

2003 Seattle Annual Meeting (November 2-5, 2003)
Paper No. 81-20

Presentation Time: 8:00 AM-12:00 PM

ANALYSIS OF SPATIAL VARIABILITY OF PRECIPITATION AND SNOW ACCUMULATION ON MOUNT MANSFIELD, STOWE, VERMONT

MUSSELMAN, Keith¹, SHANLEY, Jamie², WEMPLE, Beverley³, BIERMAN, Paul¹, and DENNER, Jon², (1) UVM Geology, Univ of Vermont, Burlington, VT 05405, kmusselm@zoo.uvm.edu, (2) U.S. Geol Survey, Montpelier, VT 05601, (3) UVM Geography, Univ of Vermont, Burlington, VT 05405

Spatial variability of precipitation in the northern Appalachian Mountains of the eastern United States is an important but poorly documented phenomenon. This meteorological occurrence has a broad range of regional implications on wildlife habitat, water resources, and land management decisions. Two upper elevation watersheds located on the eastern side of Mount Mansfield in Stowe, Vermont, have substantial differences in unit area runoff. The West Branch watershed includes the Stowe Mountain Resort ski area within its 11.7 square kilometers. This basin had forty percent greater unit area runoff than its undeveloped counterpart, the 9.8-km² Ranch Brook watershed. This runoff difference is not fully explained by empirical land use / runoff calculations, and may be explained in part by spatial variability of precipitation. A network of 15 automated recording precipitation gages was recently installed within this study area. Our detailed record of high elevation precipitation aids in understanding precipitation trends and spatial variability within these watersheds.

Rainfall occurring between August 10th and October 30th, 2002 as well as snowfall from December 12, 2002 through the 2003 snow season was documented. Snowfall data were complimented by repeated snow pack analyses using coring techniques, conducted within one of the watersheds. Results indicate the maximum snow water equivalent stored within the basin's snowpack to be greater than 27% of that river's annual unit area flow.

The data collected are used to map, document, and increase understanding of small-scale precipitation trends in the region. Results suggest an average positive linear precipitation / elevation relationship of 8cm/km per month. A significant increase in precipitation is observed in close proximity to major ridgelines and summits. Using regressions determined from one month of observation and basin hypsometry data, the more mountainous West Branch watershed was calculated to have

received approximately 138 mm of precipitation and the adjacent Ranch Brook watershed was calculated to have received 115 mm. Storms during this month loaded the West Branch watershed with 15–21% more rain than the neighboring Ranch Brook watershed. These findings help explain the runoff discrepancy observed between these high elevation watersheds.

2003 Seattle Annual Meeting (November 2–5, 2003)

Session No. 81--Booth# 40

Environmental Geoscience (Posters) I

Washington State Convention and Trade Center: Hall 4-F

8:00 AM–12:00 PM, Monday, November 3, 2003

Geological Society of America Abstracts with Programs, Vol. 35, No. 6, September 2003, p. 146