McIDAS-V Tutorial
Using Simulated ABI Data
updated June 2012 (software version 1.2)

McIDAS-V is a free, open source, visualization and data analysis software package that is the next generation in SSEC's 35-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, and contains "Bridge" software that enables McIDAS-X users to run their commands and tasks in the McIDAS-V environment. 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.

This tutorial assumes that you have McIDAS-V installed on your machine, and that you know how to start McIDAS-V. If you can not 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*).

Loading ABI Data Bundles

1. Load the **June-04-2005.mcvz** data bundle (Figure 1).

    a. In the **Main Display,** select *File -> Open File*.
       Locate *<local path>*/**ABI/June-04-2005.mcvz**
       bundle. Click **Open**.

    b. In the **Open bundle** window, select *Replace
       Session* in the drop-down list. Click **OK**.
       There may be a pause, as the data is unzipped
       before the bundle loads. The bundle will load 16
       bands of the simulated ABI data, listed under *Plan
       Views* in the **Legend** of the **Main Display**.
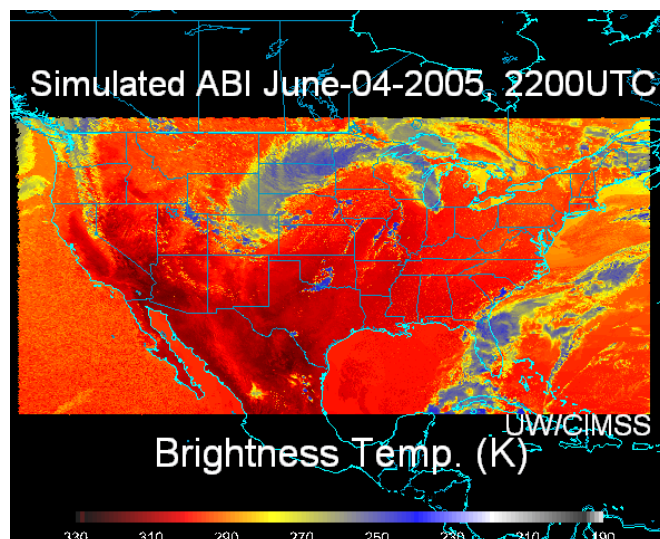
Exporting Data to Excel

1. In the *Field Selector*, select **Formulas** under **Data Sources**.

2. Expand *Export* list under **Fields**. Choose *Export Grid to Excel*. Select *Image Display* under **Displays**.
   Click **Create Display**.

3. Enter a filename in the **Select input** window. Click **OK.**

4. A *Field Selector* window appears for selection of data to export. Select *ABI brightness temperatures
   (band10) 7.34 um*. Click **Stride** tab. Uncheck "**Use Default**." Select *Every Fifth Point* for **X**. By default,
   the **X** and **Y** strides will be linked (changing one changes the other as well). Select a file name/location and
   click **OK**.

5. The image is displayed in the **Main Display** window. Open the excel file and view the data points.

Looping Through All 16 Bands

6. Load the second bundle, **Katrina.mcvz**, showing Hurricane Katrina on August 28th, 2005 at 2200 UTC.

    a. Select *Edit ->Remove ->All Layers and Data Sources* from the **Main Display** before loading
       Katrina.mcvz to free memory for the new bundle.

    b. Load *<local path>*/**ABI/Katrina.mcvz** using the same procedure as before. The **Main Display** window
       size may need expansion to view all the text labels correctly. When the bundle loads, 10 simulated ABI
       bands are displayed (Figure 4).

7. Loop through the bands:

   a. Select *View-> Displays ->Visibility Animation -> On* in the **Main Display**. This loops through all layers in the **Legend** that are marked with the 🔓 Visibility Toggle Lock in the unlocked position.

   b. To include a layer in the animation, click the Visibility Toggle Lock to "unlock" the current visibility of the layer. Lock the **Drawing Control** item to maintain the text throughout the animation.

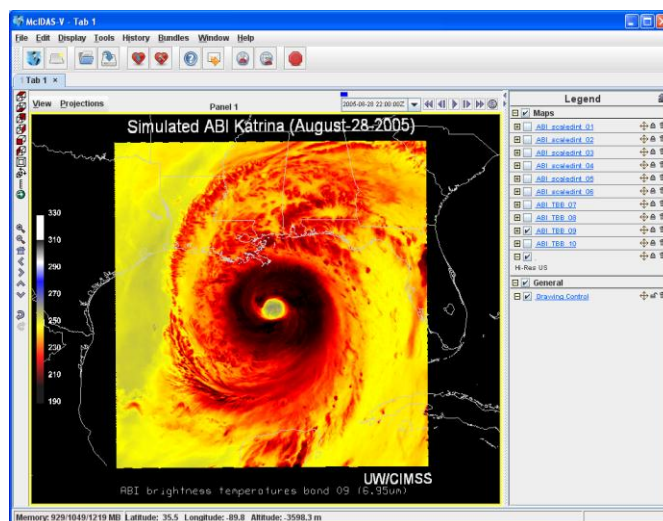   c. Uncheck *View -> Displays ->Visibility Animation -> On* to turn the loop off.

Loading Local Simulated ABI netCDF files

8. Remove all layers and data.

9. Load a local netCDF file.

   a. In the *Data Sources* tab of the **Data Explorer**, select *General -> Files/Directories* chooser. Locate the netCDF files in the *<local path>*/**ABI/Katrina** directory. Select one file and click **Add Source** (Figure 5)**.**

   b. Select the Field to be displayed under **Fields**, and *Color-Shaded Plan View* under **Displays**.

   c. Display a subset of the data region. Click **Region**, unselect **Use Default**, and *left click + drag* to select your desired region.

   d. Reduce the number of data points displayed (Figure 6). Click **Stride**, unselect **Use Default**, click on the drop down arrow for **X:**, and select **Every other point**. If necessary, repeat this process for the same for the **Y.** Click **Create Display**.
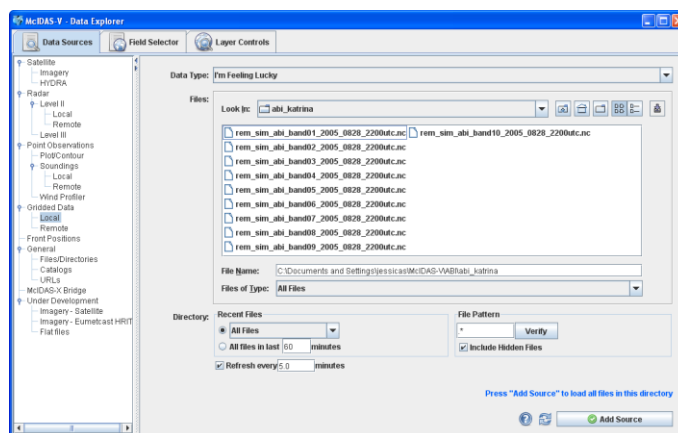

Figure 4: Display of Katrina.mcvz bundle

Figure 5: Loading netCDF data through General Files Chooser.
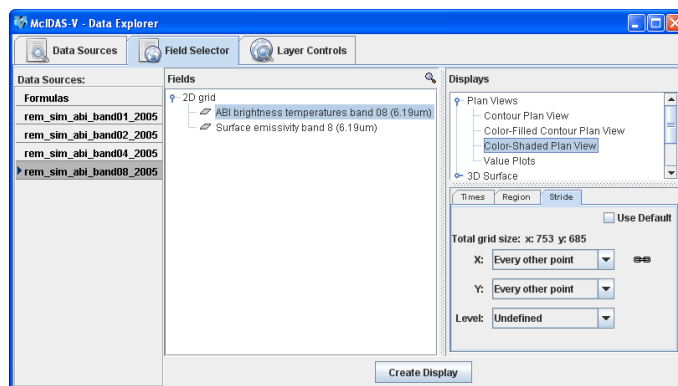

Figure 6: *Field Selector* **with Strides tab active.**

10. Adjust the data range (Figure 7):

   a. Right click on the color bar in the **Legend**

   b. Select *Change Range*. A new **Change Range** window appears.
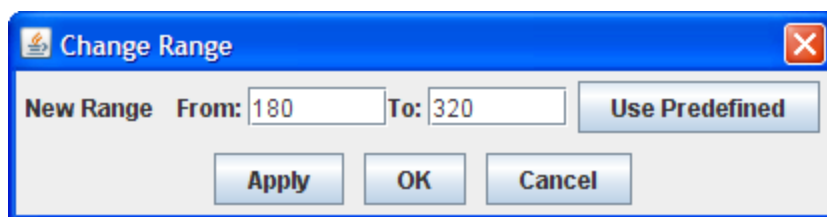

Figure 7: Change Range window to adjust the data plotted.

   c. Enter the new range and click **OK**. For example, 0 to 1 for the reflective bands or 180 to 320 for the IR Bands, 7-10.

11. Another method for stretching and shifting the range is available through the **Legend** colorbar (Figure 8)**.**

   a. *Left click* on the color bar in the **Legend** of the **Main Display** to activate the Interactive Color Bar.

   b. Shift the range up with right and left arrows.

   c. Expand the range with the up and down arrows.

   d. Use *Shift+left/right arrows* to change the range faster.

12. Adjust the color enhancement:

   a. Right click on the color bar in the **Legend**. Select *System -> Gray Scale* (for visible and near-IR bands 1-6) or *System -> Temperature* for the infrared (IR) bands.
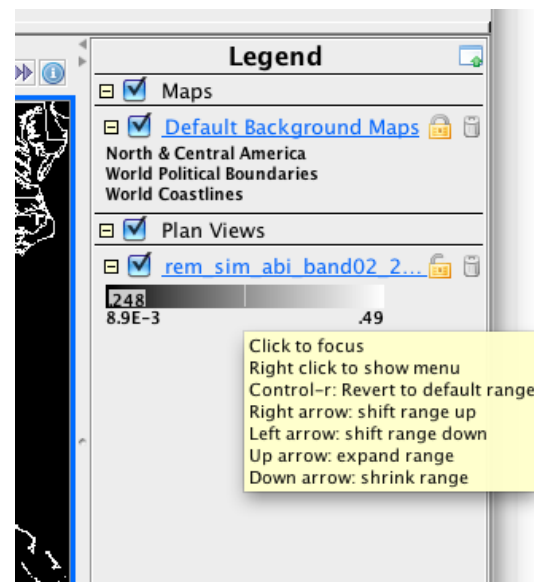

Figure 8: The Legend colorbar allows stretching and shifting the display range.

Installing a Plugin

13. In **Main Display** window, select *File -> New Display Window -> Map Display*. Note that the maximum number of panels available is currently **Four Panels**.

14. Copy **4by4.jar** locally and load through the plugins manager.

    a. In Main Menu, select *Tools -> Plugins -> Manage*.

    b. In the **Plugin Manager** window, select *File -> Install Plugin From File*.

    c. Navigate to location of **4by4.jar** in the **Open** window. Select <local path>/**ABI/4by4.jar**. Click **Open.** Click **OK** after reading the message "You Must Restart McIDAS-V to complete the installation of this plugin." Click **Close** to close the **Plugin Manager**.

    d. Exit McIDAS-V. McIDAS-V must be restarted to finish installation of plugin.
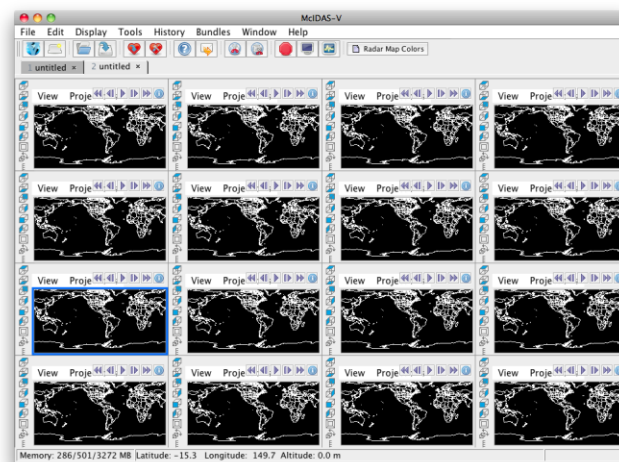
    e. Launch a new session of McIDAS-V.

Figure 10: Plugins add capability

15. In **Main Display** window, select *File -> New Display Tab -> Map View -> Four By Four*. McIDAS-V now has the added capability of display 16 panels of data (Figure 10).

16. Follow the instructions in the section entitled "Loading Local Simulated ABI netCDF files" to load one band into each panel.

The various ABI (Advanced Baseline Imager) visible (1,2), near-infrared (3-6) and infrared (7-16) bands, plus some of their uses, are listed in Figure 9. This table shows which band would be used in conjunction to highlight various features. For example, during the daylight hours, bands 2 and 3 for vegetation or a land mask, bands 2 and 4 for high versus low clouds, bands 2 and 5 for snow cover or water/ice clouds. During the day or nighttime, the IR bands can be used to identify fires, fog, cloud-top phase, upper-level SO_2, ozone, volcanic ash, land surface temperature, etc.

TABLE I. Summary of the wavelengths, resolution, and sample use and heritage instrument(s) of the ABI bands. The minimum and maximum wavelength range represent the full width at half maximum (FWHM or 50%) points. [The Instantaneous Geometric Field Of View (IGFOV).]

Future GOES imager (ABI) band	Wavelength range (µm)	Central wavelength (µm)	Nominal subsatellite IGFOV (km)	Sample use	Heritage instrument(s)
1	0.45–0.49	0.47	1	Daytime aerosol over land, coastal water mapping	MODIS
2	0.59–0.69	0.64	0.5	Daytime clouds fog, insolation, winds	Current GOES imager/ sounder
3	0.846–0.885	0.865	1	Daytime vegetation/burn scar and aerosol over water, winds	VIIRS, spectrally modified AVHRR
4	1.371–1.386	1.378	2	Daytime cirrus cloud	VIIRS, MODIS
5	1.58–1.64	1.61	1	Daytime cloud-top phase and particle size, snow	VIIRS, spectrally modified AVHRR
6	2.225–2.275	2.25	2	Daytime land/cloud properties, particle size, vegetation, snow	VIIRS, similar to MODIS
7	3.80–4.00	3.90	2	Surface and cloud, fog at night, fire, winds	Current GOES imager
8	5.77–6.6	6.19	2	High-level atmospheric water vapor, winds, rainfall	Current GOES imager
9	6.75–7.15	6.95	2	Midlevel atmospheric water vapor, winds, rainfall	Current GOES sounder
10	7.24–7.44	7.34	2	Lower-level water vapor, winds, and SO_2	Spectrally modified current GOES sounder
11	8.3–8.7	8.5	2	Total water for stability, cloud phase, dust, SO_2 rainfall	MAS
12	9.42–9.8	9.61	2	Total ozone, turbulence, and winds	Spectrally modified current sounder
13	10.1–10.6	10.35	2	Surface and cloud	MAS
14	10.8–11.6	11.2	2	Imagery, SST, clouds, rainfall	Current GOES sounder
15	11.8–12.8	12.3	2	Total water, ash, and SST	Current GOES sounder
16	13.0–13.6	13.3	2	Air temperature, cloud heights and amounts	Current GOES sounder/ GOES-12+ imager

Figure 9: ABI band list from Schmit et al, 2005 (BAMS).