Challenges and Opportunities in Running and Participating in an International REU in Svalbard, Norwegian High Arctic

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Introduction
The overarching objective of the Svalbard REU is to provide research opportunities and training for undergraduate students in scientific topics that are societally relevant regarding Arctic processes, Quaternary geology, and environmental and climatic change. We recruit highly motivated and qualified undergraduate geoscience students to undertake the challenges of this research experience and discover for themselves the rewards of conducting high latitude research in an international location. Because of its high latitude location (76-80° N lat.) in the North Atlantic, modern towns and facilities, abundant glacial and marine environments, and a rich Quaternary history, the Norwegian Arctic archipelago of Svalbard provides an unparalleled opportunity for meaningful Arctic research by undergraduate students. Arctic science is not routinely part of undergraduate curricula and few polar research opportunities exist for undergraduate students due to the expense, logistics, and safety considerations associated with bringing students into the field.

Location and Description of Field Sites
The Svalbard Archipelago is located in westernmost Barents Sea at the edge of the continental shelf east of Greenland and north of the Norwegian mainland. The archipelago is situated between 76 to 81 degrees north latitude at the boundary of polar waters and the northern extension of the North Atlantic drift and their associated air masses. Thus, the area is very sensitive to climatic shifts which is seen in impacts on sea ice extent and glacier mass balance. Svalbard today is approximately 60% covered by glacier ice.

Field work in the REU is conducted in two alternating venues. The terrestrial group (Retelle, Roof and Werner) leads a group to study glacier-lacustrine processes and sediments at Linneadal, on the west coast of Spitsbergen at the mouth of Isfjorden. The marine group, led by Brigham-Grette and Powell, works out of Ny Ålesund marine station and studies glacial marine processes and sediments in Kongfjorden. The Linneadal lake group lives in a refurbished WWII and Cold War vintage weather station at Kapp Linne run by an eco-tourism group while the marine group lives in the marine station in Ny Ålesund. Both sites offer the opportunity to work on samples and data at night as well as recovery/protection from bad weather and polar bears.

A - Challenges and Solutions of running an International REU
- Budgeting – high cost/student, changing prices and exchange rates
- Keeping field equipment as simple as possible to keep costs low
- Recruitment - attracting more under-represented group participants
- Involving students with diverse backgrounds and levels of preparation
- Remote area and daily physical challenges requiring maturity, commitment, and willingness to work closely in a team
- Participant project selection - often a stressful process
- Post experience follow-through – REUnion meeting insuring students are up for rigorous conditions
- Lame "home" advisers

B - Best practices: running an REU
- International collaboration (logistics, guest lectures etc.)
- Pre and post season mentoring and engagement
- Participant involvement (buy-in) re. project selection
- Mid and end experience presentations
- Engaged faculty mentors
- Project ownership (by students)
- Everyone is everyone else’s field ass't.

C - Goals of the new REU
- Increase diversity (racial, academic background)
- Working with diversity offices at each school, attending sessions and recruiting at GSA, calling faculty at smaller schools where STEM opportunities are less or not available**
- Continue to inspire and motivate the next generation of arctic researchers
- Involve students in meaningful research projects
- Introduce students to the wonders of the Arctic
- Teach students how to effectively and safely conduct field research
- Continue monitoring the rapidly changing Arctic environment
- Mentor and motivate students to attend graduate school.

Fundamental Goals of the Svalbard REU Program:
- Recruit and train the next generation of scientists
- Develop a diverse, internationally competitive, and globally-engaged science and engineering workforce
- Expose undergraduate students to the excitement and challenges of conducting important and relevant climate change research in the Arctic

International Collaboration is a Major Plus: We partner closely with UNIS, The University Centre in Svalbard. Shown above is 2012 joint field party with Retelle and Roof and UNIS professor Hanne Christiansen and REU cohort plus UNIS students from Norway, Germany, Denmark and Sweden. Other benefits include shared logistical costs, expanded expertise, project advising and international exchange.

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Annual Schedule 2013-2014-2015
- Fall 2013: PI's meet via skype several times to plan for recruiting and field season
- Recruiting: Mass mailing to Geoscience departments, Environmental Science Studies Programs and individuals, Attend GSA and AGU
- Review applications for PolarTrec teacher (high school teacher to accompany project)
- Application online via Svalbard REU website:  http://www.mtholyoke.edu/go/svalbard
- Deadline January 15
- January 15-February 1, 2014: Review of applicants by lead PI and Field personnel
- Notification of successful candidates by phone call
- Late February, early March 2014: Successful Candidates are sent travel info, medical clearance, liability, expectations, etc.
- March 2014: Logistics planning via skype, phone and at Annual Arctic Workshop: Airline reservations, lodging in Longyearbyen, Kapp Linne and/or Ny Ålesund
- July 6 2014: Team leaves for field work via Oslo to Svalbard
- July 7-8: Intro to Svalbard and Safety training in Longyearbyen (polar bear safety, rifle training, boat survival)
- July 10-August 1: Field work in Kongfjorden
- August 2 return to Longyearbyen, then Boston
- August 2 to 9: Laboratory analysis on m samples and data at UMass Amherst Geosciences
- Fall 2014/Winter 2015: contact with REU participants for progress reports on research project/thesis
- March 2015: REUnion at 45th Annual Arctic Workshop, participants present posters/talks.

*Part of the Svalbard REU program is in Running and Participating in an International REU in Svalbard, Norwegian High Arctic.