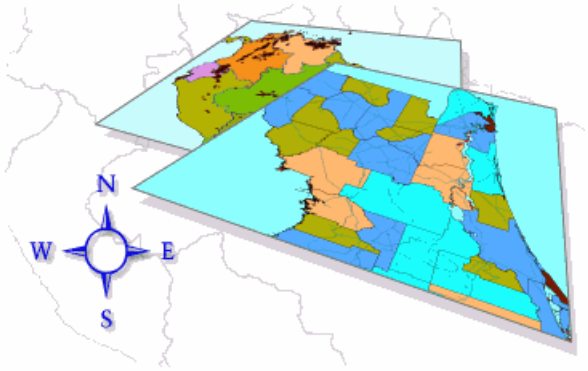


GIS Mapping



CANVAS 9 GIS+ blends native support for Geographic Information System (GIS) data with the full range of illustration tools and features found within CANVAS 9 Professional Edition. This tutorial describes how the powerful combination of the technologies found within this new version may be used to open and work with Shapefiles and create projections without having to use a third party program.

Can your current software do that?

The goal of this short tutorial is to provide you with a solid understanding of Shapefile technology and learn something about the GIS-specific Canvas features. Before we start, you should take a minute and look over some of the more common GIS vocabulary and other industry terms.

Question: What are Shapefiles?

A **Shapefile** is a digital vector (non-topological) storage format that has been created specifically for storing precise geometric location and other associated attribute information.

Shapefiles consist of the following three separate types of files:

1. The main file, a Shapefile (.shp), which contains geographic objects.
2. An index file (.shx), which stores the index of the feature geometry found in the main file.
3. A dBASE table (.dbf), which contains attribute information about the geographic objects found in the Shapefile.

Latitude is the angular distance of a point on the earth's surface along a meridian north or south of the equator. Latitude runs east to west.

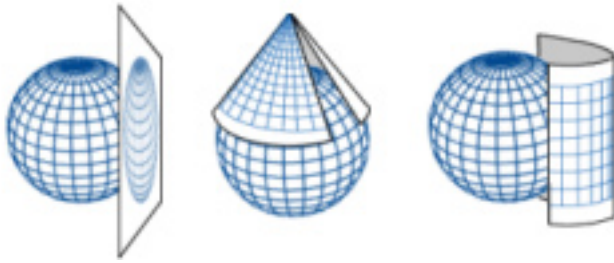
Longitude is the angular distance of a point on the earth's surface east or west of the prime meridian, the Greenwich meridian is located in Greenwich England thus the name. Longitude runs north to south.

A **Meridian** is a line of longitude running vertically from the north pole to the south pole. Unlike lines of longitude, meridians terminate at the poles.

The **Prime Meridian**, called the Greenwich Meridian (0), runs through Greenwich, England. From the Prime Meridian, measures of longitude are negative to the west and positive to the east up to 180°, halfway around the globe.

A **Projection** is a method of representing the earth's three-dimensional surface as a flat two-dimensional surface. This normally involves a mathematical model that transforms the locations of features on the earth's surface to locations on a two-dimensional surface. Because the earth is three-dimensional, some method must be used to depict the map in two dimensions. Therefore such representations distort some parameters of the earth's surface, be it distance, area, shape, or direction.

There are a variety of map projections, but all are generally of three basic types: Azimuthal, conical, and cylindrical projections.



Azimuthal

Conical

Cylindrical

NOTE: Before we continue further we wanted to remind you that the features and options discussed in this tutorial will only be active if you have purchased and installed Canvas 9 GIS+. To upgrade to Canvas X GIS+ click [here](#).

STEP 1

Opening Shapefiles

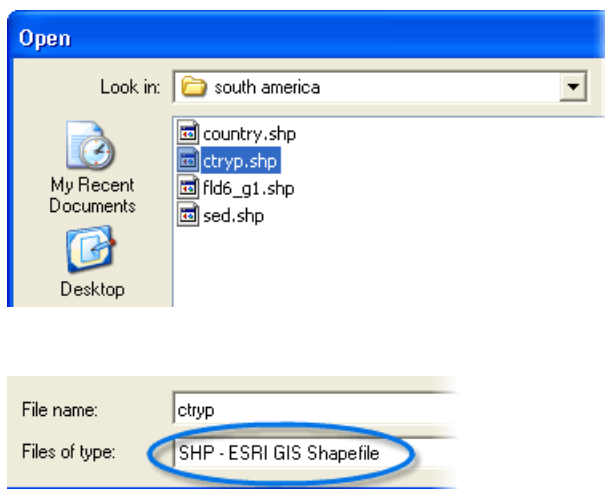
Start by choosing File > Open. The Open dialog box will appear.

Next, locate and select the .shp file that you wish to open and click OK. The Additional Files/Layers dialog box will open. Remember that the file type that you select must be a SHP - ESRI GIS Shape file.



Tip: Canvas can either open or place Shapefiles. Whether you choose Open or Place, you will be presented with the same dialog boxes.

When a Shapefile opens, Canvas creates a default page size. If you wish to create a special custom page size you need to use the Place command.



STEP 2


Projection and Coordinate Systems

Shapefiles do not contain information about projection, earth model, or projection parameters. Generally this information is provided by the person or organization that created the Shapefile.

For this tutorial, we are using Shapefiles that we have downloaded from the USGS GEO-DATA Explorer site. The information for the coordinate system was provided in a map abstract.

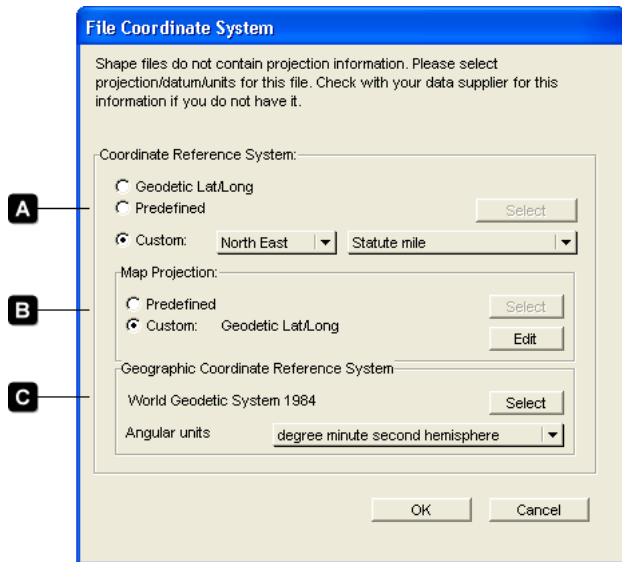
In the Additional Files/Layers dialog box, click the Projection button to open the File Coordinate System dialog box. The coordinate system that we will use for all the Shapefiles is:

Projection: Mercator
Datum: GRS 1980
False Easting: 0
False Northing: 0
Central Meridian: 0
Standard Parallel 1: 0
Unit: Meter

 Tip: If working with multiple Shapefiles that use the same coordinate system, you should establish the coordinate system for the first one before adding another Shapefile. This way, when you add additional Shapefiles, the coordinate system is already completed.

File Coordinate Systems dialog box:

Now let's take a look at the File Coordinate System Dialog Box. By default, the Geodetic Lat/Long radio button is selected when this dialog box opens. If you do not have the coordinate system information, simply click OK.



A. Predefined or Custom Coordinate Reference System

Select the **Predefined** radio button to choose an option from the Projected Coordinate Reference Systems dialog box. These predefined options are already configured with the projection, datum, ellipsoid, unit of measurement, etc.

Select an option and click OK to return to the File Coordinate System dialog box.

Select the **Custom** radio button to enable the origin and measurement menus. Select either North East, North West, South East, or South West as the Canvas 0,0 origin.

Select a unit of measurement to be used in the file. For this tutorial, we are using "meter" as the unit of measurement.

B. Map Projection:

You can either select a predefined projection or use a custom one.

Select the **Predefined** radio button to open the Select Map Projection dialog box. Select one from the list. The related property and parameter values are displayed on the right. Click OK to return to the File Coordinate System dialog box.

Select the Custom radio button and then click the Edit button to open the Map Projection dialog box. Select a projection from the list. Further customize the projection by entering the necessary values in the Parameters section.


For this tutorial, "Mercator" is our selected projection. In the Parameters section, enter 0 in the Central Longitude and True scale Lat fields.

When complete, click OK to return to the File Coordinate System dialog box.

C. Geographic Coordinate Reference System

In this section, you can select the earth model and Angular units. The default earth model is WGS 1984. The default Angular unit is degree minute second hemisphere.

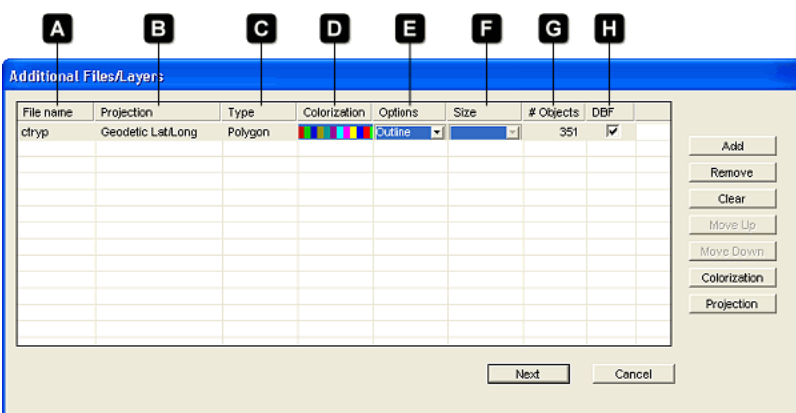
Although the map abstract lists GRS 1980 as the datum, we will use the "WGS 1984" earth model for our example. The Angular units will be the default selection.

 Tip: For more information, regarding projections, ellipsoids, datum, angular units, etc., visit European Petroleum Survey Group (EPSG) and download their database.

STEP 3

Additional Files/Layers Dialog Box

When this dialog box appears you will have access to the various controls that are designed to modify the appearance of the Shapefile when it is opened within Canvas. Below is an explanation of the different options available.



- A - File name** Lists the name of the file being opened.
- B - Projection** Indicates the file's projection. Geodetic Lat/Long is the default. Select a row and click Projection to open the File Coordinate System dialog box.
- C - Type** Indicates the object type. Shapefiles consist of either polygons, lines, or points.
- D - Colorization** By default the fill color is set to black in the Colorization column. To change the fill color and style, select the row and click Colorization to open the Colorization dialog box.
- E - Options** For polygons, select either Outline or No Outline. For points, select the shape: Circle, Rectangle, or Triangle.
- F - Size** Refers to point size. Select from Tiny, Small, Medium, or Large.
- G - # Objects** Indicates the number of objects contained in the file.
- H - DBF** Choose to import or not import object attributes by selecting or deselecting the DBF checkbox.

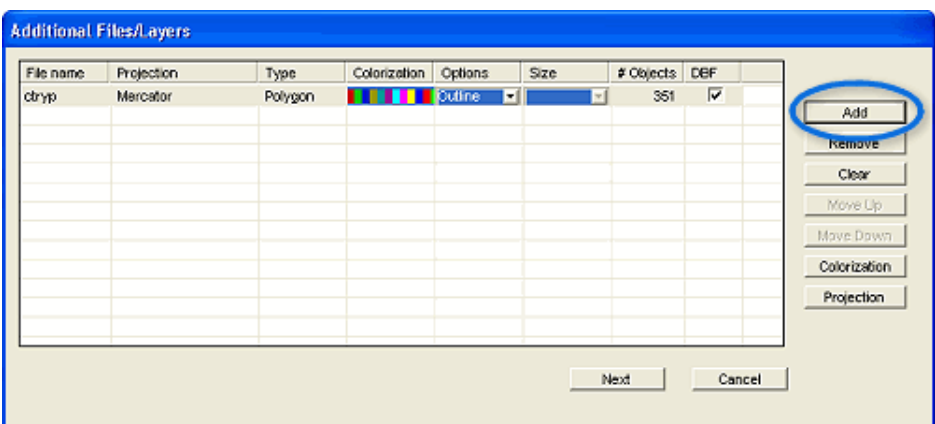
STEP 4

Adding Shapefiles

Now that we've established the projection for the first Shapefile, it is time to add additional Shapefiles.

NOTE: We recommend setting up the projection for the first file and then adding other files. Thus, the added Shapefiles will use the same projection.

To add a file, click the Add button and navigate to the Shapefiles. Repeat this process until you have added all your Shapefiles.

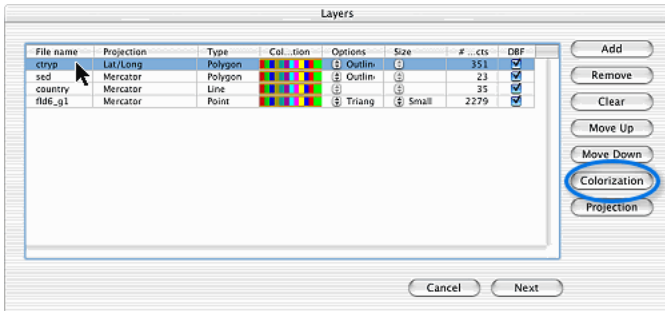


STEP 5

Colorization

To differentiate between the various Shapefiles, we'll use a different colorization technique for each one. Colorization refers to the fill color of the objects.

Select the first row and click the Colorization button to open the Colorization dialog box.

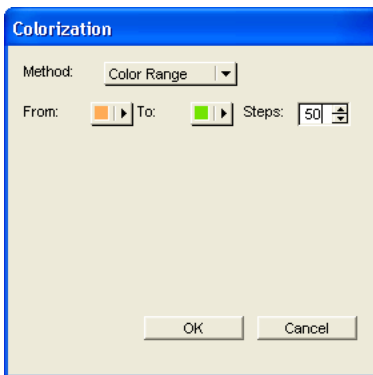


In the Method menu you will have the option to select either No Fill, Solid Color, Color Range, or Color Array.

For the first Shapefile, we will use the Color Range method as shown in the image. Enter 50 in the Steps field. Click OK after selecting the colors to return to the Additional Files/Layers dialog box.

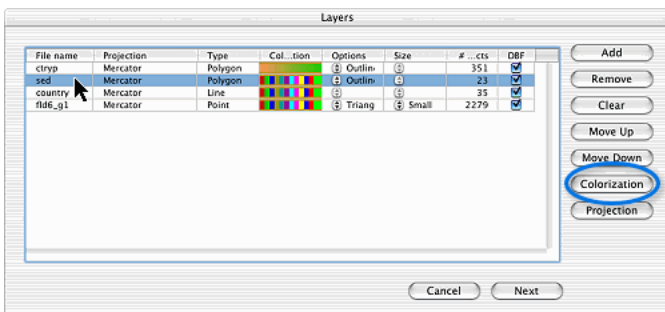


Tip: Color Range creates a gradient fill for the Shapefile.

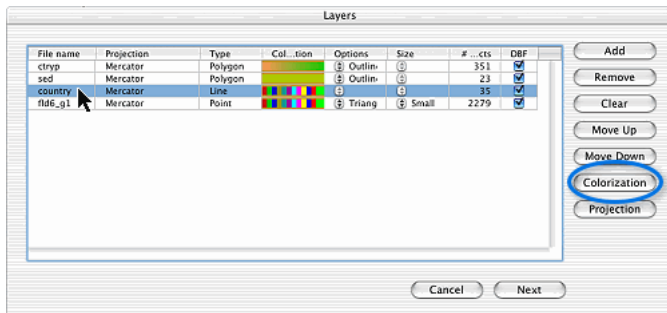


Now select the second row and click the Colorization button. We will use the Solid Color method. For this particular Shapefile we will be using a light green color.

Click OK to return to the Additional Files/Layers dialog box.



Select the third row and click the Colorization button.

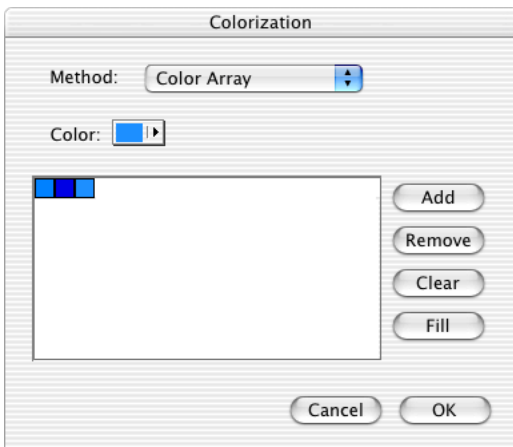


For this Shapefile we will use the Color Array method and give it three shades of blue. Using Color Array, the selected colors are randomly applied as fills. To do this select a color from the pop-up color palette and then click Add. You can delete a single color by selecting it in the dialog box and then clicking Remove.

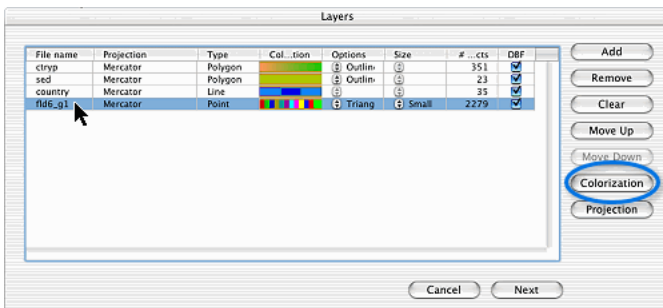
Click OK to return to the Additional Files/Layers dialog box.



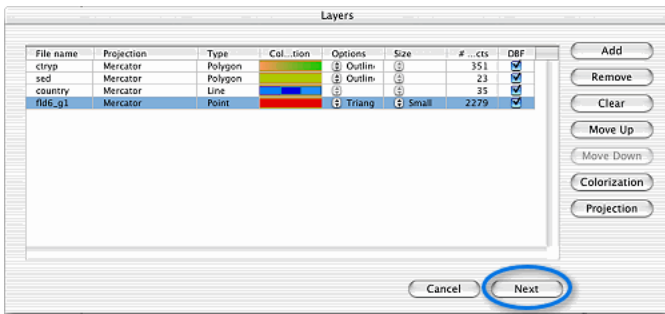
Tip: Click the Clear button to remove all the default colors from the dialog box.



Select the fourth row and click the Colorization button. We will use the Solid Color method. Select a shade of red and then click OK.



Now that the projection and colorization techniques have been established, we can click the Next button to move to the Document GIS settings.

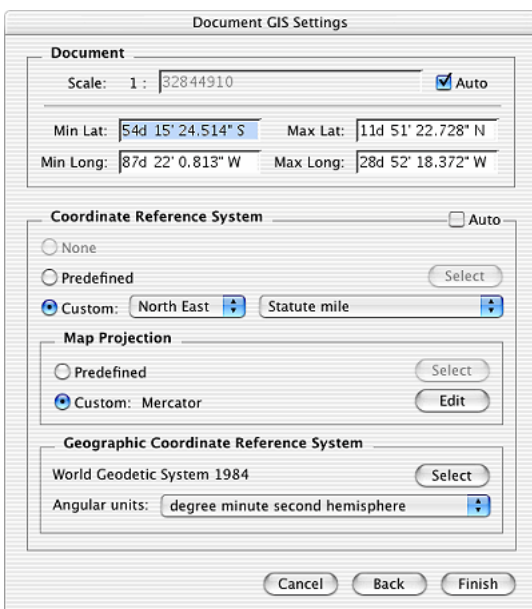


Document GIS Settings

The Coordinate Reference System section of this dialog box indicates the settings that you entered in the File Coordinate System dialog box.

The Document section at the top indicates the bounding box of the document. Deselect Auto to enter values in the Min Lat and Min Long fields. If you are unsure of the coordinates for the bounding box, select the Auto checkbox.

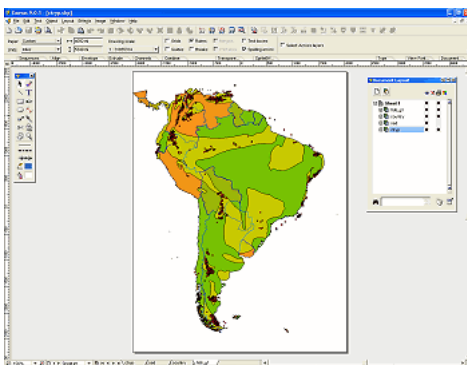
Click Finish to open the Shapefiles.



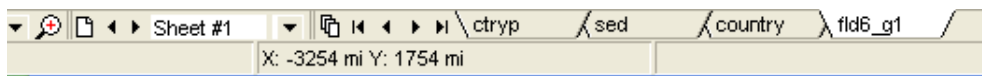
STEP 6

Controlling the layers

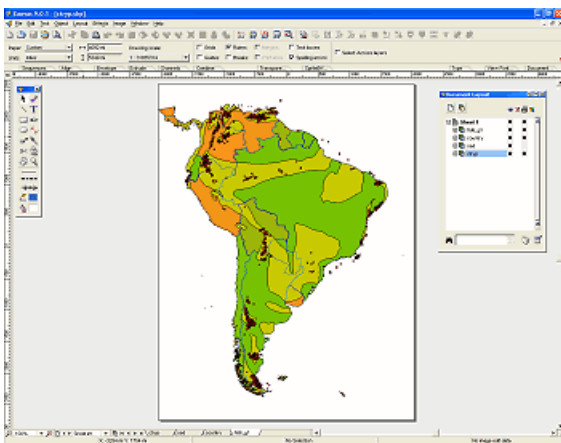
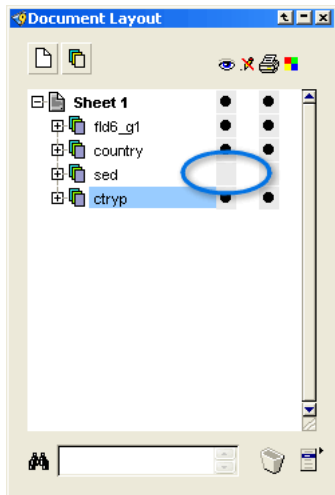
On the right is the completed projection. Since we used the Add button to open additional Shapefiles, each Shapefile is on a different layer which gives us control of how the map is displayed.



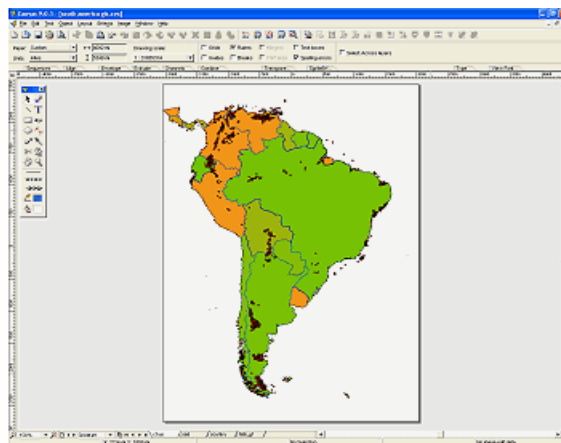
You can use the Page and Layer controls to shuffle through the various layers.



Or you can also use the Document Layout palette to lock, delete, shuffle, and turn off layers.

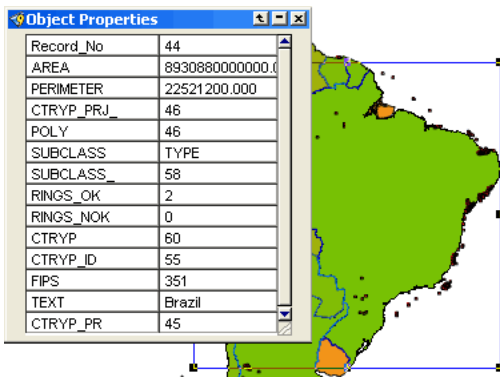


Above is the original projection



Above is the same projection with the "sed" Shapefile turned off

Note that all of the object's GIS information is easily accessible by simply selecting the object and opening the Object Properties palette.



Tip: Remember that you can use Canvas 9's powerful scripting engine to extract and process Shapefile data. For scripting information, download the Canvas Scripting Reference Guide.