

STAT 406, SPRING 2008
Assignment #3
Due Tuesday, March 4, 2008

A tributary of the Washita River in southwest Oklahoma, the Little Washita River Watershed is unique in that over a period of several years it has been the target of extensive research. In 1936 the eastern portion of the watershed was chosen as part of a national demonstration project for soil erosion control. In the late 1930's the Civilian Conservation Corps (CCC) did extensive erosion control work, such as terracing, drop-structure building, gully plugging, and tree planting. Since establishing county offices in the 1940's, the U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) has applied extensive soil and water conservation structures and measures, including terraces, diversions, farm ponds, floodwater-retarding reservoirs, gully plugging and smoothing, scrub timber removal, and land use planning. To find out more about this unique area, you could go to <http://hydrolab.arsusda.gov/washita94/chap2.htm> or <http://edna.usgs.gov/Edna/samples/washita.asp>. I have selected part of this data set for you to analyze in this assignment.

You can download the data from the course website under the name "hw3.txt". The columns are labeled as follows: "u"--horizontal coordinate, measured in meters, "v"--vertical coordinate, measure in meters, "moist"--soil moisture, measure in percent by volume and "elev"--elevation, measured in feet. Your task is to model the spatial distribution of soil moisture, and to produce a map of predictions over the area under consideration. You should address such questions as trend and anisotropy, model fitting and assessment via cross-validation. You will notice a relationship between elevation and moisture which you could exploit as part your modeling the trend. You will find a second data set on the website ("hw3_all_elev.txt") which contains the elevation data at a finer resolution. You can use this data to calculate predictions. Alternatively, you could predict the elevation data first on a grid and use those predictions as your covariate.

You should think of this task as a research mini-project, in which there are no imposed standards, but you should perform the analysis by thinking of as many aspects of the problem as you can.