



Intense benthic grazing of phytoplankton in a coral reef

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ABSTRACT: Grazing on phytoplankton by a section of the fringing coral reef in Eilat, the Gulf of Aqaba, Red Sea, was studied using the control-volume approach, a direct, nonintrusive technique common in engineering studies. Concentrations of chlorophyll *a* were measured using four vertical arrays of pumps, 10 pumps on each, that defined an imaginary box (i.e., the control volume), extending from the bed to surface, overlying a section of the sloping fore-reef >100 m² in size. Concurrent velocity measurements were made at the center of the box using a vertical array of acoustic current meters. Together, the concentration and velocity measurements allowed us to compute phytoplankton fluxes in and out of the control volume. While phytoplankton patchiness and other turbulent variations in concentration introduced significant variability, mass balances of fluxes into and out of the box indicate a flow-dependent grazing rate of approximately 10 m d⁻¹ to 20 m d⁻¹. This value was larger than, but not statistically different from, values derived from an "a priori estimate" (calculated based on the density and feeding rates of benthic grazers) and an estimate computed from the observed near-bed gradient of Chl *a*. Phytoplankton grazing is a principal pathway through which allochthonous nutrients are imported to the reef community from the flowing water.

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