Applying MapCalc Map Analysis Software

Using MapCalc's Shading Manager for Displaying Continuous Maps: *The display of continuous data, such as elevation, is fundamental to a grid-based map analysis package. Understanding the interaction between the data distribution and different display options is critical to generating effective map presentation.*

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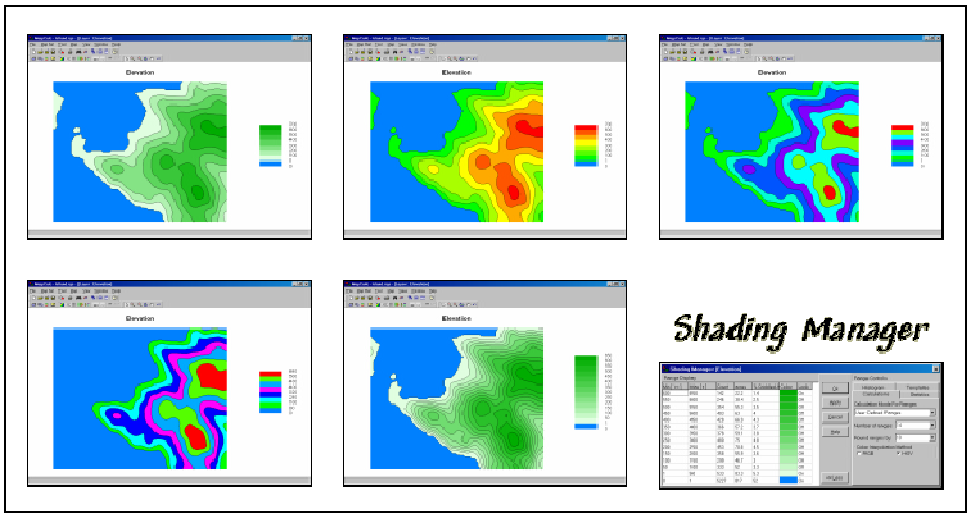
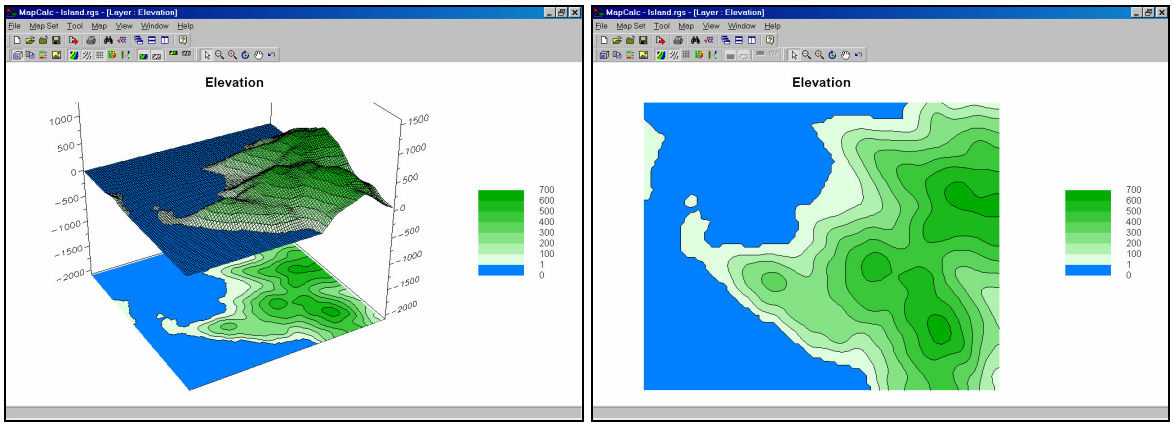
Summary of MapCalc Shading Results.



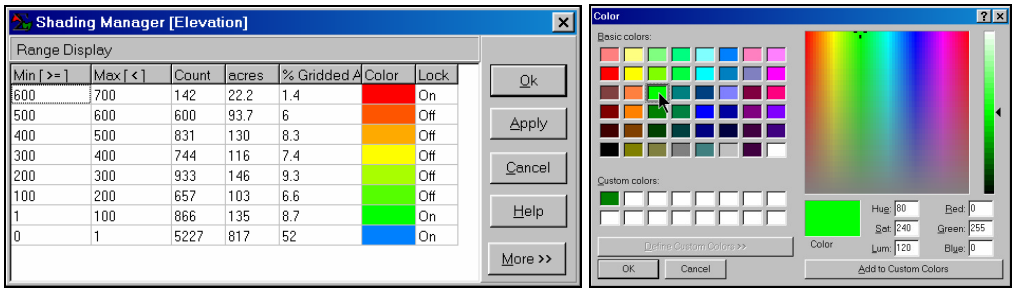
Assigning Colors and Contour Intervals. All grid-based data (also referred to as "raster" data) is represented as a matrix of numbers. Continuous maps contain values that form a continuum in both numeric and geographical space, such as an elevation map, temperature gradient or sales density surface. The range of values on the map is divided into ***contour intervals*** and ***colors*** are assigned to each interval. MapCalc's ***Shading Manager*** is used for making these assignments.



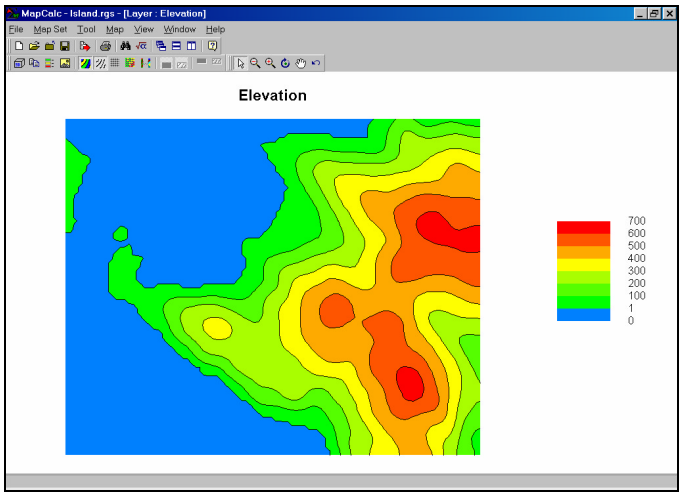
Contour Map (elevation surface). The elevation values on this map range from 0 (sea level) to 635 feet. If a separate color was assigned to each data "step" there could be as many as

636 different colors and the display would look like confetti. For this display the map values were grouped into seven 100-foot contour intervals from pale to dark green, plus an additional interval representing the ocean (0-foot) as light blue.

Step 1. A different color scheme can be applied by right-clicking on the map then selecting the "***Shading Manager***" (or clicking on the "Shading Manager" button on the tool bar; or from the Main Menu, select Map à Shading Manager)…

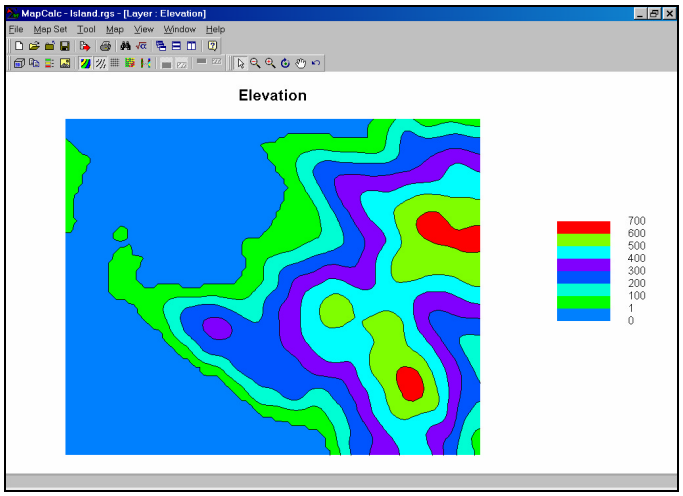


The color for an interval can be changed by selecting it, then choosing a new color from a pop-up pallet. In this example a light green was assigned to the 1-100 foot contour and bright red was assigned to the 600-700 foot contour. The intervening colors were automatically assigned as a continuous color gradient from green to red.



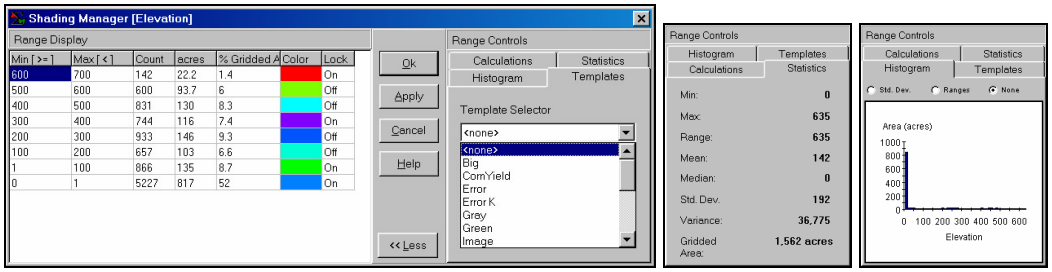
Color gradient (green to red). Note that the spatial patterns are unchanged and that just the color assignments were modified.

The "***On/Off Lock***" sets in the color table can be used to establish inflection points in the color gradients. For example, if the yellow selection is reassigned to a bright purple, the color gradient progresses from green to purple to red…



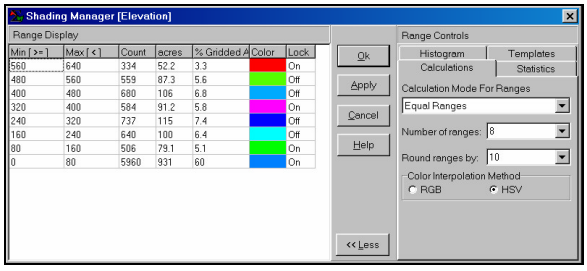
Color gradient (green to purple to red). The purple interval is set and the color gradients on either side are automatically assigned. To "force" color assignments you would simply set the color locks on.

Step 2. The right side of the shading manager provides several options for viewing a map (the ***Less/More*** button toggles off and on the extended option window).

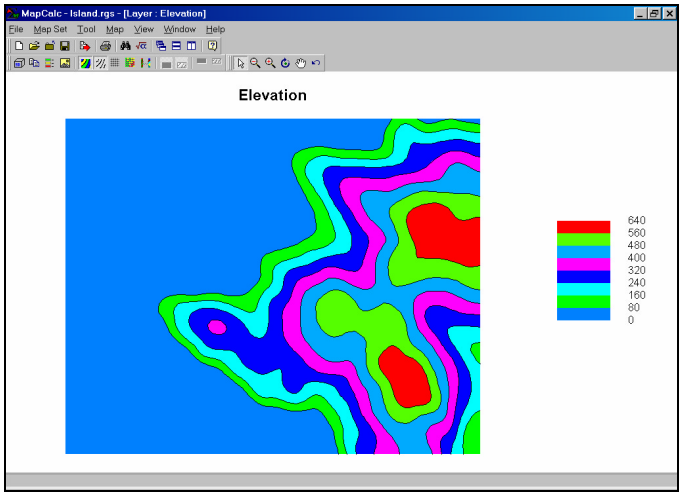


The ***Templates*** tab allows you to store and recall color pallets for applying them to other maps. This feature is critical for consistent viewing of related maps, such as applying the "CornYield" template to several different cornfields. The ***Statistics*** tab provides basic statistics summarizing the values on a map. The ***Histogram*** tab plots a frequency distribution of the data (not very informative in this case as most of the map area is classified as ocean— 0 foot, hence the big spike).

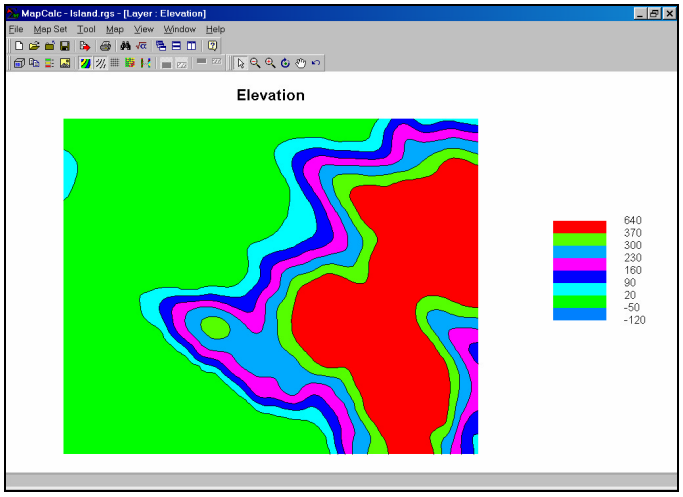
Step 3. The ***Calculations*** tab allows you to specify different methods for determining data intervals used in a display…



For example, if the ***User Defined Ranges*** method is changed to ***Equal Ranges***, the contour intervals are recalculated. Note that the first interval was changed from 0 through 1 to 0 through 80. The resulting map is a bit strange as it "lumps" the ocean area into land area with elevation of up to 80 feet.

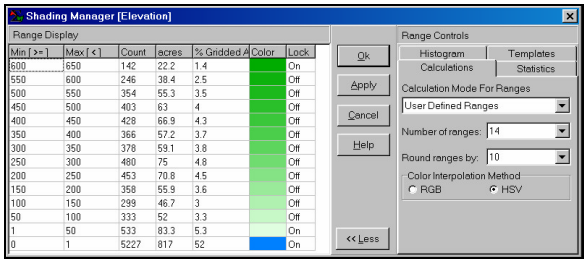


Equal Ranges Classification. An 80-foot contour interval was calculated by th3e equation ***(max – min) / # ranges*** = (635 – 0) / 8 = 79.375= 80. Note from the shading manger table that while the data range is consistent, the interval membership varies greatly—from only 334 cells in the 560-640 interval to 5960 cells in the 0-80 interval. The other interval calculation methods (***Equal Count***, ***Standard Deviations***, and ***Custom Min/Max/Increment***) group the data using different equations and result in dramatically different map expressions of the same data…

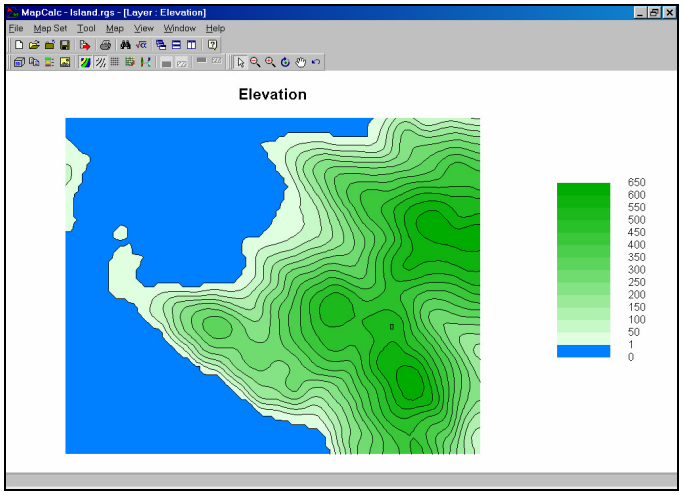


+/- 1 Standard Deviation Classification. This method uses the mean and standard deviation to calculate the interval assignments— bounds assigns equal range intervals to the middle range of values (+/- 1 standard deviation) and leaves the "tails" for the upper and lower intervals. Note the assignment of "irrational" negative intervals results if the data isn't normally distributed.

Step 4. The ***number of intervals*** used can dramatically affect the display of a map.



In this example, the original *User Defined Ranges* of eight intervals was increased to fourteen, retaining the same color gradient from light green to dark green with the ocean area assigned light blue.



2D Contour Map (50-foot interval).

The result is a 50-foot contour map that implies more information. Generally speaking, more than 20 intervals tends to make maps "overly busy" and is not encouraged.

Summary. *Color*, *interval calculation method* and *number of intervals* can dramatically change map displays. It is important to use the most appropriate specifications for each of these considerations when generating displays of continuous data. The ability to easily construct and recall *customized display templates* is an key feature of any mapping software package.

When attempting to view a map, you should first consider its ***Data Type*** (*Discrete* or *Continuous*) then decide on the ***Display Type*** (*Lattice* or *Grid* and *2D* or *3D*) and finally the ***Color Intervals/Pallet*** (*Shading Manager*) to use.