Soil Salinity Samples and Variograms: Case Study in the Lower Arkansas Basin

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Abstract. The objective of this study was to develop a methodology to generate high accuracy soil salinity maps with the minimum number of soil salinity samples. Variograms are used in this study to estimate the number of soil salinity samples that need to be collected. A modified residual kriging model was used to evaluate the relationship between soil salinity and a number of satellite images. Two data sets, one representing corn fields, and the other representing alfalfa fields are tested with seven satellite images. The satellite images were acquired from different sources Aster, Landsat7, and Ikonos to check the correlation between measured soil salinity and remote sensing data. Two strategies were applied to the data sets to produce subset samples. For the corn fields data set, nine subsets of the data ranging from 10% to 90% of the data in 10% increments were produced. For the alfalfa fields data set, three subsets of the data 75 %, 50%, and 25% of the data were produced. A modified residual kriging model was applied to the reduced data sets for each image. For each combination of satellite image and subset of the data, a variogram was generated and the correlation between soil salinity and the remote sensing data was evaluated. The results show that the variograms can be used to significantly reduce the number of soil salinity samples that need to be collected.

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