

## **Annual hydrochemical fluxes from alpine-subalpine catchments in the Snowy Range, Wyoming**

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**Abstract.** It is well documented that alpine-subalpine surface waters are an excellent indicator of environmental changes due to their sensitive nature. Hydrochemical fluxes are useful in quantifying responses of alpine-subalpine ecosystems to changes in atmospheric deposition and streamflow chemistry. Long-term data on hydrochemical composition of alpine-subalpine catchments in Wyoming are limited and further study will allow the elucidation of trends over time.

The Glacier Lakes Ecosystem Experiments Site (GLEES) in the Snowy Range of southern Wyoming, managed by the USDA Forest Service, was established with the objective to determine the effects of atmospheric and climate change on alpine-subalpine aquatic and terrestrial ecosystems. The primary goals of this study are to quantify 15 years of mass balance data from GLEES to examine trends in precipitation inputs and hydrochemical outputs. Results for atmospheric wet deposition from National Atmospheric Deposition Program (NADP), 1989-2004, show increasing trends in  $\text{Ca}^{2+}$ ,  $\text{NH}_4^+$ , and  $\text{NO}_3^-$  and decreasing trend in  $\text{Na}^+$  and  $\text{Cl}^-$ . Dry deposition assessed using Clear Air Status and Trends Network (CASTNET) data, 1992-2004, indicated an increasing trend in  $\text{NO}_3^-$  and a decreasing trend in  $\text{SO}_2$ . Dry deposition accounts for 15% and 12% of the average total nitrogen and sulfur deposition at GLEES respectively. This study calculated annual hydrochemical fluxes and characterized the temporal variability in hydrochemical fluxes over the past 15 years as a function of changes in chemical inputs.