

THE OFFICIAL MAGAZINE OF THE OCEANOGRAPHY SOCIETY

Oceanography

CITATION

Roof, S., A. Werner, J. Brigham-Grette, R. Powell, and M. Retelle. 2011. The Svalbard REU Program: A high-latitude undergraduate research experience in glacial, marine, and lacustrine processes relevant to Arctic climate change. *Oceanography* 24(3):51, <http://dx.doi.org/10.5670/oceanog.2011.54>.

COPYRIGHT

This article has been published in *Oceanography*, Volume 24, Number 3, a quarterly journal of The Oceanography Society. Copyright 2011 by The Oceanography Society. All rights reserved.

USAGE

Permission is granted to copy this article for use in teaching and research. Republication, systematic reproduction, or collective redistribution of any portion of this article by photocopy machine, reposting, or other means is permitted only with the approval of The Oceanography Society. Send all correspondence to: info@tos.org or The Oceanography Society, PO Box 1931, Rockville, MD 20849-1931, USA.

SIDEBAR | The Svalbard REU Program: A High-Latitude Undergraduate Research Experience in Glacial, Marine, and Lacustrine Processes Relevant to Arctic Climate Change

By Steve Roof, Al Werner, Julie Brigham-Grette, Ross Powell, and Mike Retelle

The Svalbard Research Experience for Undergraduates (REU) program, initiated in 2003, provides a unique, field-based research experience for US undergraduates in Arctic Quaternary geology and climate change. The Svalbard archipelago, between 74° and 81°N latitude in the North Atlantic, lies at the northern end of the warm Gulf Stream current and therefore is sensitive to subtle climate and oceanographic changes. Svalbard has warmed considerably during the last 90 years, and climate proxies indicate even greater Holocene climate variability. Our program has two main purposes: to train young scientists in cutting-edge, Arctic field research methods, and to reconstruct climate changes of the past 5,000 years from layered sediments in lakes and fjords.

Our students are conducting fieldwork at two locations: Lake Linné, west of Longyearbyen, and Kongsfjorden, near Ny Ålesund. To better understand the links among climate, glacier mass balance, sediment transport, and lake and fjord sedimentation, we are monitoring modern sedimentation processes with arrays of sediment traps, temperature sensors, water level recorders, conductivity-temperature-depth (CTD) profilers, and bathymetric surveys. Students recover sediment cores from lakes and fjords and correlate parameters such as layer thicknesses to recent and historical meteorological observations. Ultimately, we seek to derive relationships from modern processes that will allow the sediment records to be better interpreted as proxies for late Holocene climate changes.

Contemporary studies of tidewater and terrestrial glacier systems provide an unparalleled opportunity for introducing motivated third-year undergraduates to the challenges and rewards of polar field research, an experience rarely available to them. Students develop the scientific questions to be addressed and establish a field plan for instrumentation and sampling. Working together in small boats in one of the most challenging natural environments, the students expand their leadership skills and learn the value of teamwork and collaborative data sharing while maintaining a strong sense of ownership over their individual science projects. Examples of student projects include analysis of long- and short-term sedimentation processes in front of tidewater glaciers, measurement and modeling of the influence of weather conditions and surface debris on glacier ablation rates, and reconstruction of past climate from varved sediments.

This total immersion experience for the students in our program includes being surrounded by scientists from different nations associated with the University Centre on Svalbard and the international research station in Ny Ålesund. Following the summer fieldwork, students complete their projects during their senior academic years under our mentorship and the guidance of their home-institution academic advisors. Students and mentors come back together the following spring at a professional conference for a “REUnion” to share their results. To date, just over 50 students have participated in our program, and more than 80% of them are pursuing related studies in graduate school. More information about our program, which is funded by the US National Science Foundation (Award No. 0649006), is available at <http://www.mtholyoke.edu/go/svalbard>. 

Steve Roof (sroof@hampshire.edu) is Associate Professor of Earth and Environmental Science, Hampshire College, Amherst, MA, USA. **Al Werner** is Professor of Geology, Mount Holyoke College, South Hadley, MA, USA. **Julie Brigham-Grette** is Professor of Glacial Geology, University of Massachusetts, Amherst, MA, USA. **Ross Powell** is Board of Trustees Professor of Geology, Northern Illinois University, DeKalb, IL, USA. **Mike Retelle** is Professor, Bates College, Lewiston, ME, USA.



LEFT. Students proudly show off a sediment core recovered from Lake Linné during summer 2009. BELOW. REU team members get ready to deploy sediment traps in front of tidewater glaciers in Kongsfjorden.

