Characteristics and variation in lakes along a north-south transect in Alaska

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With 3 figures, 5 tables and 2 appendices

Abstract: Environmental measurements from 51 Alaskan lakes, distributed along a north-south transect, were collected to explore the influence of a climatic and vegetational gradient, as well as to provide baseline limnological data. Most lakes were dilute and circumneutral to alkaline, but broad ranges were apparent in total phosphorus and dissolved organic carbon. ANOVA and Tukey testing, along with multivariate analyses, detected significant differences in ionic and nutrient concentrations between ecozones. Northern forest lakes tended to have higher concentrations of nutrients and ions relative to arctic tundra and southern forest lakes. The contrast in water chemistry between northern forest and arctic tundra lakes is likely due to differences in climatically-influenced factors (i.e. permafrost and vegetation, as well as decompositional and hydrological processes), whereas catchment characteristics and precipitation appear to explain the water chemistry differences between northern forest and southern forest lakes. A comparison of water chemistry results among circumpolar treeline regions confirmed that the differences in major ion concentration between arctic tundra and boreal forest lakes is a widespread trend.

Introduction

Climatic warming has been shown to have a broad spectrum of effects on temperate lake systems. Impacts caused by warming have ranged from increases...