Potential contribution of residuals for better prediction of soil salinity from remote sensing data

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Abstract. Soil salinity predictions derived from Ikonos and Landsat satellite images are compared with field-collected soil salinity data for a study area in Colorado's lower Arkansas River Basin. The accuracy of the predictions are compared and issues of price, resolution, and coverage areas, are considered. Stepwise regression is used to select the combination of bands in the satellite images that best correlate with the field data. The Ordinary Least Squares (OLS) model is used to predict soil salinity using the combination of bands that resulted from the stepwise regression. The residuals for the OLS model are checked for whether they are roughly normal and approximately independently distributed with a mean of 0 and whether there is some constant variance or not. If the residuals do not meet these conditions, there is some kind of autocorrelation among them whcih can be interpolated using kriging. The final predicted surface results from combining the surface produced from the OLS model with the surface produced by the kriged residuals. The results of this methodology to predict soil salinity from remote sensing data while taking into account the importance of residuals are promising. The Ikonos imagery provides a finer resolution than Landsat, but the Landsat imagery was able to capture most variations in soil salinity at a lower cost than Ikonos. Furthermore, using remotely-sensed data to predict soil salinity represents a significant savings in time and effort over extensive field collection data schemes.

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