A Remote Sensing - GIS Approach to Evaluate the Effects of Soil Salinity on Evapotranspiration

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Abstract. Over the last decade, models for estimating of surface water fluxes (e.g. evapotranspiration) using remote sensing algorithms have been developed. These models use information derived from satellite imagery such as Landsat, AVHRR, ASTER, and MODIS to estimate ET. The remote sensing approach to estimating ET has two main advantages over traditional methods. First, while most conventional methods are point measurements that compromise the spatial variability of ET, the remote sensing approach can provide spatial estimates of the ET. Secondly, while conventional methods estimate a reference crop ET from meteorological data and apply crop coefficients to estimate the crop's ET, remote sensing models are able to estimate directly the actual crop ET in a specific field due to factors such as water shortages or salinity impacts. ET is one of the processes important to crop production that is affected by soil salinity. This presentation focuses on using geographic information systems (GIS) and remote sensing techniques to investigate the relation between ET and soil salinity in agricultural areas. Soil salinity data was obtained from global positioning system-referenced ground measurements in several corn fields in the Arkansas River Basin in Colorado. Evapotranspiration was calculated using a remote sensing model named RESET that is based on the concept of surface energy balance. Evapotranspiration values were regressed against the spatially corresponding soil salinity values to develop a relation between ET and soil salinity. The ET values correlate well with the soil salinity levels in the study region, with a correlation coefficient of up to 0.86.

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