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Visible/near-infrared (VNIR) reflectance spectroscopy for field prediction of sediment properties from Lake Okeechobee, Florida.

Lake Okeechobee is a large, shallow, subtropical lake located in south Florida. It has been heavily impacted by human activity, being surrounded by a large dike and having been subject to high amounts of phosphorus (P) loading from agricultural and cattle operations in its watershed, which has led to significant eutrophication. The sediments of Lake Okeechobee act as a net sink for P, but also maintain substantial internal P loads, potentially impacting the effectiveness of attempts to improve water quality by controlling external loading of P. As such, the P content and fractionation and levels of chemical covariates in the sediments an issue of interest to lake managers. Due to Lake Okeechobee's large size (~1730 km^2), the costs and effort required for lake-wide sediment sampling and subsequent laboratory processing are high limiting the spatial and temporal density of monitoring efforts. VNIR reflectance spectroscopy is a rapid, inexpensive, and non-destructive method that has been proven successful for prediction of soil and sediment properties in numerous settings. The sensors for collecting high-resolution spectrographic information can be field deployed, but most studies collect spectra only after samples have been dried and ground in a laboratory in an effort to attenuate moisture-related reflectance effects. Here we compare the chemometric model efficiencies between observed and spectrally-predicted levels of key sediment properties developed from both wet and dry samples. If results suggest that the wet spectra are as effective for predicting sediment quality as dry spectra, the technique can be performed in the field. The resulting savings in cost and time compared to traditional methods of sediment analysis could allow managers to increase the spatial resolution and/or sampling frequency of the lake bottom.