



Epilithic nitrogen fixation in the rocky littoral zones of Lake Malawi, Africa

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ABSTRACT: Rates of epilithic N_2 fixation in the rocky littoral zones of Lake Malawi, determined by in situ incubations and the acetylene reduction method, declined with depth, were highly correlated to light intensity and heterocyst biovolume, and are among the highest observed values for freshwater or marine systems. Daytime N_2 fixation rates were similar between sites at similar depths, except at sediment and nutrient impacted sites, where rates were lower and more variable. Daytime N_2 fixation rates were measurable in all transparent chambers and were negligible in opaque chambers, which indicates that phototrophic diazotrophs (organisms capable of utilizing atmospheric nitrogen) were responsible for all day-time N_2 fixation. Nocturnal N_2 fixation was ~60% of daytime fixation. A model that integrated N_2 fixation over depth and time predicted that epilithic N_2 fixation may contribute up to 35% of N inputs to the epilimnion of Lake Malawi.

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