

A normalizing method for combining soil EC maps

Objective:

To combine soil EC data from adjacent fields into a single map, when temperature, moisture, or tillage conditions between the fields cause EC values to be on different scales.

Background Information:

Soil electrical conductivity measurements have been found to vary with soil temperature, moisture, and surface density conditions. It has been our experience that soil temperature is the largest cause of EC variations. Because the goal of soil EC measurements is to identify contrasting soil regions, it is the relative readings that matter—not the absolute measurement. This Application Note will explain how to combine maps made when one or more of these variables has caused the EC readings to differ widely from one field to its adjacent neighbor—or from one portion of a field to another. Figure 1 is an example of what can happen when data sets from two different maps are combined into one file and mapped as one field. In this case, one half of a field was mapped in April and the second half mapped in August. As is evident in Figure 1, the warmer soil temperatures in August registered significantly higher soil EC readings. Figure 2 shows how these two files can be combined using the process described below and successfully mapped as one field. If possible, it is advisable to EC map a field when it is in uniform condition. If part of a field has been irrigated or tilled differently, it should be mapped on a separate file to allow normalizing.

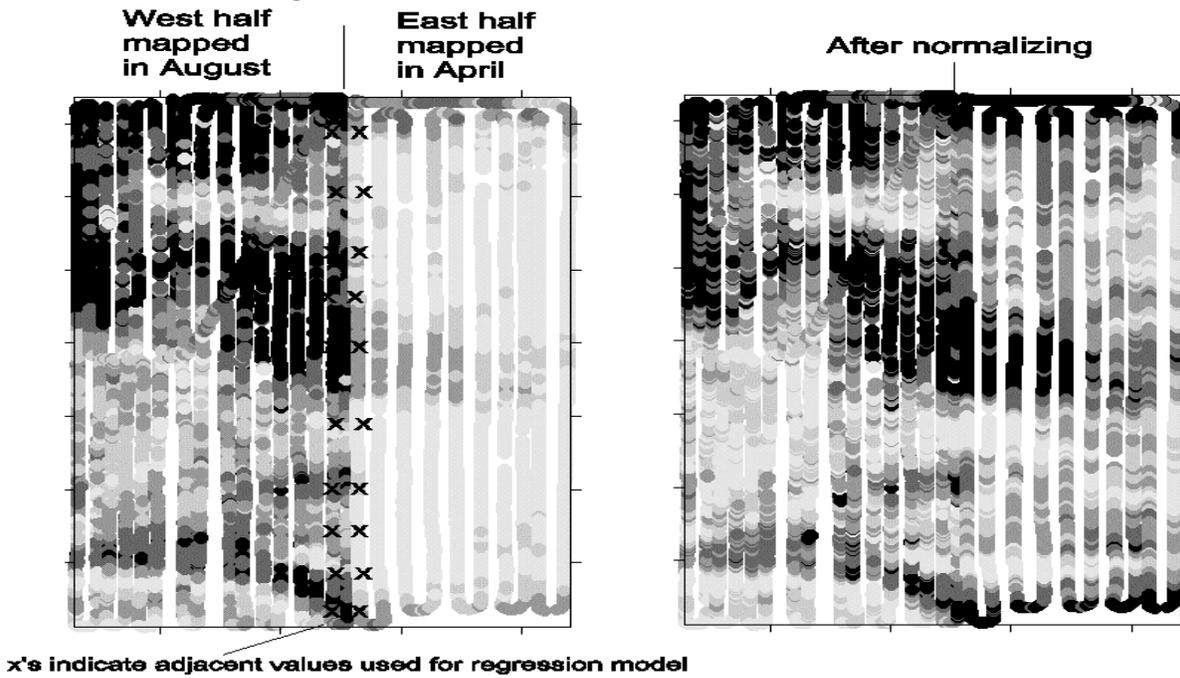


Figure 1.

Figure 2.

METHODOLOGY:

Using adjacent points from each data set, a regression model will be created and applied to the data.

Steps:

1. Combine data sets from the two adjacent field and generate a map. Inspect the area of the map where the fields join for visible difference in the sets. You may also want to compare the means of each set, although natural field differences can result in appropriately different means.
2. If there is an obvious line in the map where soil conditions have caused unacceptable variations, load each data set into a GIS that allows you to identify the EC value of selected data points or pixels.
3. Select 8-12 adjacent pixels or data points from adjacent transects, as shown in Figure 1. (It's a good idea to map a transect at the edge of each field if you expect to combine it later with its neighbor.)
4. Enter the values from the points/pixels you've selected into an Excel spreadsheet as shown in Figure 3 below. Column A will be your X axis—the data you want to fit the other field to. Column B will be your Y axis—it will be the recipient of the regression equation.

EC Values:

April	August
53	82
35	51
42	82
50	72
25	37
38	63
31	41
23	43
44	79
38	63

Figure 3.

5. Create a regression equation to apply to the data, as shown in Figure 4 below. (Tip: this is easily accomplished by using the statistical functions available in Excel; look in: Tools—Data Analysis—Regression. Create a line fit plot of the data and add a trendline. Right click on the trendline to format it; select Options—display equation on the plot.) Apply the equation to the EC data from field you selected as column Y.

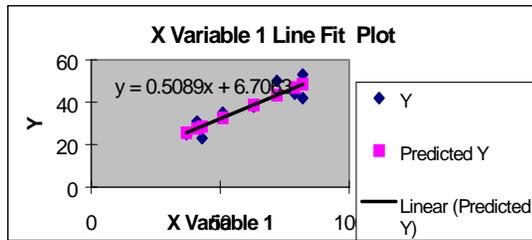


Figure 4.

6. Recombine data into one file and re-map. Inspect map to see how well the regression equation fit these fields. See Figure 2.