PHOSPHATE- UPTAKE OF EXPERIMENTAL CORAL AND ALGAL COMMUNITIES UNDER STEADY VERSUS OSCILLATORY FLOW

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ABSTRACT

Relationships between nutrient-uptake and net carbon production are variable on reefs. Nutrient-uptake appears to be governed by diffusion of nutrients through nutrient-depleted boundary layers near the surfaces of autotrophs. Nutrient-uptake may occur at different rates under steady and oscillatory flows because the boundary layers may be different. Rates of phosphate-uptake were measured for five experimental communities, two coral and three algal, for a total of 24 experiments. Uptake rate constants (S) ranged from 0.82 to 6.9 m day\(^{-1}\) over water velocities of 10 to 50 cm s\(^{-1}\). Uptake was proportional to water velocity and was close to mass-transfer limitation. Phosphate-loading rates, between 0.22 and 1.9 mmol m\(^{-2}\) day\(^{-1}\), were typical of natural loading. Excretion rates increased over time and ranged from 0 to 2.1 mmol m\(^{-2}\) day\(^{-1}\). S was not significantly different under steady versus oscillatory flow. The rate of phosphate-uptake may be enhanced by nitrogen-loading.