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# Collaborative Research: Chronology of Ice Fluctuations in the South Shetland Islands Since the Last Glacial Maximum

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**Final Report for Period:** 06/2006 - 05/2007**Submitted on:** 05/29/2007**Principal Investigator:** Hall, Brenda L.**Award ID:** 0336718**Organization:** University of Maine**Title:**

Collaborative Research: Chronology of Ice Fluctuations in the South Shetland Islands Since the Last Glacial Maximum

**Project Participants****Senior Personnel****Name:** Hall, Brenda**Worked for more than 160 Hours:** Yes**Contribution to Project:****Post-doc****Graduate Student****Undergraduate Student****Name:** Smethurst, Naomi**Worked for more than 160 Hours:** No**Contribution to Project:**

This person helped organize and prepare samples.

**Name:** Doughty, Alice**Worked for more than 160 Hours:** No**Contribution to Project:**

This person helped organize and prepare samples and paperwork.

**Name:** Essig, Megan**Worked for more than 160 Hours:** Yes**Contribution to Project:**

This person helped organize and prepare samples.

**Name:** Mietkowicz, Nathan**Worked for more than 160 Hours:** No**Contribution to Project:****Technician, Programmer****Other Participant****Research Experience for Undergraduates****Organizational Partners****University of Washington**

This is a collaborative project. Rock samples for cosmogenic dating are analyzed at the University of Washington (supported by NSF). Both the Maine and Washington groups are involved in data interpretation. There is a close working relationship, with both groups meeting regularly.

## Other Collaborators or Contacts

### Activities and Findings

#### **Research and Education Activities:**

This is a lab-only project as the samples were collected previously. During the course of this project, we prepared samples and sent them to the University of Washington cosmogenic isotope lab for analysis (see separate report filed by Stone). Since receiving the dates, we have interpreted the data and prepared publications. We also have carried out public outreach.

#### **Findings:**

The results we have are consistent with what we anticipated from the glacial geology. That is, the ages are reasonable for the moraines on which the samples lie. Most ages span the Holocene. Ice was within a kilometer of its present position by the late Pleistocene (~11ka). Prominent readvances occurred at ~6000-7000 and ~4000 yr B.P. There is also evidence of ice expansion within the past 1000 years. These data represent one of the best-dated Holocene sequences for the Antarctic.

We are still in the process of interpreting some of these data, but our initial thoughts are that these dates are consistent with the glacial record from Southern South America. This suggests synchrony of climate change across the Antarctic Convergence, at least for the Holocene time period.

We are also encouraged by the results in that they show that exposure-age dating can be a reliable dating tool for subantarctic islands. Previous exposure, which plagues most high-latitude records, was not a serious problem.

#### **Training and Development:**

People who worked on the project increased their knowledge of the cosmogenic exposure-age technique and Antarctic rocks. In one specific case, this has improved a person's teaching skills in an Isotope Geochronology class. It also has increased research skills at the University of Maine in this field and helped lead to the development of a cosmogenic lab at that facility.

#### **Outreach Activities:**

Data from this project are incorporated into graduate and undergraduate classes, including a class on Cosmogenic Isotopes. The PI also regularly visits K-6 classrooms to give presentations on Antarctica and climate change. Data from this project are to be maintained on the University of Washington cosmogenic isotope web site, which - in addition to the data - provides public service information about exposure-age dating and a popular Antarctic webpage.

### Journal Publications

Hall, B.L., "Late Holocene advance of Collins Ice Cap, King George Island, South Shetland Islands, Antarctica", *The Holocene*, p. , vol. , (2007). Accepted

### Books or Other One-time Publications

### Web/Internet Site

#### **URL(s):**

<http://gcmd.nasa.gov/getdif.htm?Hall-Shetland>

#### **Description:**

This site contains metadata for this project.

### Other Specific Products

## Contributions

### **Contributions within Discipline:**

Holocene climate changes are currently a 'hot' topic in paleoclimate research. This is one of the only records of Holocene glacier fluctuations for the Antarctic (particularly if one looks at pre-Little Ice Age variations). This record, which spans the entire Holocene, will allow us to begin to test hypotheses not only of Holocene climate change, but also the global synchrony or asynchrony of climate events during our present interglacial.

### **Contributions to Other Disciplines:**

Dates of glacier fluctuations in the South Shetland islands will allow people to constrain relative sea-level changes on those islands as the moraines cross cut and are cut by raised beaches.

### **Contributions to Human Resource Development:**

This project has contributed to the training and employment of four undergraduate students (three female) at the University of Maine, as well as other students at the University of Washington. These data are used in graduate classes on cosmogenic isotopes.

### **Contributions to Resources for Research and Education:**

As mentioned previously, all analytical information from this project will be maintained on a public database (see Stone report).

### **Contributions Beyond Science and Engineering:**

Our work allows us to address the larger question of the timing and cause of abrupt climate change - a subject which should be of concern to the general public.

### Categories for which nothing is reported:

Any Book

Any Product