Title:
The Integrated Ecosystem Model for Alaska and Northwest Canada: An interdisciplinary decision support tool to inform adaptation to Arctic environmental change

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Abstract:

The physical and biotic components of arctic and boreal terrestrial ecosystems in Alaska and Northwest Canada (permafrost, hydrology, vegetation, biogeochemistry, and disturbance) are tightly linked and sensitive to climate change. Individual models of these components were developed to assess the response of each component to climate change, but it is also important to represent interactions among the components to comprehensively assess how this northern landscape may respond to environmental change. Such an integrated model has the potential to provide managers, stakeholders and decision makers the ability to better visualize potential future landscapes resulting from the interaction of biological and physical processes. In this study, an integrated framework is under development to dynamically couple (1) a model of disturbance dynamics and species establishment (the Alaska Frame-Based Ecosystem Code, ALFRESCO), (2) a model of soil dynamics, hydrology, vegetation succession, and ecosystem biogeochemistry (the dynamic organic soil-dynamic vegetation model version of the Terrestrial Ecosystem Model, TEM), and (3) a model of permafrost dynamics (the Geophysical Institute Permafrost Lab model, GIPL). Together, these three models comprise the Integrated Ecosystem Model (IEM) for Alaska and Northwest Canada. We will present our progress to date, anticipated model projections of landscape structure and function that will inform adaptation to Arctic environmental change, and results from our work to improve the tundra fire and vegetation dynamics component of the IEM.

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