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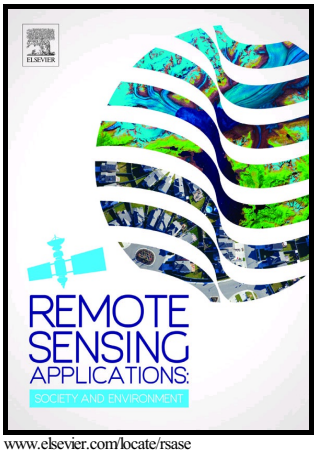

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Estimation of chlorophyll-*a* concentrations in diverse water bodies using ratio-based NIR/Red indices

Zhiming Yang[1,*], Michael Reiter[2] and Nicolas Munyei[3]

[1]*Department of Environmental, Earth and Geospatial Sciences, North Carolina Central University, Durham, NC 27707*
[2]*Department of Integrated Environmental Science, Bethune-Cookman University, Daytona Beach, FL 32114*
3Department of Agriculture and Natural resources, Delaware State University, Dover, DE 19901
** Corresponding author: zyang@nccu.edu*

Abstract

Numerous studies indicate that biological and chemical water quality parameters such as chlorophyll-*a* have distinctive spectral characteristics and can thus be measured using spectral indices. But these indices appear to be less reliable in diverse water bodies including lakes, ponds, rivers and streams in coastal regions. The purpose of this study was to develop a new ratio-based two-band spectral index to estimate chlorophyll-*a* concentrations in diverse water bodies. In this study, an Ocean Optics Spectroradiometer (300-900 nm) was used to collect hyperspectral data from ponds, lakes, streams and rivers in the coastal St. Jones River Watershed, DE from March 2006 to May 2007, while independent *in situ* water samples were collected concurrently and analyzed for chlorophyll-*a* and total suspended solids (TSS). The relationship between the reflectance value of individual bands and *in situ* chlorophyll-*a* concentration was first examined to identify bands sensitive to chlorophyll-*a* but not to TSS. The most sensitive band was then selected as the numerator to build a series of ratio-based indices and each of them was examined for its correlation with *in situ* chlorophyll-*a* concentration. The ratio showing the highest correlation coefficient was determined as the new ratio-based spectral index. Also, the performance of ratio-based spectral indices from the literature was examined to compare with this newly developed spectral index. It was found that the new spectral index R716/R667 showed high correlation (r = 0.82) with *in situ* chlorophyll-*a* concentration and it is