Using LANDSAT imagery for detecting soil salinity in corn fields: calibration and validation

Ayman Elhaddad and Luis A. Garcia[1]
Civil Engineering Department, Colorado State University, Fort Collins

Abstract. Mapping soil salinity is one of the first steps in the rehabilitating salt-affected lands. Traditional soil salinity mapping techniques involve taking soil samples from the field to the lab for analysis or estimating soil salinity in the field using electromagnetic devices. These traditional methods can be problematic for a variety of reasons. First, soil salinity needs to be mapped at a reasonable spatial resolution so that any variability in salinity is not overlooked, and this can be a challenge when collecting samples for lab analysis. Secondly, soil salinity needs to be estimated accurately. A good level of accuracy can be achieved when the analysis is done in the lab, but accuracy can be compromised when electromagnetic devices are used if the devices are not properly calibrated and if the field is not in a suitable condition for using the devices. Finally, traditional methods of mapping soil salinity are not very cost effective. Multispectral satellite imagery seems to offer a new, convenient method for mapping soil salinity. Although utilizing multispectral satellite imagery for soil salinity mapping is not as accurate as lab analysis, the method ensures a consistent level of accuracy and costs much less than lab analysis. However, the method still needs more validation before it can be approved as a dependable approach. In this research, we use two different types of satellite imagery to estimate salinity in corn fields. We compare the results of using a higher resolution Ikonos 4 m 4 band image with a Landsat image, which covers more area at a lower cost.

---

[1] Water Resources, Hydrologic and Environmental Sciences Division
Civil Engineering Department
Colorado State University
Fort Collins, CO 80523-1372
Tel: (970) 491-5144
e-mail: garcia@engr.colostate.edu