Quick Start

The various files after expansion (use WinZip on PC and Stuffit Expander 5.1 on Mac):

Cc Color wheel (8 bit BSQ, 440 pixels by 290 lines by 3 bands), 373 KB (binary).

Cc.hdr Its header file (ASCII).

Cc.wvl and wavelength file (ASCII).

URBAN HYDICE sensor imagery (16 bit BIL, 307 pixels by 307 lines by 210 bands), 40 MB (binary).

URBAN.hdr The corresponding HyperCube header (ASCII).

URBAN.wvl The corresponding wavelength file (ASCII).

TERRAIN HYDICE sensor imagery (16 bit BIL, 307 pixels by 500 lines by 210 bands), 64 MB (binary).

TERRAIN.hdr The corresponding HyperCube header (ASCII).

TERRAIN.wvl The corresponding wavelength file (ASCII).

DTED Digital elevation matrix file (binary, 572 KB).

DTED.hdr Its corresponding header (ASCII).

Library.zip Spectral library (PC WinZip file, 49 signature files and 1 library list file, all in ASCII, 300 KB).

Immediate scenarios that you can try:

The color wheel (**Cc**).

1. Double click HyperCube to launch it.

2. If **Mac** then choose menu item **File->Open As...,** If **Windows** choose **File->Open...** A standard **Open File** dialog will appear.

3. Select **Multiband** as the file type from the popup menu.

4. Traverse the directories to find **Cc** and press **Open**. A dialog window will appear showing the contents of the header (hdr) file.

5. Press the **Load** button (no changes are needed) and the cube image will be displayed.

6. Select menu item **Image->Cube Color Composite->Specific Wavelengths** and a color image of the 3 bands of the cube will be generated (this isn't necessary but gives you a nice color image to select points from). If this menu item is dimmed, then click once on the image to activate it.

7. Position the cursor within the large yellow square on the color image and hold down the shift key while clicking the left mouse button. A small red crosshair will be set with a number 1 near it.

8. Select **Functions->Classify...** A new dialog will appear with a single point shown within a list and a magnified area displaying the selected point.

9. Press the **Classify** button in the dialog. A new image will be generated displaying the color regions matching the selected point within a tolerance. Move the cursor over this region and a label will dynamically appear with the number 1 in it.

10. You have just performed a single point classify using the **Vector Angle** algorithm with a tolerance of .08 radians.

11. Select several more points on the true color image or the cube itself by shift clicking the mouse. The additional points will be added to the classify dialog list. Press **Classify** and this time a multiple class map will be generated yielding the class as the cursor is moved over it.

12. Select **File->Close All** from the main menu to continue with the other data sets.

The urban scene file (URBAN)

1. These steps, using HYDICE imagery, are a bit more involved than those used in **Cc**.

2. If **Mac** then choose menu item **File->Open As...,** If **Windows** choose **File->Open...** A standard **Open File** dialog will appear.

3. Select **Multiband** as the file type from the popup menu.

4. Traverse the directories to find **URBAN** and press **Open**. A dialog window will appear showing the contents of the header (hdr) file.

5. Press the **Load** button (no changes are needed) and the cube image starting at band 60 will be displayed.

6. Select menu item **Image->Cube Color Composite->Definitions...**

7. Check **Use histogram equalization** in the resulting dialog.

8. Click **Okay**.

9. Select menu item **Image->Cube Color Composite->Specific Wavelengths** to form a color composite image from the cube image bands.

10. Select menu item **Windows->Show Info** and position it so it's not overlapping the images.

11. Reactivate the color composite image and move the cursor over the color image and while observing the x and y coordinates in the **Info** window shift click each of 3 points at coords [135,37], [87,134] and [213,124]. Exact positioning is not critical but these should be a road, a grassy area and a roof top, respectively. You can clear all points and try again by selecting menu item **Edit->Clear**.

12. Select menu **Functions->Plot->Spectra (Selected Points).** This will display a spectral plot of each point. Position it as necessary and reactivate the color composite image.

13. Select **Functions->Classify...** A dialog will appear with the 3 points shown within a list and a magnified area displaying a highlighted point.

14. Press the **Classify** button in the dialog. A class map will be generated displaying 3 color regions matching the 3 selection points. Move the cursor over each region and a label will dynamically appear with a number matching the selection point.

15. You have just performed a 3 point classify using the **Vector Angle** algorithm with a tolerance of .08 radians.

The next continuing steps show how to classify the 3 selected image points against a library.

16. On the classify dialog press **Load Lib...** button and open the folder containing the library signatures. All of the signatures and the Alib file must reside within the same folder.

17. Select file **Alib**, it will be the first shown in the entire list, and **Open** it. The library will be processed (a progress indicator will be shown) after a few seconds.

18. Click on the **Library** radio button in the classify dialog (it's within the **Search Domain** outline box at the upper right). Leave the **Signature** outline box set at the **File** button.

19. Press the **Classify** button. Three new windows will appear, each representing the 4 closest library signatures that match the selected image points. Double click a line within any of the 3 windows and that signature will be display in graph type window. Now, click and drag the graph portion over top of the signature plot that was produced in step 12. It will be superimposed in black to show you how well it matched a selection point. By using the **Options...** button in the **Classify** dialog you can change the number of closest matches (defaulted to 4) to some other number.

20. You have now classified an image against a library. The next steps will perform the inverse of the above, i.e. classify a library signature against the image.

21. Scroll the Alib window to signature 41 (Trees 1). Double click it to select it.

22. On the Classify dialog window select the **Library** button in the **Signature** outline box and the **File** button in the **Search Domain** outline box so that you are classifying a library signature against the image.

23. Press the **Classify** button and shortly a single class map will appear. Compare it with the color composite image of the same area.

24. Move the cursor over the class map area (red) and the matching library name will appear.

25. You may select additional signatures in the Alib window and produce a multiple signature class map. Double clicking a chosen signature in the list deselects it.

This group dynamically searches the library for the best matches as a function of cursor position.

26. Assuming the state of the HyperCube program is unchanged to this point, select **File** as the **Signature** and **Library** as the **Search Domain** in the Classify dialog.

27. Press the **Options...** button on the classify dialog. A lot of stuff will appear. Check **Enable dynamic display in File:Lib searches**. Press **Okay** to exit the options dialog.

28. Press the **Classify** button. Then, as you move the cursor over the Urban cube image window or its corresponding color composite window the 4 closest library names will be listed.

29. As an added visual feature, choose **Functions->Plot->Spectra (Dynamic).** A plot window will appear showing the image and the matching library signatures as the cursor is moved.

30. Try all of the above using the **TERRAIN** image data set.

The digital image data (**DTED**).

1. Choose menu item **File->Close All** and answer "no" to any save dialogs.

2. Choose **File->Open As...** and select **RAW** as the type of file and load image DTED.

3. Click the **Load** button in the header dialog. A 512 by 512 representation of DTED will appear.

4. Choose menu item **Applications->Shaded Relief...** and check **Anaglyph**, then **Okay**.

5. Two images will be generated. The first is the shaded relief and represents a "Sun" angle of 45 degrees coming from the upper left. The second is an anaglyphic stereo of the data that may be viewed in 3D with typical red/cyan glasses.

These steps represent a tiny fraction of the capabilities of **HyperCube**. The documentation describes each function in detail plus numerous visual examples.