Dear Editorial Staff,

On behalf of myself and co-authors, I am pleased to submit XXX INSERT TITLE XXX as a standard article to *Ecological Applications*. This paper is the product of an interdisciplinary working group as part of the second cohort Global Lake Ecological Observatory Network (GLEON) [Graduate Fellowship Program](http://fellowship.gleon.org/). The paper broadly addresses the role of lakes in landscape and global carbon cycling. Papers published in the last approximately ten years have identified that lakes actively process carbon, but few studies have integrated all the important mechanisms that contribute to lake carbon budgets in a unified, ecosystem-scale model framework. Without bringing these mechanisms together, it is difficult to compare key carbon fates within lakes, including carbon burial, the process of long-term carbon storage in lake sediments. In addition, it is difficult to compare fates across lake ecosystems when different models were applied; this represents a clear need for development of a generalizable model.

We took advantage of available long-term datasets (e.g., LTER) to compare carbon fates across five different lake systems. This study was much improved by its interdisciplinarity, bringing together limnologists, ecosystem ecologists, landscape ecologists and others to solve a problem typically tackled by limnologists in the past. For example, a limitation of previous studies was the inability to account for organic carbon inputs from wetlands and forests surrounding lakes, but the addition of landscape ecologists with knowledge of spatial datasets addressed this limitation.

Although much of this paper focuses on model development and application, we feel that it is a good fit for *Ecological Applications* due to its broad implications and interdisciplinary underpinnings. Reflecting the varied interests of co-authors, the paper was deliberately tailored for a broad ecological audience beyond limnology. For example, we identified that warming water temperatures were associated with a greater ratio of respiration to burial, suggesting that carbon emissions from lakes may exceed storage as climate continues to warm. We also identified, however, that the source of carbon (e.g., externally or internally derived) in total loads influences whether carbon is more likely to be respired or buried, which has key implications for lake and watershed managers.

This paper has not been submitted for publication in other journals; *Ecological Applications* was our primary choice. We have made analysis scripts and data available through our Github repository, in accordance with principles of open science. I am available to address any questions you might have and look forward to hearing from you.

Sincerely,

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