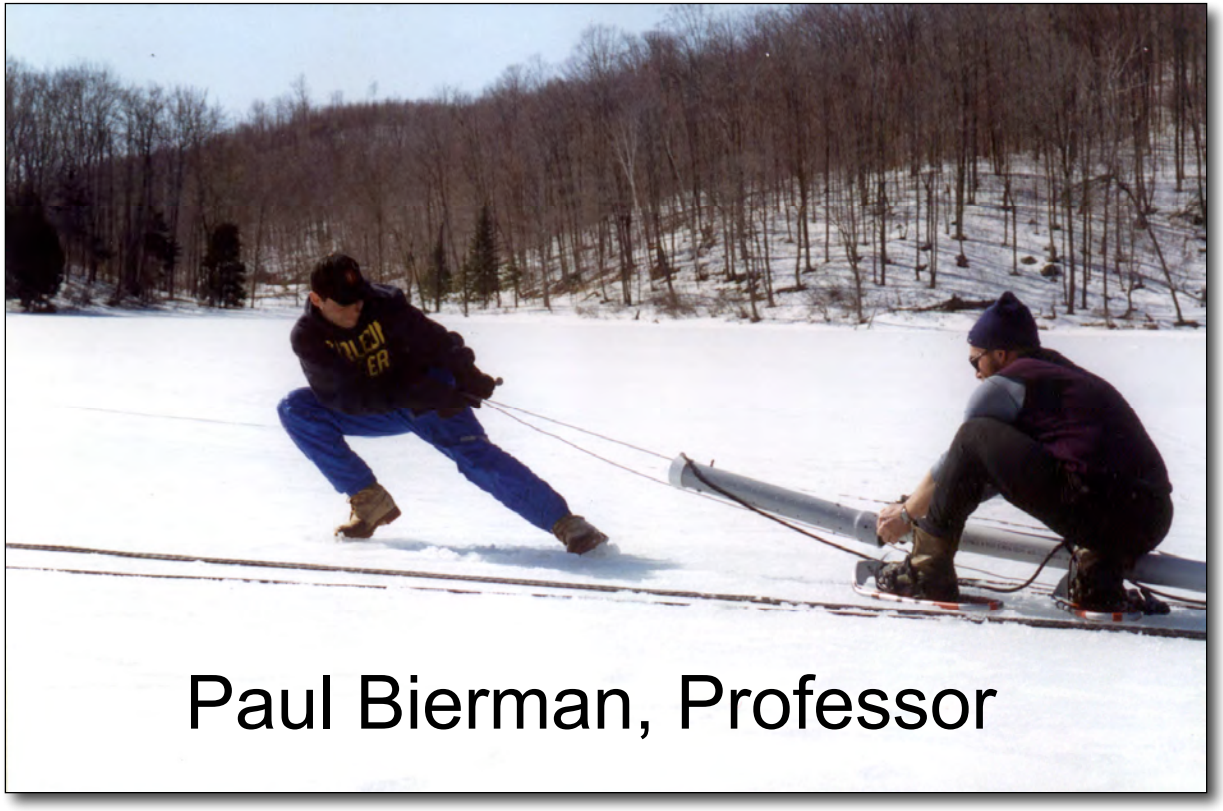
1997 - NSF CAREER proposal

Hydrologic Sciences -- L. Douglas James, PO



For more information see: http://www.uvm.edu/cosmolab/?Page=projects/career/career.html

COLLEGE OF ARTS AND SCIENCES
Department of Geology

The University of Vermont

THE RUBENSTEIN SCHOOL OF ENVIRONMENT AND NATURAL RESOURCES

What am I talking about?

The NSF CAREER Program

…*The (CAREER) Program is a Foundation-wide activity that offers … awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research….*

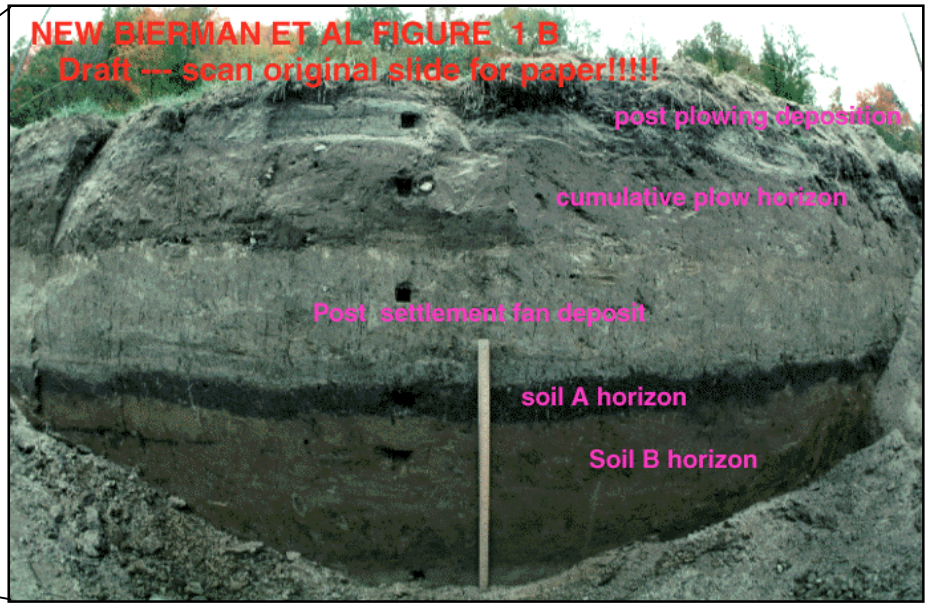
The Grant we got…

Holocene Geologic Records of Episodic Sedimentation -- Characterizing the Timing and Distribution of Hillslope Erosion and Extreme Hydrologic Events

A bit of history…

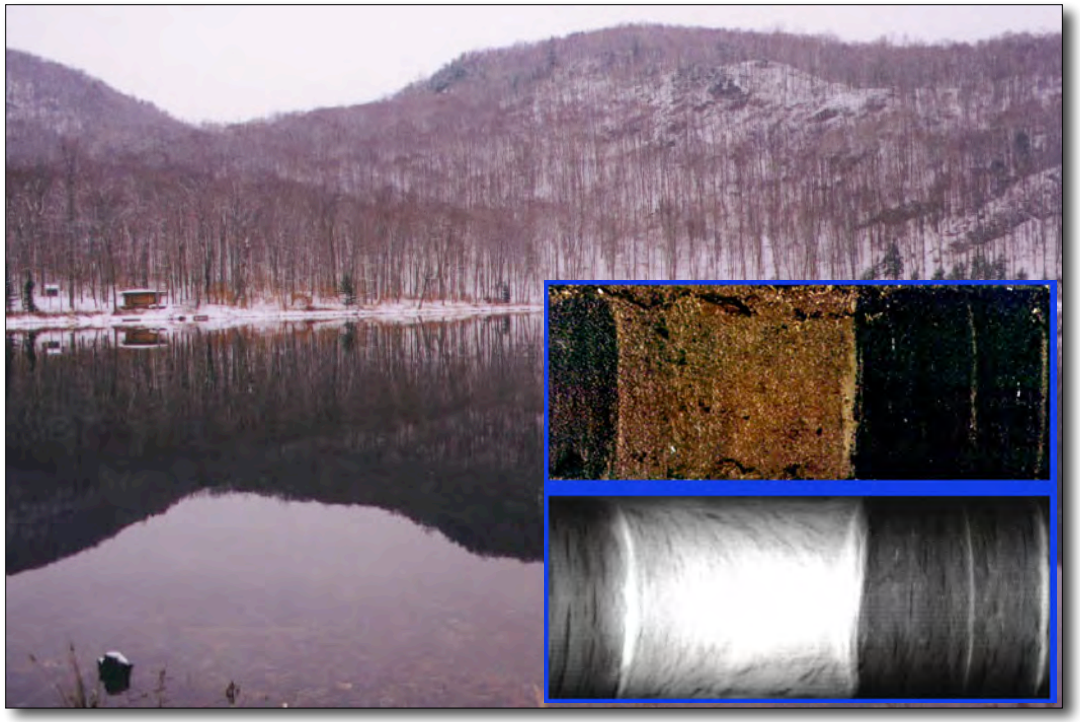
- Evolved out of work with my first graduate students.
- New approach, process orientation.
- Understanding erosion - time and place in New England

Alluvial Fans….



We are geologists…we like to get dirty

Pond Muck…



Remember, we are geologists…we like to get dirty, really.

Third try was the charm..

Try 1 (1994) FAILED

New England Debris and Alluvial Fans: Recorders of Holocene Hillslope Activity

too regional, too narrow, senior co-PI had no NSF record.

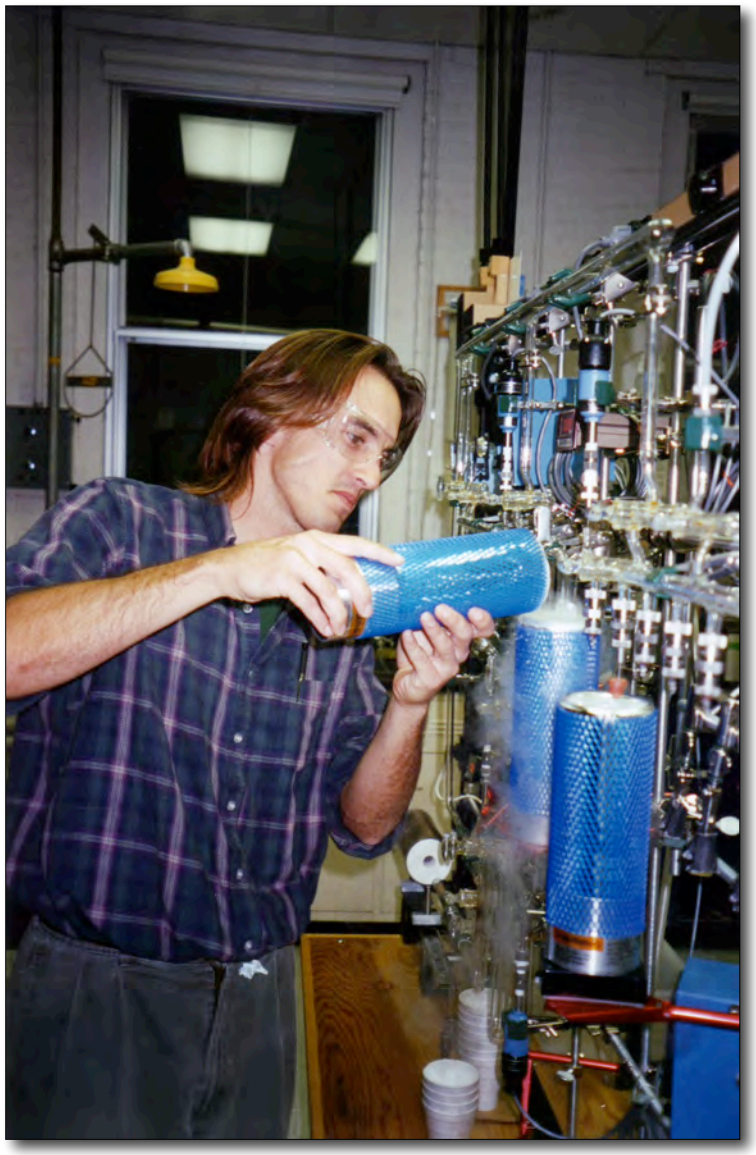
Gather more data….

Try 2 (1995) FAILED

Landscape and biotic response to deglaciation

too broad, won't work in New England.

Gather more data….



Deeply integrated Research and Teaching Plan

- MS students
- Undergraduate classes
- Field and lab based - hands on

From the project summary: This *Career* proposal integrates my own field and laboratory research with the research and training of both my undergraduate and graduate students; it furthers my educational philosophy of active student involvement at all levels and is designed to provide discreet, achievable research projects for every student involved.

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Cosmogenic Nuclide Laboratory and Geomorpho Research Group

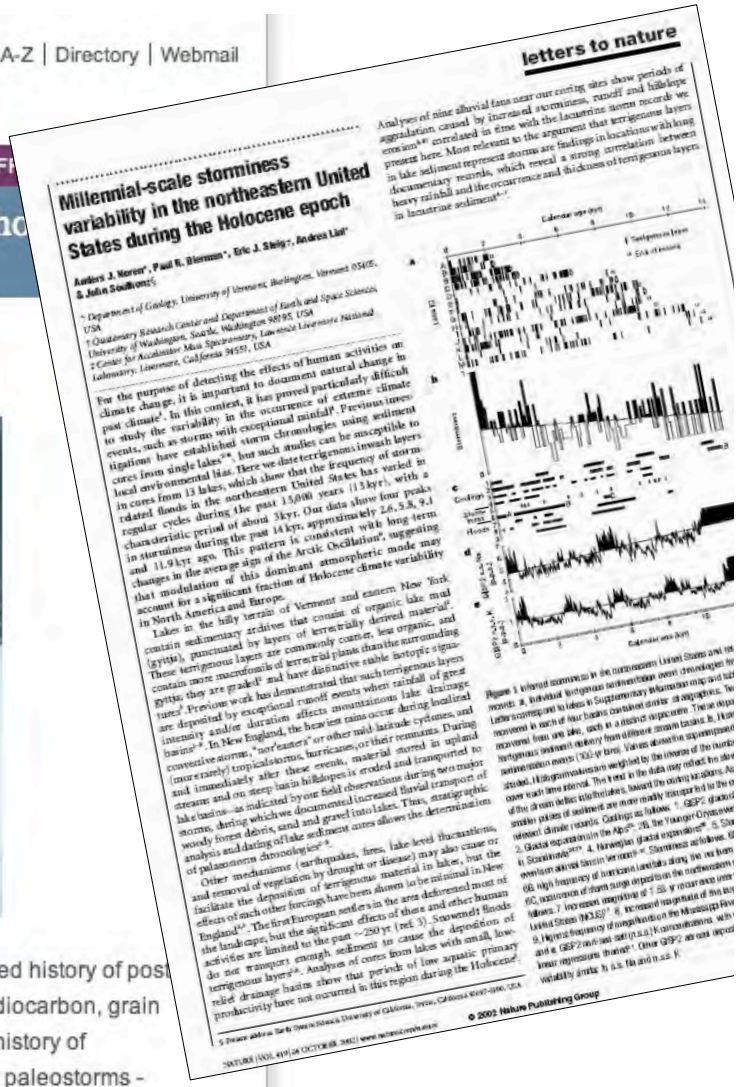
Paleostorminess, New England Ponds and Lakes

The ponds and lakes of New England preserve in their sediments a detailed history of post glacial surface processes. After coring two dozen ponds we did pollen, radiocarbon, grain size, LOI, stable isotope, C/N and radiocarbon analyses to determine the history of sedimentation and thus infer the temporal and spatial distribution of major paleostorms - paleotempestology in action.

Project Support

NSF EAR-9702643 - CAREER award -- Timing and Distribution of Extreme Hydrologic Events

Proposal Project Summary (download pdf)



letters to nature

Millennial-scale storminess variability in the northeastern United States during the Holocene epoch

Anders J. Noren*, Paul R. Bierman*, Eric J. Steig*, Andrea Lini*

& John Southon†

* Department of Geology, University of Vermont, Burlington, Vermont 05405, USA

† Quaternary Research Center and Department of Earth and Space Sciences, University of Washington, Seattle, Washington 98195, USA

‡ Center for Accelerator Mass Spectrometry, Lawrence Livermore National Laboratory, Livermore, California 94551, USA

http://www.uvm.edu/cosmolab/?Page=projects/paleostorms/paleostorms.html

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Cosmogenic Nuclide Laboratory and Geomorp… Research Group

Vermont Alluvial Fans

Humid-temperate Vermont has alluvial fans, not quite at the scale of western North… but these humid-temperate alluvial fans have their own story to tell. Using nume… hoe trenches, detailed stratigraphic analysis, precision surveying, and numero… dates, we reconstructed intervals of increased fan sedimentation and thus hi… The human impact on the landscape is clearly shown by the uptick in sedim… over the last several hundred years.

Project Support

NSF EAR-9702643 - CAREER award -- Timing and Distribution of Extreme Hydrologic Events

Proposal Project Summary (download pdf)

http://www.uvm.edu/cosmolab/?Page=projects/vermontalluvialfans/vermontalluvialfans.html

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Cosmogenic Nuclide Laboratory and Geon Research Group

Urban Hydrology

Undergraduate and graduate students worked closely with City of Burlington Code Enforcement Office Staff as well as those from the Department of Publics Works to map greenspace loss primarily from the conversion of lawns to parking lots at residential rental properties. We designed and deployed a sprinkling infiltrometer to measure infiltration rates on land subjected to different uses. Students created test plots on the UVM campus to determine the effectiveness of tilling and compost addition as remediation agents.

Project Support

NSF EAR-9702643 - CAREER award – Timing and Distribution of Extreme Hydrologic Events

Proposal Project Summary (download pdf)

Quantifying Urban Land Use and Runoff Changes Through Service-Learning Hydrology Projects

Kyle K. Nichols, Department of Geology and School of Natrual Resources, University of Vermont, Burlington, VT 05405, current affiliation: Department of Geosciences, Skidmore College, 815 N. Broadway, Saratoga Springs, NY 12866
Paul R. Bierman, Department of Geology and School of Natrual Resources, University of Vermont, Burlington, VT 05405
Lyman Persico, Department of Geology, University of Vermont, Burlington, VT 05405
Andrew Bosley
Paul R. Melillo
James Kurfis

ABSTRACT

We have used land use change, driven by development of the University of Vermont campus and recent student occupancy of surrounding neighborhoods in Burlington, Vermont, as an opportunity for service learning and for teaching fundamental hydrologic and geologic skills in two undergraduate Geology courses. Two students, in a Geomorphology class, used historical maps and aerial photographs of the University campus and from a Geohydrology class, student teams used aerial photographs and door-to-door surveys to document the dramatic increase in impermeable surfaces on campus from 4% of the land area in 1869 to 42% in 1999. In Geohydrology, student teams used aerial photographs, field mapping, and door-to-door surveys to document greenspace losses of 40 to 50% over the past 20 years in neighborhoods inhabited predominantly by students. despite zoning controls enacted in 1973. Students used simple hydrologic calculations to demonstrate that this unregulated change in land use increased both the volume and peak flow of stormwater runoff. Senior research projects have also made field and demographic studies of individual neighborhoods and quantified the percent of land use change. In each of these studies, students worked closely with City and University staff and presented results at local forums, professional national meetings, and on the World Wide Web. These service-learning projects have received positive feedback from the students, city officials, and community members.

SERVICE-LEARNING PROJECTS

Undergraduate projects provide excellent opportunities for student and faculty involvement with public issues and for hands-on service learning that requires students to interact with community members while collecting data (National Service-Learning Clearinghouse, 2002; Ward, 1999). At UVM, we use service learning as part of the sophomore/junior level Geomorphology class (Grant et al., 1999; Clapp et al., 1996), and junior/senior level Geohydrology class (Persico et al., 2000). Senior research projects provide the greatest opportunity as part of senior research projects. Of these independent in-depth service learning in the hydrological sciences, Senior research has included quantifying land change in Burlington neighborhoods (e.g. Kurfis Bierman, 2002; Kurfis et al., 2001) and surveying ca groundwater wells (University of Vermont Ca Department, 2002a).

BURLINGTON SETTING AND RE

LAND USE HISTORY

Burlington, underlain primarily by gl post-glacial sediment including till, lacu marine silt and deltaic sand, began urban mid- to late-1800s. Most urban neighbo built out by 1930 and are served by storm se codes (passed in 1973) mandate that imper may not cover more than 35% of each lot f neighborhoods near the University wher The code is designed to leave 65% of e space where precipitation can infilt runoff.

Between 1963 and 1972, UV enrollment, adding more than 3000 concomitant expansion of dormitory forced many students to live off ca transformation of single- and multi into student apartments. On aver has four more cars per parcel (Kni (two, Kurfis and Bierman, 2002). increased the number of needed most houses currently occupied single-family homes or dup insufficient driveway space fo and their landlords have re between the number of avail

INTRODUCTION

The University of Vermont (UVM) is located in Burlington, Vermont, a moderate-sized (population 39,000 in 2000) college town situated on and above the shores of Lake Champlain (Figure 1). Burlington is often considered a desirable place to live because of its "Green" reputation and its family friendly environment (e.g. Steere, 1995). However, in recent years, some neighborhoods close to the UVM campus have experienced a significant change in character and land use as students have moved off campus and into the community. In this paper, we present several closely related service-learning projects in which students quantify the hydrologic impact of these land use changes, specifically the conversion of permeable green space to impermeable parking lots and building.

Nichols et al. - Quantifying Urban Land Use


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Old images record landscape change through time
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SLC 2005 Call for Papers, p. 13

Take home messages….

1. Do something new and different
2. Have evidence project will work
3. Don’t give up (resubmit and keep gathering data)
4. Truly synthesize research and teaching
5. Be passionate about the project and have fun

November stream crossing to survey fan trench

Graduate Seminar - ice cream cake erosion