Spatiotemporal Variation in the Characteristics of Suspended Particles in the Everglades: Implications for the Ridge and Slough Landscape

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The surface-water transport of suspended particles and their associated nutrients is an important process critical to understanding the basic functioning and restoration of wetlands. The differential transport of suspended particles is also a leading hypothesis for the formation and maintenance of the Everglades ridge and slough wetland landscape pattern but is not yet well tested. Therefore, we quantified spatial and temporal patterns in suspended particle concentrations, size distributions, nutrient content, and P fractionation in the interior of WCA-3A, a region with remnant ridge and slough structure. Surface water samples were collected from three depths in a *Nymphaea odorata* slough and adjacent *Cladium jamaicense* ridge roughly every month beginning in August 2005.

To date, total suspended sediment (TSS), total particulate phosphorus (P), and total particulate nitrogen (N) concentrations, and the weighted average size of these variables, have not significantly differed between ridge and slough or with depth. Suspended particles held on average 37% and 5% of total water column P and N, respectively, while the mean total suspended sediment concentration was only 0.81 mg/L. The weighted average size of particulate P (2.7 μm) was smaller than particulate N (6.1 μm) and TSS (9.6 μm). Particle characteristics changed through the wet season. Phosphorus particle size was larger at the beginning of the wet season in the water column of the slough relative to later in the wet season or during anytime in the ridge. Two weeks after Hurricane Wilma passed over the research site, TSS and particulate N concentrations temporarily increased, the size of N particles decreased, and particulate P did not change. Diel sampling conducted in November 2005 revealed that TSS and particulate N parameters decreased at night during water column turnover. Direct sequential chemical extraction of particulate P was conducted in December 2005. Microbial + labile fractions dominated particulate P (65%), while the humic + fulvic organic (24%) and Ca inorganic (9%) P fractions were less important. Particulate P was not associated with Fe + Al or refractory organic P and fractionation did not differ between ridge and slough or with depth in the water column.

In conclusion, suspended particles held a large proportion of P in the water column, were likely dominated by microbes, and contained relatively labile P. In addition, previous studies have shown that particles have different transport properties than solutes. Suspended particles must therefore be considered in models of P transport in the Everglades. However, the characteristics of suspended particles did not differ between adjacent ridge and slough ecosystems in an area of the Everglades with the best preserved ridge and slough landscape pattern. Extreme flow events may be necessary to generate meaningful differences in particle mobilization, transport, and interception between ridge and slough.

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