

DRAFT

CAVE Annotation Tool

April 2, 2012

1. Overview

FXC 5.1.1 includes many capabilities from accessing a remote weather data base, to real-time collaboration, automated remote weather briefings, extensive weather graphic annotation, slide presentations, and running remote applications like dispersion models. However, the majority of NWS forecast offices use FXC only to generate graphics for their web pages (i.e. "Graphicast" and "Weather Story"). To provide this limited capability when AWIPS II is introduced into the offices, only a subset of the FXC capabilities have been implemented on AWIPS II / CAVE.

2. Assumptions

It is assumed that the basic display functions, including loading geo-referenced map backgrounds and GIS information is provided by CAVE (not the plugin).

3. Basic Plug-in Architecture

The FXC annotation plugin creates a drawLayer (interactive resource) on top of the CAVE display. This allows the user to load and manipulate real-time weather data on CAVE from the standard menus, and launch the annotation plugin when the user wants to annotate the display. Since it is a plugin (not a separate perspective) the annotation tool is available on the various CAVE perspectives. The objects can be saved in a file in one perspective and easily loaded from the file in another. The annotation tool can be disabled on any perspective by modifying a configuration file. In the D2D perspective, the drawing can be swapped into a small pane. However, the drawing must be returned to the large pane to perform any editing.

The plugin code is in the gov.noaa.gsd.viz.drawing directory. A significant portion of the FXC 5.1.1 code was ported to CAVE and incorporated as a plugin. A design goal was to use the existing CAVE software interfaces and not to modify the core code.

4. Launching the FXC Annotation Capability from the Menu

FXC has been integrated into AWIPS II and therefore can be launched directly from the CAVE toolbar, unlike AWIPS I where FXC required a separate launcher. Selecting the “Annotation” item on the menubar will bring up the “drawing tool” menu item (Figure 1) that starts the drawing tool.

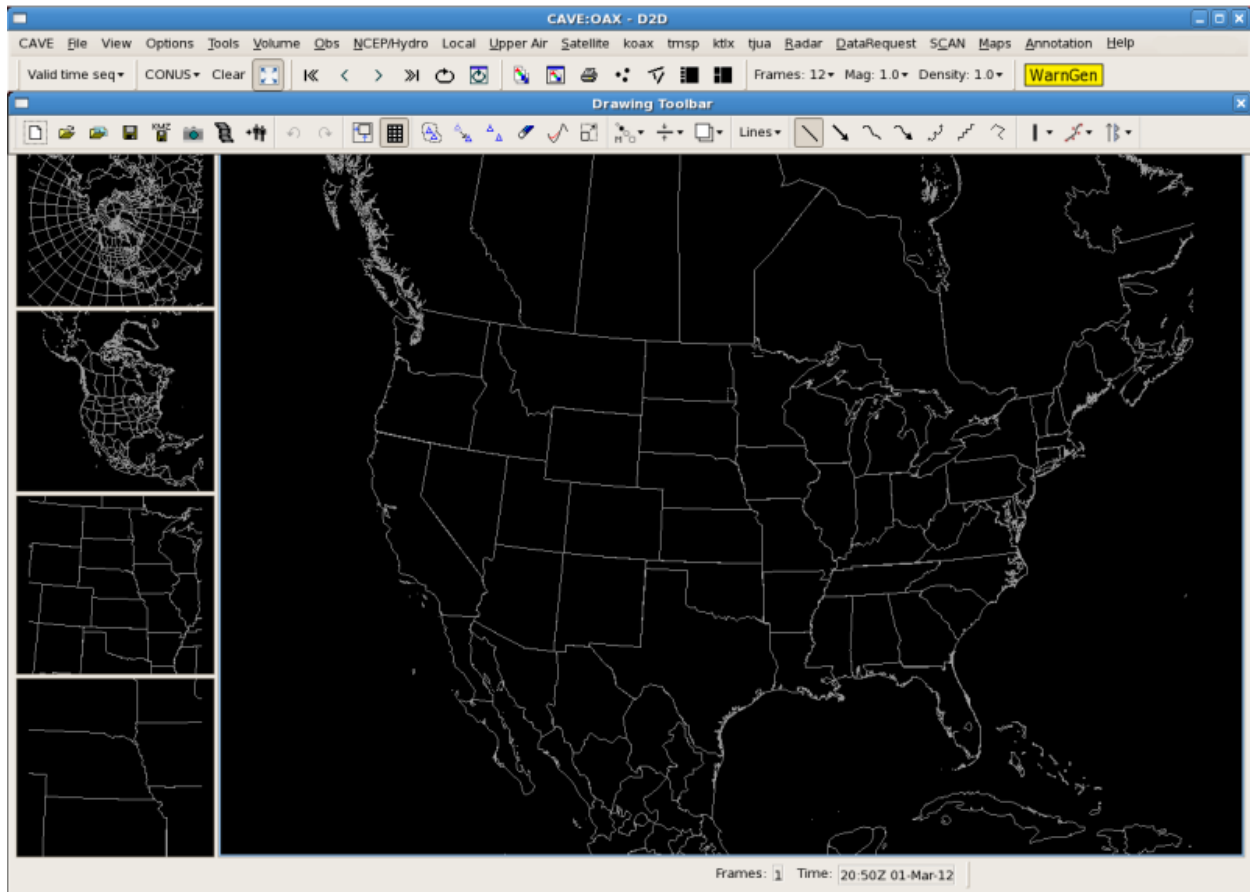


Figure 1. The CAVE annotation selector and drawing toolbar.

4.1. Drawing Toolbar

The toolbar is in a separate window and positioned immediately below the CAVE toolbar. The toolbar can be moved to any desired location on the screen. Closing the toolbar with the “close window” selector (window frame) will close the toolbar and erase any drawings!! The drawing annotations and toolbar can be toggled on/off by clicking on the legend with the left mouse button.

The drawing toolbar is essentially the same as the original FXC with some minor exceptions:



Object Grouping – This selector behaves different then in the FXC application. When selected, the user can group objects by depressing and holding the left mouse button while moving the cursor over the objects that are to be grouped. The user can then depress the RIGHT mouse button to display a

popup menu with various editing options (if instead, the RIGHT mouse button is clicked briefly over the grouped objects, then the properties palette will highlight the available options for the grouped objects and no popup window will appear).



Unmapped Image – Many forecast offices currently use map background images created with ArcGIS or other tools. These maps typically do not correspond to any of the AWIPS projections and scales. This button will allow users to load such an image on any of the AWIPS II scales for annotation. Note, however, that since these images are not geographically registered trying to load weather data on these images is meaningless.



Line editing – This button selects all freehand lines and shapes and makes them editable by displaying editing nodes. This allows the user to edit any curved lines (e.g. front, freehand drawing, cloud, ridge) by:

- 1 - clicking on the line at a starting point with the left mouse button AND immediately releasing it,
- 2 - drawing the edited segment (Figure 2), and then
- 3 - finishing the editing by ending the segment at the desired location on/off the old line AND clicking the left mouse button.

Note that line editing is performed by redrawing a segment of the line, not rubber-banding. A special button now exists for line editing instead of being included in the “edit polygon” button. All shape/node editing is now performed by selecting the “Edit Path” and “Edit Polygon” buttons.

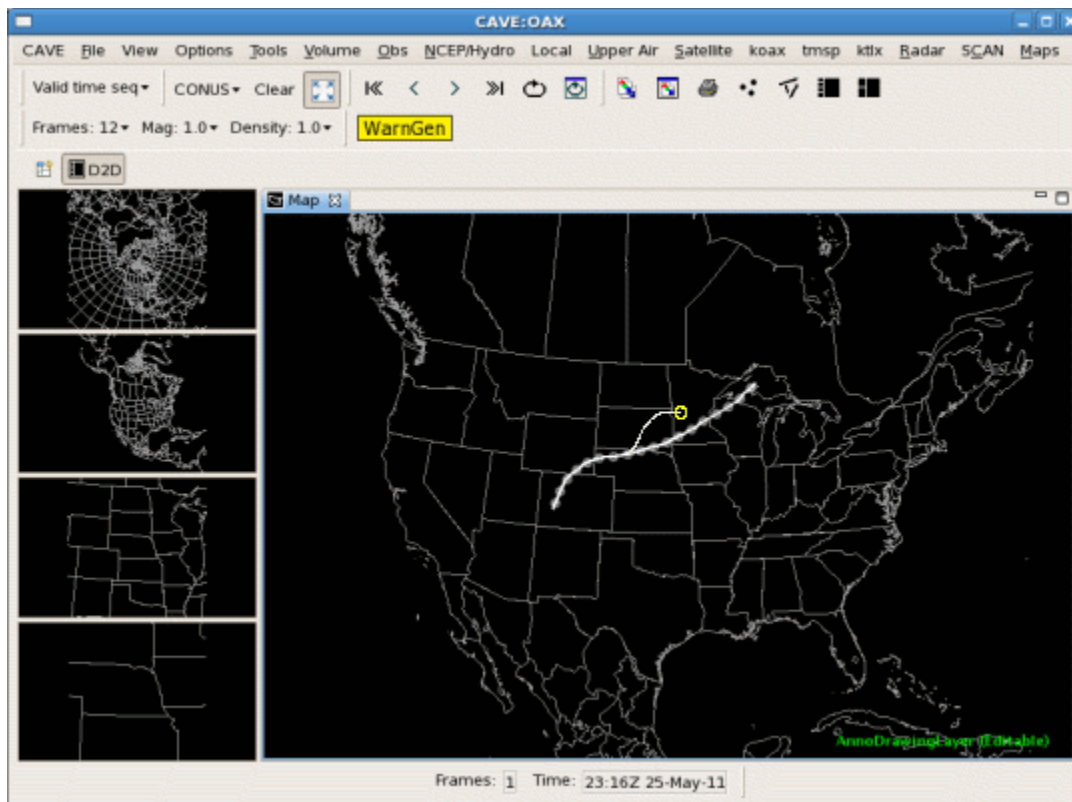


Figure 2. Editing of freehand path



Polygon editing – Selecting this button will cause all polygons to become editable. A node in a polygon can be moved by:

- 1 - clicking on the desired node with the left mouse button AND immediately releasing it,
- 2 - dragging the node to the desired location (Figure 3), and then
- 3 - finishing the editing by clicking the left mouse button and releasing it.

To delete a node, move the cursor over the node to be deleted and depress the right mouse button. A pop-up menu will appear. Select the “Delete Node” menu item to delete the node.

Selecting this button will also enable editing of lines, arrows, and wind barbs.

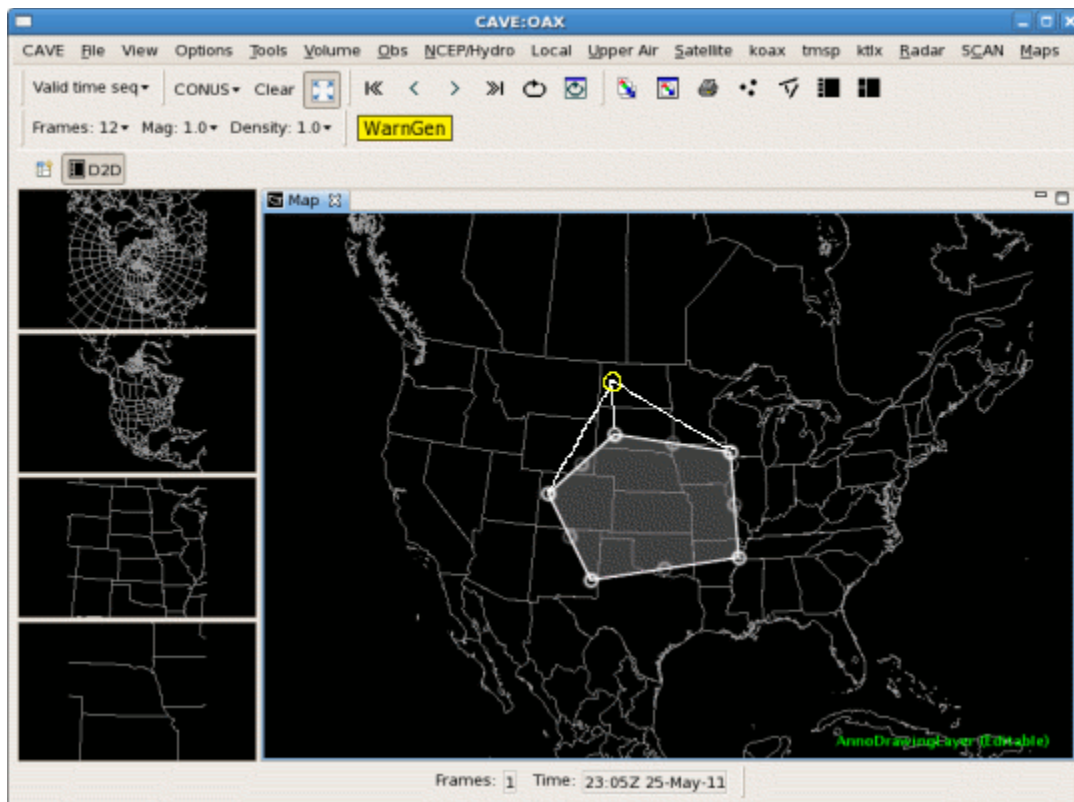


Figure 3. Moving the node of a polygon.



Animation - The drawing tool allows users to draw unique graphics into multiple frames. This button will capture all of the frames and create an animated GIF image from these frames. The animation rate can be specified in the CAVE -> Preferences -> Annotation dialog window. **Note that some data needs to be loaded into the frames (they can be toggled off) in order to annotate multiple frames!!**



Screen Capture - This button (camera) captures the main D2D pane and replaces the "Save as GIF/JPG/PNG" menu item on the original FXC file menu. Unlike the original FXC, there are no options such as format or transparency with this selector. The image can be saved as a JPG, PNG, or GIF image with a user-specified name in [user]/fxcData/images (or directory specified with CAVE preferences).



Default Zoom - Forecasters often use a geographic area that is smaller than the State scale to generate routine web products. This button will re-center and zoom in on a designated area defined in CAVE -> Preferences -> Annotation. The zoom button can be used at any time to re-center and zoom in on the designated area.



Send-to-web - The send-to-web button located next to the camera button saves the contents of the large pane as an image and triggers a script that can be used to transfer the image to a server. The Graphicast.xxx image is stored in the [user]/caveData directory. The image file is temporary and will be overwritten each time the sendToWeb action is performed. A dialog window (Figure 4) will appear to confirm that the user wants to transfer the image to the web server.



Figure 4. Send-to-web dialog window

Important

The sendToWeb script is now located in the [user]/ fxcData/scripts directory. WFOs can create and customize their own “sendToWeb” script. This directory also contains the fxcWFO file which contains the D2D localization identifier. This identifier will change when the office assumes backup responsibility for another site.



Properties Palette - This palette makes it possible to change multiple properties of a glyph without having to use the right popup menu for each property that is to be changed. The “Properties Palette” button acts like a toggle button. Selecting the button either displays or hides the palette. By clicking with the right mouse button on the glyph to be modified, the properties palette will enable only those properties that can be modified for that particular glyph.

The icons on the following toolbar selectors have changed. However, the functions remain unchanged.



line thickness



Decorations/blips on left



Decoration (blip) size



Decorations/blips on right



Glyph color (foreground)



Solid border for polygon/rectangle



Line Smoothing (bicubic)



Dashed border for polygon/rectangle



Line Smoothing (by averaging)



No border for polygon/rectangle



Line Smoothing (none)



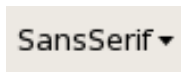
Dashed line type

4.2. New Drawing Features

Lately, many of the changes made to the CAVE plug-in have also been migrated to FXC 5.1.1. Text annotation is selected from the toolbar (make sure “abc” is selected when entering text).

- *Text Font*

The annotation tool now provides a choice of fonts. The java installation on the workstation determines the available fonts. It may be possible to replace or add specific fonts. However, users would be responsible for any font changes.



font selector on the toolbar (SansSerif is the default font).

- *Text box*

This feature does not currently exist in FXC 5.1.1 but has been added to this plug-in. In addition to the many text options such as font, color, shadow, etc. the capability now exists to automatically create a colored background box for the text. When selecting the text option on the toolbar, three new selectors will appear to the right of the text color box on the toolbar:



background border (solid, dashed, or none)



background fill (opaque, frosted, translucent, transparent, or hollow)



background color (e.g. yellow)

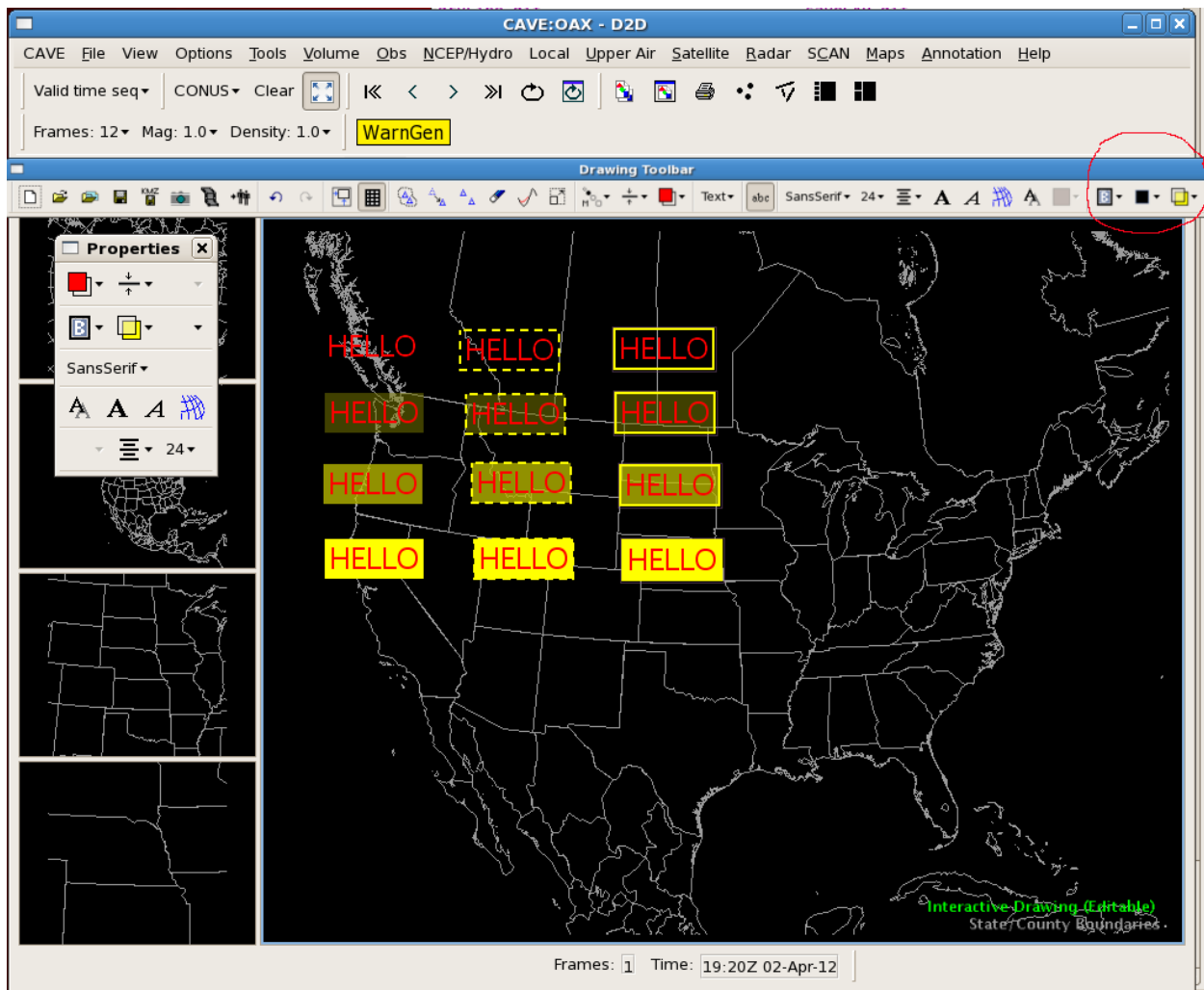


Figure 5. Editing the text background box

Figure 5 illustrates the available background borders combined with various degrees of transparency for the background color. The default settings are set on the toolbar (see red circle). However, the user can change the settings for individual text strings by RIGHT clicking on the desired text. This will display the properties palette with all of the available options for the selected text. The properties palette allows the user to make several changes to the properties without RIGHT clicking on the desired text for each property change. The RIGHT mouse button can still be used to display the popup menu if a user prefers the old method for changing properties.

- *Text Centering*

The annotation tool allows the user to specify the alignment for several lines of text:

 Left justified text

 Centered text



Right justified text

- *Rotation of images (glyphs)*

The CAVE plugin allows the user to rotate the image to any angle by “grabbing” the corner of the image with the left mouse button and rotating it to the desired angle.

- *Resizing of images (glyphs)*

A new feature introduced recently is the resizing of glyphs. This is done by right-clicking on the desired glyph to be resized and selecting Shape -> Resize. Thereafter, moving the mouse cursor causes the glyph to resize accordingly. To exit the resizing option click the left mouse button.

Clicking on a drawing object with the right mouse button will display a popup menu that allows the attributes of the object to be changed. Note that popup menu consolidates the annotation menu items with the basic CAVE right mouse button options!



Straight-edged Path

A new line type was added to facilitate drawing of time series charts or drawing other lines that contain a large portion of straight line segments. To draw a straight-edged line click-and-release the left mouse button at the starting point and then click the mouse button again each time you want to end that segment and start a new one. Click and release the right mouse button to complete the line.

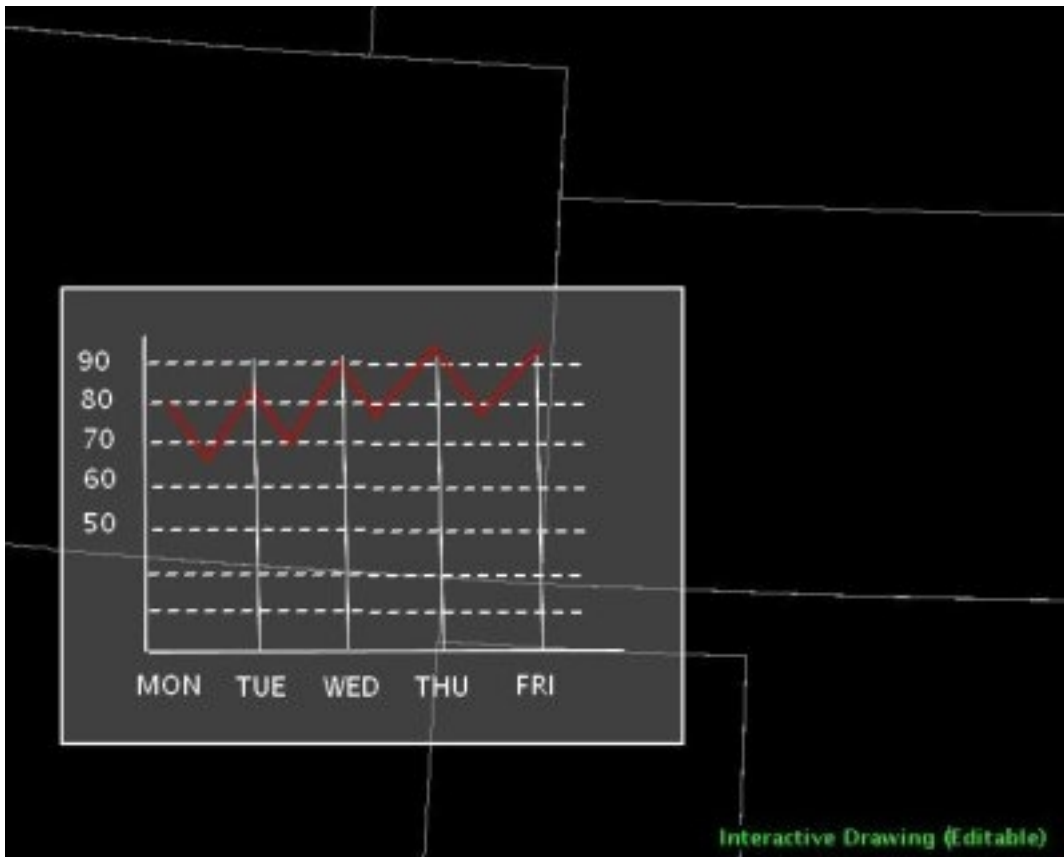


Figure 6 Graph illustrates the use of a Straight-edged path.

Important

CAVE resets its internal frame count to "one" when all data is unloaded or toggled off (even though the frame count on the toolbar may still say two or higher). This will cause all drawings that are not drawn to the first frame to disappear. Note that this may also make it appear as though saved drawings are not displaying. The drawings in the other frame can be displayed by double-clicking the right mouse button to advance a frame.

4.3. Annotation Preferences

The CAVE preference menu (Figure 6) is used to define certain annotation tool parameters. The preference menu is displayed by selecting CAVE -> Preferences -> Annotation.

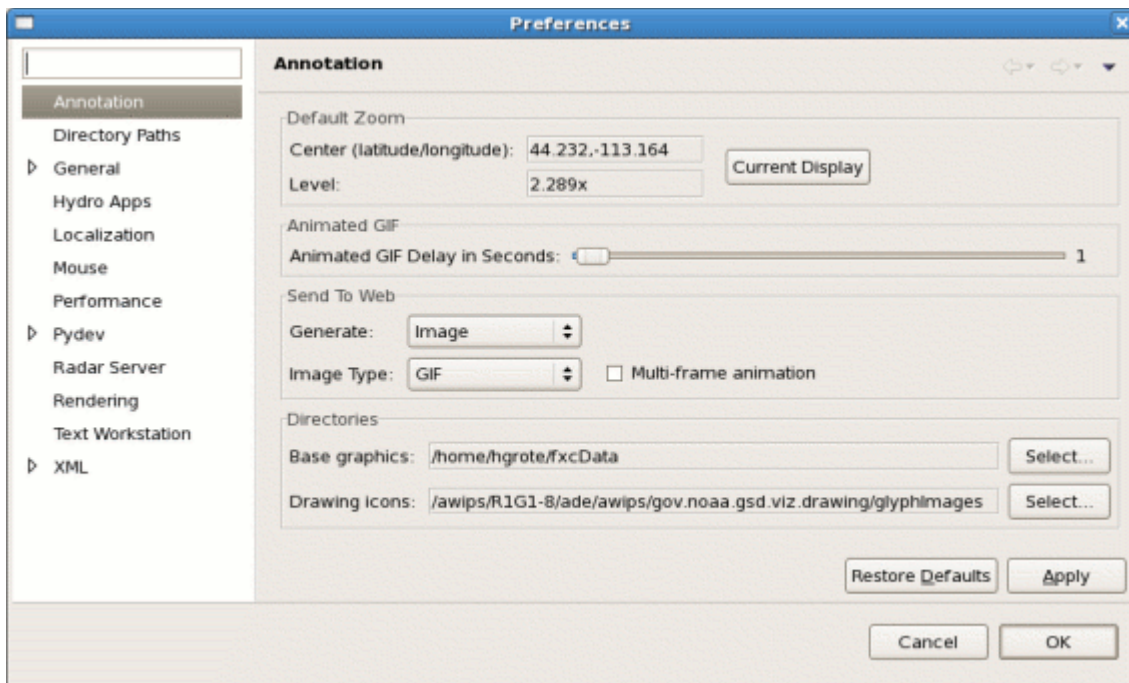


Figure 6. Preference Dialog

- **Default Zoom** – The default zoom is associated with the default zoom button on the toolbar. The default zoom can be set by zooming and panning to the desired geographical area in the main CAVE window and then selecting “Current Display”. This will update the center (latitude/longitude and zoom level to be used for default zoom values.
- **Animated GIF** – The slider button can be used to set the time delay between animation frames. The range is from 0.1 to 100 seconds. This is the value used by the “Create Animation” button on the toolbar.
- **Send-to-web** – This sets the type of product to be generated when the send-to-web button is selected. The choices are Image, KML, and Image and KML. The possible image types are GIF, PNG, and JPEG. If GIF is selected, the user can also select the “Multi-frame animation” to create an animated GIF.
- **Directories** – Most offices have their own set of weather icons that they use for their web graphics. If these icons exist in a directory accessible to the workstation, the directory path can be specified here in the “drawing icons” text field. This will be the default location for the icons. This directory can be shared by many users.

The “Base graphics” directory identifies the default location for drawings, images, scripts, and unmapped background images. The editable graphics (.fxd) are stored in fxcData/drawings. Screen captures of the drawings (GIF, JPG, PNG, KMZ) are stored in fxcData/images. The fxcData/scripts contain the sendToWeb script and the fxcWfo file containing the D2D localization. A separate path is defined since directories may need to be unique to each workstation.

The Graphicast.xxx is considered a temporary file that is overwritten each time by the latest image and is therefore stored in the caveData directory created by CAVE.

4.4. Customization

The initial version of the plugin has little flexibility for customization.

- The glyph images in /gov.noaa.gsd.viz.drawing/glyphimages can be extended or modified, or a location of custom glyph images can be specified by the preference menu.
- The “sendToWeb” script in the [user]/fxaData/scripts directory should be written by the local office since each office has slightly different requirements.
- The map backgrounds are part of the CAVE system and “unmapped” background images can be loaded with the button on the drawing toolbar.
- Shape files can be loaded from the CAVE → import → Shapefile (or GeoTIFF) menu. The user can load the desired shapefiles or TIFF images from the desired directory.

4.5. Troubleshooting

The annotation tool does not have its own logs or diagnostics. Any errors will be reported through the normal CAVE logging and recording mechanisms. The NWS fxc_user list server can be used to obtain help from other WFOs and also the plug-in developers.

4.6. Useful Tips

- Line Smoothing - When drawing freehand lines, the amount of smoothing can be controlled by the pull-down menu on the drawing toolbar. For tracing rivers or other feature, it is desirable to set the smoothing option to “None”, while for drawing fronts or similar feature the bi-cubic smoothing may be preferred.
- All fronts, ridges, polygons, freehand lines, straight lines, scalloped lines, and circles can be edited:
 - Vertices can be added and deleted from polygons. Circles can be enlarged or diminished. Use the menu button depicting the expanding square to edit these objects.
 - Freehand lines (includes fronts) can be edited with the button containing the sine wave.

- Straight lines can be resized, rotated, and repositions using the button with the button containing two triangles connected by an arrow.
- Frequently generated graphic products that include graphs or special map features, can be drawn once and saved as objects and then recalled and edited at a later time. Several of these drawings can be loaded and overlaid on each other.
- The annotation tool supports the creation of animated gifs. However, CAVE expects data to be loaded into the frames in order to display multiple frames. Until a better solution can be found, the user can load data (e.g. METAR obs) and toggle them off before creating the drawings for multiple frames (NOTE: some of the later versions of CAVE make other frames inaccessible when ALL of the data layers are dimmed).
- Note - The sendToWeb button on the annotation toolbar will automatically capture the screen in [user]/caveData/Graphicast.xxx and subsequently execute the [user]fxcData/scripts /sendToWeb script (user-supplied).
- CAVE includes a high resolution topographical map, many map overlays, and the ability to load GIS data with shapefiles. It may be advantages to load the desired maps and color tables, zoom in on the desired area, and then save it as a CAVE bundle (CAVE → Load/Save Display → Save Editor Display). This bundle can then be recalled each time a user wants to create a graphic using the annotation tool. This allows users to load weather data over the background while creating their annotations.

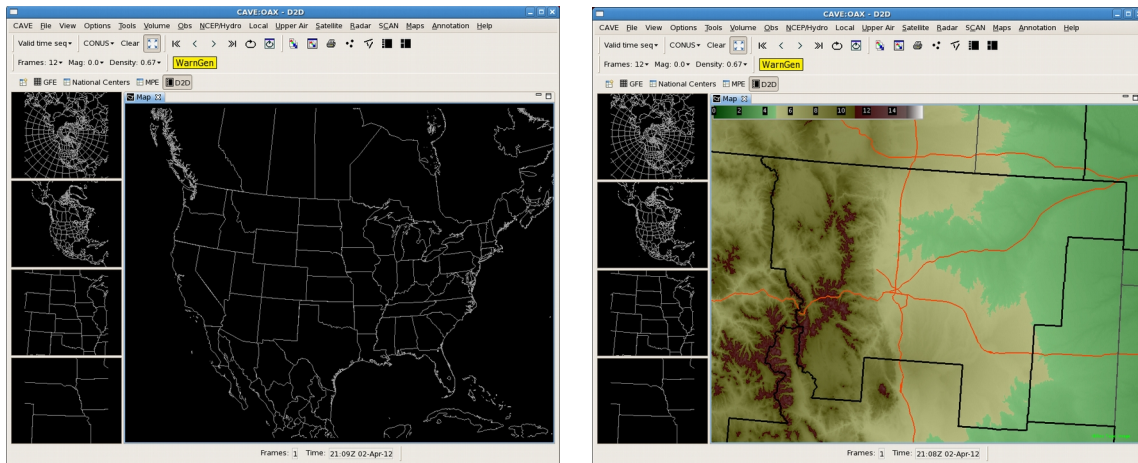


Figure 7 Cave display before and after loading a bundle

- Note - If the user inadvertently closes the drawing tool while a drawing is being edited, the drawing may be recoverable from [user name]/fxcData/scripts/latestSession.fxd.

See <http://fxc.noaa.gov/screenshots.html> for drawing examples and instructions on how they were generated.

See http://fxc.noaa.gov/fxcug/FXC_User_Guide.html (Section 3.3 Drawing Toolbar) for a description of the basic drawing functions.