

A model of carbon evasion and sedimentation in temperate lakes

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Abstract

Lakes process terrigenous carbon. The carbon load processed by lakes may partially offset estimates made for terrestrial net ecosystem exchange (*NEE*). The balance within lakes between carbon burial and evasion to the atmosphere determines whether lakes are net sinks or net sources of atmospheric carbon. Here we develop a model to study processing of both autochthonous and allochthonous carbon sources in lakes. We run the model over gradients of dissolved organic carbon (*DOC*) and total phosphorus (*TP*) concentrations found in the Northern Highlands Lake District of Wisconsin. In our model, lakes processed between 5 and 28 g C m⁻² (watershed) yr⁻¹ derived from the watershed, which approximates one-tenth of *NEE* for similar terrestrial systems without lakes. Most lakes were net heterotrophic and had carbon evasion in excess of carbon burial, making them net sources of carbon to the atmosphere. Only lakes low in *DOC* and moderate to high in *TP* were net autotrophic and net sinks of carbon from the atmosphere.

Key words: carbon, flux, lake, landscape, metabolism, model, sedimentation

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