Modeling chlorophyll-a concentration using remote sensing in shallow water systems: Comparison of sensors

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The level of productivity in the upland and coastal water bodies is highly linked to land processes (land use, water management, water and nutrient fluxes). Understanding the linkage between these processes and the level of algal blooms in the water bodies is crucial for improving water quality. A comparative study was conducted using remote sensing data from three different sensors (SeaWIFS, MoDIS and Landsat) to evaluate the capability of reflectance data from these sensors for estimation of chl-a concentrations in three water bodies in the USA (Lake Okeechobee, Florida Bay and Chesapeake Bay). Observed chl-a data were gathered and compared with simulation results. The analysis found that all of the sensors have performed well in deeper water bodies than in shallow sections due to the bottom reflectance from non-algal blooms. For shallow water bodies, selection of the proper bands and band combinations, identification of the non-algal bloom reflectance and the corresponding algorithms can improve the simulation. Seasonality as well as spatial variability (using cross-sections) were evaluated and the results showed that chl-a values were highly variable for the selected summer months. Indicative of the effect of land surface fluxes of nutrients, chl-a values were higher closer to coastal areas in the Florida bay and Chesapeake Bay. The chl-a in the freshwater lake of Okeechobee was simulated using Landsat 8 data and the results found were very good. Comparison of the SeaWIFS and MoDIS chl-a value to that of the measured concentrations in the deeper section of Florida Bay and Chesapeake Bay, respectively showed very good agreement.

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