

Follow the steps below for an example of a "single" path through the steps of the Hybrid Approach

Remember that the hybrid approach is designed to let you **first** work with smaller subsets of the image that have been clipped and mosaiced together to form a selection of the image heterogeneity for a given theme (such as forest, or urban, or water). **Second**, these mosaiced images are allowed to "self-organized" themselves into spectral clusters using an unsupervised approach. **Third**, if the unsupervised approach to forming signature clusters fails to distinguish a land or sea surface material which "YOU KNOW IS PRESENT", you may add to the signature file the result of a "supervised" clustering approach. **Fourth**, all signatures either from the unsupervised or supervised approach are appended together to form a single signature file which is used to "classify" (as a supervised classification step) the complete and full extent of the originals image. There are more than one path through this approach. Below are the basic steps in more detail.

CLIP Representative Data

There are multiple ways to clip an image, many of them use the subset command. The method that I have used and found to work the fastest is the following:

1. Start with the image you want to clip in a viewer
2. Click on UTILITY and select INQUIRE BOX
3. Move the box and enlarge it include the area you want to clip
4. Click the DATAPREP button, and select SUBSET IMAGE
5. Fill out the options selecting the image input and output, and click on FROM INQUIRE BOX button.

This will make a .img file that contains the area, layers, and data type you selected.

Group multiple Images blocks

Once you have all your clipped images, you will want to put them backtogether for your unsupervised classification. Do the following:

1. Click the DATA PREP button
2. Select MOSAIC IMAGE
3. Click EDIT and ADD IMAGE or use the button
4. Add all your clipped images
5. Then click PROCESS and RUN MOSAIC

This will make a new .img file with all your clipped images included.

Unsupervised clustering on representative data

1. With ERDAS running click on the classifier icon from the icon panel
2. Select Unsupervised classification, the dialog opens

3. Input raster file (*.img from the mosaic step) and provide an output name
4. NOTE: you should output a signature file
5. Initial clusters can be generated either arbitrarily or from an existing signature mean; select initial from statistic
6. Enter the number of different NUMBER OF CLASSES (ie. Try 3 times the number of expected classes)
7. Set the maximum iterations up to 40 (this insure the process does not run on forever)
8. Set the convergence threshold to .95 (ie. Stop processing when 95% of the pixels stay in the same cluster between interations)
9. Click OK on the dialog and on the status dialog when the process is completed.

Evaluate

1. Check for spatial distribution

- file|open|raster layer and display your multi bands combination (ie. 4,5,3 - this can be either the original "un-clipped" image of the mosiac image) it doesn't matter. All you are going to do is display the classified product "on top" of the unclassified image to help determine what surface material the various self-organized clusters relate to.
- from the viewer tool bar open a classified raster layer (this could be - or should be - the unsupervised classified data layer you just created), make sure the "clear display" option is turned off from the "raster options tab" found from that dialog box. Click OK. This will add two data layers into a single viewer (one on top of the other). You will now go through the steps to allow you to view the "true color", or false color image while also viewing the unsupervised clusters.
- select Raster | Attributes from the viewer, the editor will be displayed
- NOTE: you can edit the way this editor appears by selecting Edit | Column Properties
- Start by setting opacity for all classes to "0". In the Raster Attribute Editor, click on the word OPACITY at the top of the Opacity column, then right-click-hold on the word Opacity and select formula from the column option menu, click on the "0" (the zero on the number pad); and click on Apply.
- Now change the color for class 1 to something like Yellow or red so it is easier to see, click on the color patch and change the color.
- Change the opacity for class 1 in the Cell Array to 1 and press return, this class will be shown in the viewer.
- From the viewer menu bar select Utility | Flicker. Now the dialog opens, so turn on the auto mode.
- The flashing pixels are the pixels in this class, click on the Class_Name in the editor and give it meaningful name and assign it a meaningful color
- Repeat steps 6 thur 9 for the other classes.

2. Edit signature file

Based upon what you discovered when evaluating the location and pattern of the unsupervised clusters you may wish to remove or combine some clusters from the signature file.

- Click on the Classifier button located in the main menu bar. Select Signature Editor from the menu and a Signature Editor table will appear.
- Go to the File menu in the Signature Editor window and open the .sig file that you named in your unsupervised classification. You should now get values in your

Signature Editor table. The classes that you see here are those that were generated by the unsupervised classification and are based on spectral properties.

- Now that your .sig file is open, you may begin to edit it. This part of the exercise will show you how to merge two classes. You may want to do this after you go into the field and decide that two of the classes that were separately grouped during the unsupervised classification are really the same thing (i.e. both are alder). To merge two classes, you first need to select them from the table. To do this, click on the row of one of the Class #'s that you want to merge. Hold down the shift key and then click on the other class(es) being merged. In this example we will be merging classes 2 and 3 that were generated from an unsupervised classification into nine total classes
- Now go to Edit > Merge. Notice that a new class containing the data that you merged has been added to the last row in your table. With the two merged classes still selected, go to Edit > Delete to get rid them
- Save the new Signature File and close the Signature Editor table.

Supervised

You may also wish to add a signature cluster (a signature or cluster mean) to the signature file for a surface material that you know is present in the image but that you feel is too generally addressed by the unsupervised approach. To do this you may "supervise" the assignment of the cluster signature by "training" the signature.

There are a number of options for creating supervised training areas (drawing AOI's, growing AOI's, selecting AOI's from feature space) you can use one or any combinations of these to define training signatures.

NOTE: Remember you can go to the View/Arrange layers from the viewer menu and "right-mouse-hold" on the AOI layer and delete the AOI you don't need any longer.

1. Display

- Display file the representative mosaic as you like
- click on the Classifier icon on the ERDAS "icon" panel
- select signature editor to start the signature editor dialog box, you can close the classification menu bar
- explore how to view selected columns by selecting the view/columns option (ie. you don't need the RED, GREEN, BLUE columns displayed)

2. AOI = area of interest

- from the viewer menu bar select AOI/TOOLS
- using the viewer ZOOM make sure you can see a feature well (ie. zoom in)
- In the AOI tool palette, click on the POLYGON icon.
- In the viewer draw a polygon around the feature
- In the signature editor click on the add signature icon or select edit/add
- In the signature editor click inside the signature name column you just added and change the name to something you understand (ie. forest, urban, etc.)
- Repeat these steps for one or two other landcover types

3. Options for making training area (AOI) > Growing areas

- Select AOI/Seed Properties from the viewer menu bar, the region growing dialog opens
- Under geographic constraints, the area should be checked, enter a value (try 300) and press return
- For spectral distance, enter something like 10
- Click on options and make sure "include island Polygons" is checked
- Close
- In the AOI tool palette click on the region grow icon (looks like a magnifying glass)
- Click inside a different landcover type (say residential) in the viewer. A polygon will be created based upon the region growing properties you selected ... you can play around with those settings.
- When you're happy click on the added Signature (or edit/add) in the signature editor .
- Again do as many as you feel happy doing

4. Options for making training areas (AOI) > from feature space

- Select feature/create/feature Space Layers from the signature editor, the dialog box will come up
- Fill in the name of the input raster layer you are viewing (ie. *.img) and click the "output to viewer" button.
- Scroll down until you see the <imagename_2_5.fsp.img> row and click on (ie. select) that row. That will output band 2 with band 5, clearly you can select a different combination
- Click OK. and wait.
- Click OK when the job is done and a feature space viewer will come up.
- Now link the feature by selecting feature/view/linked cursors from the signature editor. A dialog will open
- Set the viewer to feature space viewer number (or click on the select)
- Click link, white cross hairs should come up in both the feature space viewer and the image viewer
- Drag the inquire cursor around in either viewer and see where geographic objects fall in feature space
- Use the AOI tool to draw a polygon IN THE FEATURE SPACE VIEWER around the geographic object.
- Now Add signature in the signature editor
- The signature you have just added is a non-parametric signature so select feature/statistics from the signature editor menu bar to generate statistics.
- Remember to change the names on all of you signatures.

Append the signature files of the unsupervised and supervised

- If a signature file is not currently opened - Click on the Classifier button located in the main menu bar. Select Signature Editor from the menu and a Signature Editor table will appear.
- Open any of the signature files you wish to append.
- Select FILE > OPEN from the menu bar of the Signature Editor and locate a second signature file. However, this time MAKE SURE the Append button is selected.
- Repeat these steps until all of the signature files have been append into a single file.

Do a supervised classification of whole image using appended signature file

- **It may be necessary to "associate"** the signature file with the image you wish to classify. Image association ensures that the signature file be applied to the "raw" (the original) image. In the signature editor menu bar select EDIT > Image Association. Navigate to the whole raw multispectral original image.
- In the signature editor menu bar select classify/supervised to perform a supervised classification
- Enter a new name for both the output and the output distance file
- Click Attribute options and select minimum, maximum, mean and st.d.
- Under the NON-parametric rule, select feature space
- Click OK wait