Assessing Water Quality of Nebraska's Lakes

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Introduction: The Nebraska Department of Environmental Quality (NDEQ) and the U.S. Environmental Protection Agency (EPA) need to determine the condition and monitor the changing quality of Nebraska's 2500+ lakes and ponds. CALMIT is pioneering new and improved techniques for using aerial and satellite remote sensing to accomplish these tasks. The research aims to provide lower-cost methods to assess suspended sediment, chlorophyll and a variety of other pigments that are diagnostic of water condition.

Methods: The project involves the use of aerial hyperspectral data (i.e., data collected in dozens of very narrow "color" bands). The data are obtained using an AISA imaging spectro-radiometer carried aboard CALMIT's Piper Saratoga aircraft. Data obtained with the AISA are calibrated using close-range spectro-radiometers and water samples collected simultaneously in the field.

Image Classification: Data processing was accomplished by using algorithms derived from close-range spectroradiometers and laboratory experiments. The data have a spatial resolution of approximately 1 meter.

Project Results: Results show that airborne hyperspectral data can be used to very closely estimate surface water quality. Additional work will focus on extending results to satellite imaging systems such as those on-board Landsat-7. This research is part of a larger EPA-funded project to develop new and improved methods for classifying lakes in agriculturally-dominated areas of the Midwest. For additional details, see http://www.calmit.unl.edu/lakes/
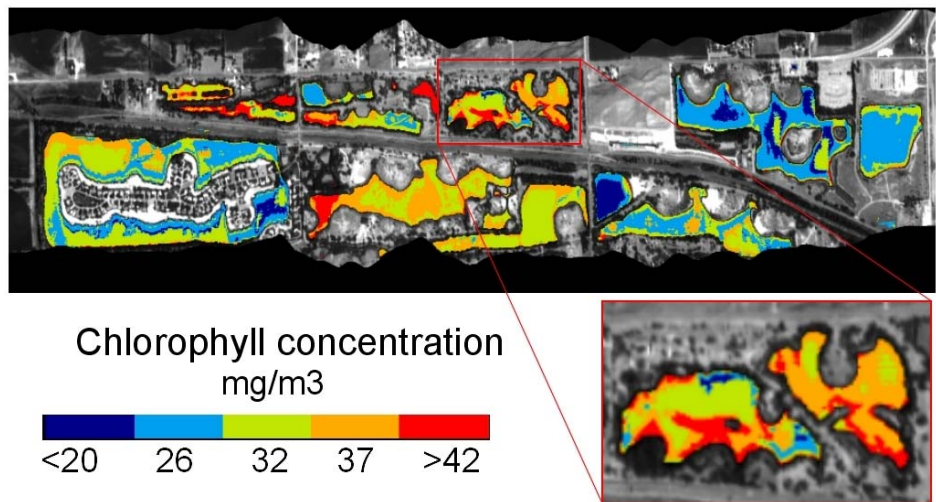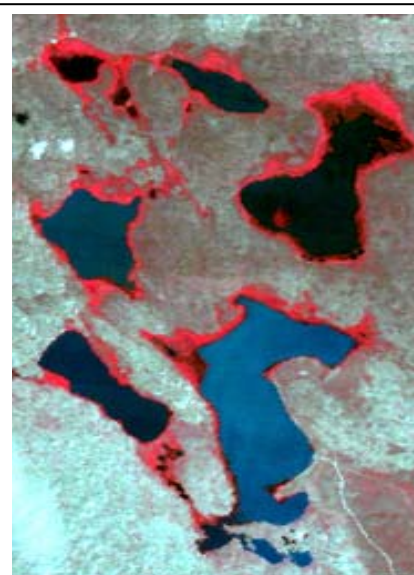

Figure 1. Hyperspectral remote sensing estimation of chlorophyll

Figure 2. Landsat Image of Sand Hills Lakes