

12.481

Week 2: ArcPad Basemaps and Navigation

Goals:

- Learn to add basemaps to an ArcPad map
- Control basemap symbology and order
- Zoom, pan, and navigate in ArcPad
- Control and dictate map scale and layout

Basemaps in ArcPad

One of the nice things about using a digital device for field data collection is that a wide variety of different basemaps can be used for mapping and data collection. Basemaps come in two different types, vector and raster. Vector data consists of point, line, and polygon data. Examples of vector data are digital line graphs, or DLGs, which are files that contain all of the lines on a topographic map, or digital geologic maps, which may contain line, point, and polygon data. Raster data is essentially image data, or any other data that is stored in a 'grid format' of x,y pixels. Examples include digital air photos, satellite imagery, digital raster graphics, or DRGs, which are scans of topographic maps, and digital elevation models, or DEMs, which are gridded files of elevation information. Typically in digital mapping, both vector and raster data are used to make a complete basemap.

When using ArcPad, all vector layers must be shapefiles, which are the standard type file used by ArcView or ArcGIS. Raster files can be of two types, .jpg (JPEG) or .sid (MrSID). Each raster file must also be accompanied by a world file (.jgw or .sdw, respectively). These file types were selected for use with ArcPad because of the high compression ratios achieved. JPEG files are easier to make from typical TIFF images (a common image standard), but MrSID files achieve greater compression with less loss of detail. This exercise will make use of MrSID images. These images can be produced using ArcGIS 8.2 on any of the machines which support it, or on Manaslu in Kelin Whipple's lab, which has a stand-alone encoder that will create MrSID images from a wide variety of image types.

For this exercise we will install two vector files, one of topography and one of roads, and three raster files, a Landsat TM scene, a digital air photo, and a shaded relief DEM, then practice navigating around on these basemaps.

¹N. A. Niemi, 9/22/02

Install Basemap Files

Put your iPAQ computer into the cradle attached to one of the laptop computers. ActiveSync will automatically set up a connection between the iPAQ and the laptop. When a dialog box on the computer asks if you would like to set up a Partnership select 'No' and click OK (otherwise, it will attempt to Sync all of your e-mail, etc.). A dialog box will open which looks much like the 'My Computer' window on a PC. At the top of this window is a button marked Explore. Press this button and another window will open, which looks identical to a typical Windows file window. Move this window to the right side of the screen. Double-click to open MyDevice, then do the same to MyDocuments. From the left side of the screen, find the folder called 12-482-2. Drag this folder into the MyDocuments window. You should get confirmation that the data is being transferred. This may take a few minutes, as some of the image files are quite large.

You can remove the iPAQ from the cradle for the rest of the exercise.

Start ArcPad

Choose the ArcPad icon from the main menu to start ArcPad. ArcPad should start with a blank view. Instead of starting this week with creating our own shapefiles, we will start by adding existing layers and data to the ArcPad map environment.

Once ArcPad is up and running, click the second button from the left on the Main toolbar, the AddLayer button. It is a black + sign on a yellow diamond. A dialog box will open which resembles in some ways the Windows Explorer on the PC. Navigate to the 12-481-2 folder and show its content by pressing the + button next to it. In this folder you should see the files that were transferred over from the PC. Note that the icons to the left of each file name identify the file type. Roads.shp and contours.shp have an icon with a long and two short lines, identifying them as line shapefiles. The rest of the files have a 'grid' icon, identifying them as raster data. Tap the box next to each file to check that you wish to load it. Press OK on the dialog box. These files should now be loaded. To check this, press the Layers button on the Main toolbar, which looks like 3 yellow sheets of paper. This box should show all layers. Check that all are set to visible (checkbox under the eye on the left). Dismiss this box with either Cancel or OK.

If a variety of data now fills your screen, continue on. If your screen is still blank, do the following. On the Browse Toolbar (second one down), the second icon from the left looks like the earth. Press this icon. If your screen remains blank, ask for help.

Control and Navigation

Re-open the Layers dialog. Note that you can select layers by tapping on them once. When a layer is selected, a pair of black arrows appears on the right hand side of the dialog box. These arrows allow you to move layers up and down relative to one another. Note, also, that ArcPad is intelligent enough to automatically place all raster layers below the vector layers. Rearrange the layers in this order -

Roads
Contour
Airphoto
Relief
Landsat.

Now change the layer properties of Roads and Contour. Double-click the Roads layer and move to the 'Line Style' tab and change the width to 1 and the color to red. Repeat with the Contour layer, but use a light brown color. Click OK and close the Layer dialog.

The black mass at the lower right side of the screen should have become a brown mass. Select the magnifying glass from the left side of the toolbar and Zoom in on the brown mass. Although a mass of brown remains in the center of your screen, at the edges, this mass should have resolved itself into contour lines. Zoom in again to the very center of the screen. Now the individual contours should have begun to resolve themselves.

Select the dropdown menu from the magnifying glass and choose the Pan tool, which looks like a hand. Use this tool to look around the topographic map region.

The gray layer under the topographic map is a 1-m resolution digital air photo. This photo is difficult to look at, however, because of the contour lines which overlie it. Open the Layer dialog, and uncheck the boxes next the Roads and Contour. Close the dialog and you will see that the images alone are left on the screen.

Zoom in further on the airphoto. Can you see geologic detail, or has the image become pixelated (just a mass of gray dots?) Note the Zoom control also has a magnifying glass with a '-' sign in it. This is used for Zooming out. It does not work with a traditional click, however, like you are used to. As with the Zoom In button, you must draw a rectangle on the screen with the stylus. The smaller the rectangle the more the image zooms out. This is not an easy technique to master. Try Zooming in and out with these controls.

Now move to the drop down menu next to the 'earth' on the Browse toolbar. Note that the first two choices are 'Zoom In' and 'Zoom Out'. Try these for adjusting the map scale. Note that each moves with a fixed zoom. Use these, together with the magnifying glass controls, to find the largest-scale that the air photo can be used at before it pixelates.

Write the scale down here:

Now open the Layers dialog and turn the visibility of the airphoto layer to off.

When you return to the view it will probably resemble a complete mess. Although the scale you were at was acceptable for viewing 1-m resolution data, it is insufficient for viewing the next lower layer, a 30-m DEM. Open the drop-down menu from the 'Earth' icon and at the bottom tap 'Zoom to Layer'. A list of all layers will appear. Select Relief. Note that the zoom changes to just fit the Relief layer on the screen. This layer should look like a shaded relief map of the mountains.

We can return to the same menu, but this time select 'Zoom to Full Extent'. After a minute, the entire Landsat scene will appear on the screen. Since the Landsat scene encompasses all of the other layers, this same effect could have been achieved by selecting 'Zoom to Layer' and Landsat, however, this choice is useful when the map contains multiple, non-overlapping, basemaps (for example, if the map area required two Landsat scenes).

To return to the previous map extent, we could choose the Zoom tool and select the shaded relief area. Alternatively, we can move to the next icon on the Browse bar, a large blue arrow. Select the drop down menu from this icon and choose 'Go back to previous extent'. The last map extent will be displayed.

Open the Layers dialog and turn the airphoto back on. You can turn the Landsat scene and relief.sid off to save drawing time.

Another useful feature is the Set Map Scale feature. Choose this option from the same menu that you just selected the Previous Zoom option. In the dialog box, type in the value you recorded above (no commas). The map returns to exactly that scale. Note that the map scale and cursor position are displayed along the bottom of the map. A scale bar is also drawn on the map. These options can be turned on and off using the Options menu on the Main toolbar (the top toolbar). Select the drop-down menu next to the wrench and hammer. The options selected are surrounded by a red box. Tap to turn off a given option.

Measuring Distances

The final toolset we will explore in this exercise are the measuring tools. These are found in the drop down menu of the Information icon, which we used in the last class. There are three measuring tools, Measure, Radial Measure, and Freehand Measure. Test each of these tools to get a feeling for its function. Note that the Measure tool displays its results, distance and azimuth, in the lower left of the ArcPad screen. The other two tools display a dialog box with results in it when you complete the circle or path.

These tools can be very useful in the field in quickly determining a rough fault offset, or distance to a distant outcrop or hill.

Play, play, play

That's all the exercises for this lesson. The images loaded in the iPAQ are from the field area where we will spend January field camp. You can continue to play with them to get a feel for the iPAQ and the field area. Panning around on the Landsat scene is particularly informative. Note the bright colors, blues and greens, which denote volcanic rocks, versus the browner colors of the carbonate rocks, or the bright white of the salt pan. The really bright green to the northwest of the salt pan is probably irrigated fields.