

## GLY 5826, Assignment 7

I have placed a comma-separated-value (csv) file of x and y coordinates (m) and soil-water distribution coefficient ( $K_d$ ,  $l\text{ kg}^{-1}$ ) values on the internet at <http://www.fiu.edu/~sukopm/GLY5826/BATCH.csv>. These data were measured using batch techniques and reflect the strength of adsorption of the fungicide Metalaxyl to aquifer solids near Seattle, Washington. They can be used to predict the movement of this chemical in the aquifer. You will learn more about  $K_d$  and its use later.

The data were collected on one of those ‘super’ sampling schemes I mentioned in class; even though there are only 30 locations, you will obtain approximately 30 pairs in each lag class. The sampling locations were chosen with a lag class width of 1.5625 m in mind.

1. Compute and plot the omni-directional semivariogram. Note that because of the ‘optimized’ sampling scheme, you will be able to estimate the variogram effectively even at 25 m. Use this limit and the lag class width above in your computations (i.e., compute a new ‘Number of lags’ and ‘Lag separation’ in SGeMS).
2. Compute the mean and variance of the data set. Fit a variogram model. Plot the observed and fitted variograms together. I believe a variogram model that includes a small nugget is appropriate. The sum of the variances contributed by the nugget and the ‘main’ variogram should equal the variance of the data set.
3. Use conditional Gaussian simulation (incorporating the data and the variogram model) to create values on a 25 x 25 m grid at 0.1-m grid spacing. Plot the results and a histogram of simulated values. (Hint: Use SGeMS or under Tools/Data analysis, choose Histogram in Excel. You might need to add this ‘add-in’.) Provide a comparison between simulated and observed values. (The observations fall on a 0.1 m grid; you can make an exact point-by-point comparison by simulating on to a 0.1 m grid.)
4. Use simple Kriging to inter/extrapolate the data on to a 25 x 25 m grid at 0.1-m grid spacing. Plot the results and a histogram of predicted values. Provide a comparison between simulated and observed values.