McIDAS-V Tutorial

Adaptive Resolution

updated June 2015 (software version 1.5)

McIDAS-V is a free, open source, visualization and data analysis software package that is the next generation in SSEC's 40-year history of sophisticated McIDAS software packages. McIDAS-V displays weather satellite (including hyperspectral) and other geophysical data in 2- and 3-dimensions. McIDAS-V can also analyze and manipulate the data with its powerful mathematical functions. McIDAS-V is built on SSEC's VisAD and Unidata's IDV libraries. The functionality of SSEC's HYDRA software package is also being integrated into McIDAS-V for viewing and analyzing hyperspectral satellite data.

More training materials are available on the McIDAS-V webpage and in the Getting Started chapter of the McIDAS-V User's Guide, which is available from the Help menu within McIDAS-V. You will be notified at the startup of McIDAS-V when new versions are available on the McIDAS-V webpage - http://www.ssec.wisc.edu/mcidas/software/v/.

If you encounter an error or would like to request an enhancement, please post it to the McIDAS-V Support Forums - http://www.ssec.wisc.edu/mcidas/forums/. The forums also provide the opportunity to share information with other users.

In this McIDAS-V Tutorial, some exercises will be explained using different methods of data access: local data files, pre-loaded data bundles and real-time access to default remote servers. If you have access to your own real-time ADDE servers, you may also use those, but be aware that different server configurations may make the explanations in this document not quite applicable to all data that you may load.

This tutorial assumes that you have McIDAS-V installed on your machine, and that you know how to start McIDAS-V. If you cannot start McIDAS-V on your machine, you should follow the instructions in the document entitled *McIDAS-V Tutorial – Installation and Introduction*.

Terminology

There are two windows displayed when McIDAS-V first starts, the **McIDAS-V Main Display** (hereafter **Main Display**) and the **McIDAS-V Data Explorer** (hereafter **Data Explorer**).

The **Data Explorer** contains three tabs that appear in bold italics throughout this document: ***Data Sources***, ***Field Selector***, and ***Layer Controls***. Data is selected in the ***Data Sources*** tab, loaded into the ***Field Selector***, displayed in the **Main Display**, and output is formatted in the ***Layer Controls***.

Menu trees will be listed as a series (e.g. ***Edit -> Remove -> All Layers and Data Sources***).

Mouse clicks will be listed as combinations (e.g. *Shift+Left Click+Drag*).

Introduction

Adaptive resolution is a feature designed to load high resolution data efficiently by obtaining and loading only the minimum amount of data needed to display all of the observable features in the given display size and geographic domain. If the domain is subsequently changed by using either Shift+left-click+drag or the Projections menu, adaptive resolution automatically reloads the data at a higher resolution (if available) if the user zoomed in to a more detailed view, or reloads the data at a lower resolution (sampled) if the user zoomed out to a wider view.

If the data is sampled, it is indicated in the Legend of the Main Display, where a line similar to '*Data Sampling: every 3rd pixel*' or '*Data Sampling: every 4th by 5th grid point*' appears below the layer label. If the data is displayed at full resolution, then no data sampling text will be written.

Another concept associated with adaptive resolution is matching the display region. When displayed using the Match Display Region dropdown in the Region tab of the Field Selector, the only data displayed will be data that resides in the geographical boundaries of the active panel. This helps to efficiently create displays without displaying more data than necessary. The Match Display Region dropdown can be used in conjunction with adaptive resolution, where only the highest resolution that can be viewed in the active panel will be displayed.

Note that adaptive resolution is still under development. This feature may have some bugs, it is not yet applicable for all data and display types (such as satellite data), and it may not currently be in its final implementation.

Use Adaptive Resolution to Explore Data Sampling of the Display

1. By default, adaptive resolution is turned off. Turn adaptive resolution on for the session.
    a. In the **Main Display**, open the User Preferences via the ***Edit -> Preferences*** menu item.
    b. In the ***Display Window*** tab in the **User Preferences**, check the ***Panel Configuration -> Enable Adaptive Resolution (Under Development)*** item and click **OK**.
2. Add the local High Resolution Rapid Refresh (HRRR) grib2 file. If using real-time data, skip to step 3.
    a. In the ***Data Sources*** tab of the **Data Explorer** window, navigate to the ***General -> Files/Directories*** chooser.
    b. For **Data Type**, select *Grid files (netCDF/GRIB/OPeNDAP/GEMPAK)*.
    c. In the **Files** panel, select the *<local path>***/Data/AdaptiveResolution/hrrr.rad.201504060100.grib2** file.
    d. Click **Add Source**.
    e. Skip to step 4.
3. If using remote, real-time gridded data, add the data source.
    a. In the ***Data Sources*** tab of the **Data Explorer**, navigate to the ***Gridded Data -> Remote*** chooser.
    b. For **Catalog**, select *http://www.ssec.wisc.edu/mcidas/software/v/threddsRTModels.xml*.
    c. Expand the directory tree to select ***Realtime data from IDD -> NCEP Model Data -> Rapid Refresh (RAP) -> RAP-CONUS 13km -> Latest Reference Time ****.
    d. Click **Add Source**.
4. Select a field, display type, one time, and display the data.
    a. In the **Fields** panel of the ***Field Selector***, select a field to display.

   i. If using the local grib2 file, there is only one field: ***Radiation @ Nominal top of the atmosphere***.
   ii. If using the remote RAP data, select a 2D field such as: ***2D grid -> Mass -> MSLP****.
   b. In the **Displays** panel, select the ***Plan Views -> Contour Plan View*** display type.
   c. In the ***Times*** tab of the subset panel, use the dropdown menu to select ***Use Selected***. Select one time.
   d. Click **Create Display**.
5. Explore how the data sampling is used in the display.
   a. Notice that in the **Legend** of the **Main Display**, the display is likely sampled. Any sampling of the data is written out in the **Legend** with text such as: *Data Sampling: every 3rd grid point*. Note that this sampling is partially dependent on the size of the **Main Display** window. If the **Main Display** is very large, then no sampling may be done.
   b. Use *Shift+Left Click+Drag* to zoom in to a smaller region. This keyboard/mouse combination both zooms in on the display and resamples the data to the new geographical region in the display. The text for data sampling in the **Legend** will likely either improve or disappear. Once the text has disappeared, the data is displayed at full resolution.
   c. Scroll out with the mouse wheel to observe that no data is drawn outside of the area subsetted in step 5b above. This is because part of adaptive resolution is to only display data in the geographical bounds of the current view. This keeps more data than necessary from displaying, which helps to make the display faster and more efficient. *Shift+Left Click+Drag* can be used to display data over the full geographical domain.
   d. Changing projection is another way of invoking absolute resolution. This can be done through the ***Projections*** menu of the **Main Display**. For example, select the ***Projections -> Predefined -> US -> Southeastern U.S.*** projection.

Use the Match Display Region Mode to Display the Data.

6. Open a new tab by selecting ***File -> New Display Tab -> Map Display -> One Panel*** from the **Main Menu**.
7. In the new display panel, zoom in over a region of interest (ex. The Northeastern United States).
8. Navigate to the ***Field Selector*** tab of the **Data Explorer**. In the subset panel, choose the ***Region*** tab and select the ***Match Display Region*** mode from the dropdown.
9. Click **Create Display**.
10. Explore how data sampling is used in the display.
    a. As with earlier, any sampling of the data will be listed out in the **Legend**.
    b. Zoom out of the display using the scroll wheel. Note that the only data displayed falls in the initial geographical bounds of the display at the time that the display was created. This is because the **Match Display Region** mode used to create the display only displays data that matches the confines of the display.
    c. The same methods used in step 5 above can be used to re-sample the data in the display.

Zooming, Panning, and Rotating Controls

Zooming	Panning	Rotating
	Mouse	
Shift-Left Drag: Select a region by pressing the ***Shift*** key and dragging the left mouse button. **Shift-Right Drag:** Hold ***Shift*** key and drag the right mouse button. Moving up zooms in, moving down zooms out.	**Control-Right Mouse Drag:** Hold ***Control*** key and drag right mouse to pan.	**Right Mouse Drag:** Drag right mouse to rotate.
	Scroll Wheel	
Scroll Wheel-Up: Zoom Out. **Scroll Wheel-Down:** Zoom In.		**Control-Scroll Wheel-Up/Down:** Rotate clockwise/counterclockwise. **Shift-Scroll Wheel-up/Down:** Rotate forward/backward clockwise.
	Arrow Keys	
Shift-Up: Zoom In. **Shift-Down:** Zoom Out.	**Control-Up arrow:** Pan Down. **Control-Down arrow:** Pan Up. **Control-Right arrow:** Pan Left. **Control-Left arrow:** Pan Right.	**Left/Right arrow:** Rotate around vertical axis. **Up/Down arrow:** Rotate around horizontal axis. **Shift-Left/Right arrow:** Rotate Clockwise/Counterclockwise.