graphical threat corridor of the forecast movement of thunderstorm anvil clouds, based on the observed or forecast upper-level winds. This tool is used by the Spaceflight Meteorology Group (SMG) and 45th Weather Squadron (45 WS) to analyze the threat of natural or space vehicle-triggered lightning over a location. The second example is a launch and landing trajectory tool that produces a DGM file that plots the ground track of space vehicles during launch or landing. The trajectory tool can be used by SMG and the 45 WS forecasters to analyze weather radar imagery along a launch or landing trajectory. Advantages of both file types will be listed.

15. SUBJECT TERMS
Advanced Weather Interactive Processing System (AWIPS), Shapefiles, thunderstorm anvil clouds

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<table>
<thead>
<tr>
<th>a. REPORT</th>
<th>b. ABSTRACT</th>
<th>c. THIS PAGE</th>
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