

PROJECT INFORMATION

Lead Principal Investigator	Joel Harper
Institute	University of Montana, Department of Geosciences
Project Title / Grant #	Collaborative Research: Greenland Ice Sheet Basal Hydrology and Sliding Dynamics: The Proof of the Drill (0909495)
NSF Program and Manager	NSFOD\OPPARCVANS, Dr. Henrietta Edmonds
PFS Project Manager	Robin Abbott

LOGISTICS SUMMARY

With this collaborative project - 0909495 (Harper, UM, LEAD), 0909503 (Pfeffer, CU), and 0909122 (Humphrey, UW) - researchers will drill to the Greenland ice sheet bed and instrument two boreholes at each of three sites spaced along a 90 km transect that extends from about 1000 m elevation to 1750 m elevation. The researchers will conduct two field campaigns during the spring and summer seasons of each year in 2010 and 2011 with a summer only campaign in 2012. The first two field seasons will be drilling campaigns; during the third season the team will collect surface data and remove instrumentation. A team of about eight will conduct the work.

In 2010, a research team of around eight will launch their field effort from Kangerlussuaq in June. In a truck leased from and driven by GLV, the team will travel with their equipment and gear to the end of the road at the ice sheet edge (Point 660). From there, they will be put in to their camp site and their first drilling site via Air GL Bell 212 helicopter flown in from Nuuk. The drilling site will be located at Issunguata Sermia Glacier, just south of the Russell Glacier. The distance between Point 660, the camp site and the Issunguata Sermia Glacier is ~1-3 km.

Several weeks later, a helicopter will be used again to move the drill site approximately 10 km from the first site. When the second hole has been drilled and instrumented, the researchers, their camp and drill sites will be pulled out of the field; all will return to Kangerlussuaq. After they store the drilling equipment in Kangerlussuaq, the team will depart via commercial air.

A smaller team (3-4) will then return in September to download data and prepare the instruments for winter. After arriving via commercial air, they will use a small, rented truck to drive to Point 660. There, they will walk to their nearest research site, download data and adjust instruments as needed. The team will tent-camp on the ice margin, spending about 3 days total in the field before returning to Kangerlussuaq and then departing Greenland, again via commercial air.

For the spring effort in 2011 the team will fly via ANG to Raven Camp and traverse 50-70 km to research sites using snowmachines and sleds. They will finish establishing sites left from 2010 and conduct any needed maintenance. In August they will return to download data and winterize the experiments.

In 2012, the researchers will make a last summer trip to take surface data and remove their instruments. At the end of each of these efforts, the researchers will traverse back to Raven Camp to fly the equipment by LC-130 to Kangerlussuaq for winter storage (and removal from Greenland at the end of the project).

CPS will provide ANG coordination; helicopter charters; field, camping, and safety equipment; fuel; storage space; and Kangerlussuaq user days. UNAVCO will provide GPS equipment and technical support. The PI will arrange and pay for all other logistics through the grant.

For the complete CPS online project record for this grant, including science objectives, go to:

http://www.polar.ch2m.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=0909495

For up-to-date information on the project's schedule, please view the online Greenland calendar

(<http://www.polar.ch2m.com/> > Greenland > Calendars/Schedules).

OUTSTANDING ACTIONS AND NOTES

Issue	Responsibility	Date Due	Date Completed
Review support plan for accuracy and distribute to all field team members	PI		
Obtain all necessary permits for fieldwork	PI		
Visit all hyperlinks and review all documents referred to in the support plan	Entire Field Team		
Note: Passports are required for Air National Guard and international travel. Also, please bring TWO copies of your passport to Greenland with you.	Entire field team		
Determine if subcontracting a local company's helicopter might be possible available for the camp move and pull out; if not continue with Air Greenland Bell 212 will be flown up from Nuuk to complete the support.	CPS		
Finish planning the fall trip (including air travel to/from Greenland), and redistribute season plan if needed	PI/CPS		

ALLOCATIONS AND SERVICES

Allocations from Inventory - Harper Ice Margin Campsite

Quant/Unit	Item
1 ea	Folding table for cooking on
1ea	8 person kitchen box (2ea - 4 person boxes)
2ea	5 gallon water jugs
8ea	REI Geo Mountain 3 tent w/ footprint
8ea	Thermarest sleeping pad
8ea	Ridgerest sleeping pad
1ea	Western Shelter Tent – 16' diameter size
8ea	Folding chairs
2ea	Coleman 454 stove – 2 burner
1ea	Portable toilet – Western Shelter, model with toilet seat/bags
16 ea	Rolls of TP
1 ea	Dishwashing soap
8 ea	T-Towels
1 roll	Garbage bags, large
12 gallon	Coleman fuel
2ea	MSR Whisper-lite stove
6ea	MSR fuel canisters
misc	Lighters and weatherproof matches
8 rolls	Paper Towels
1ea	2 person survival bag
2 ea	Fire Extinguishers
Quant/Unit for Safety/Communications gear	
3ea	Iridium satellite phone
2ea	Medical kit
2ea	Radios – Airband
Quant/Unit for Tools / Hardware/ Fuel	
1 ea	Shovel, steel square blade
8 ea	Tarps, misc. sizes
10ea	Bungee cords, misc. sizes

6ea	Duct tape
8 ea	4'x8'x3/8 th – sheets of plywood
2ea	1kw generator
2ea	Generator rain covers
2ea	12v charge cord for the 1 kw generator
1 ea	Chainsaw, 16" bar (preferably electric)
3ea	Hurdy gurdy (1 gas & 1 diesel at drillsite , 1 gas at camp)
2ea	Bung wrench
10 gals	Antifreeze
24 quarts	Motor oil 10W/30
50 ea	20gal drums filled with Mogas (15ea) and Diesel (35ea)

For more information on satellite phones, radios, manuals and other field communications support, please visit the CPS communications Web site at <http://www.polar.ch2m.com/> .

Other Services

Service	Comments
Large bed Mercedes 4 x 4 truck and a driver arranged with GLV	Will drive the gear to Point 660 and unload in a staging area there
Empty Container in Kanger for storing drill overwinter	Located beside CPS warehouses
Truck rental arranged from Per Mikkelsen from 03 June – 03 July (would like to change this to 5 June – 9 July)	Cost will be covered by Harper
Purchase of 50 ea / 20 gallon drums	
Clearances for 8 people arranged on 109 th flight for 02 June	
KISS rooms provided for 8 people in summer and 3-4 in fall	
Helicopter charters arranged for camp put in, camp move, and camp Pull out	Since no helicopters in Kangerlussuaq, a Bell 212 will fly up from Nuuk
Upon arrival in Kanger, arrange a meeting for Harper with AeroClub pilot for possible recce flight to 660 area	Cost will be covered by Harper who's interested in doing a recce to find good campsite/drill site.
Arrange/purchase 35ea drums filled with diesel and 15ea drums filled with benzene	20 gal size drums will be used for easier handling
Note: The PI may request assistance from RSL for the costs of fall commercial air tickets.	CPS will work with the PI and NSF as needed.

LOCATION INFORMATION

Please visit <http://www.polar.ch2m.com/> and navigate to the Greenland menu for en route and location-specific Greenland information. Prior to deployment, your entire field team should be familiar with the content of the *Greenland Guide* and, if traveling to Summit, with the guidelines provided in the *Summit Users' Guide*. Both are available electronically via our Web site's Greenland menu.

CARGO AND CUSTOMS

All cargo required for your project should arrive in Scotia, NY, **no later than 2 weeks prior** to the desired northbound Air National Guard (ANG) flight, must be entered into our online Cargo Tracking System, and must be properly registered with Customs.

For the most current ANG flight schedule go to <http://www.polar.ch2m.com/> and navigate to Greenland > Calendars/Schedules.

Customs instructions are available on our Web site at <http://www.polar.ch2m.com/> (go to Greenland > Customs). More information is available via the *Greenland Guide*, under Greenland on the CPS site.

The following is our current understanding of your overall cargo requirements:

Cargo List

Items	Weight/Cube
On C5 flight: 64 ea Plastic boxes	Cargo list attached in addendums
On C5 flight: All main components of drill -- heaters, hose, pumps, and tower.	Total weight on C5 = 8828lbs
On 02 June flight: 4 ea - Sensors for the drill	50lbs each = 200lbs
On 02 June flight: 10 ea – Personal gear, large duffel	50lbs each = 500lbs
On 02 June flight: 17 ea – Rubbermaid tubs with food	60lbs each = 1020lbs

SUPPORT SCHEDULE

Approx Date	Location	Activity
02 June	NY > Kanger	ANG 109 th flight for Harper field team x 8 (Joel Harper, Neil Humphrey, Douglas Brinkerhoff, Erin Kathryn Johnson, Claire Landowski, Toby Meierbachtol, Christopher Cox, Luke Maddux).
03-07 June	Kangerlussuaq	Field and Drill preparation, load planning
08 June	Kanger > Pt660	GLV flatbed truck drives equipment up Icecap Rd to Pt 660, will hand-unload equipment. For fuel may use crane on truck.
09 June	Pt 660 > Campsite > Drill site	Bell 212 from Nuuk flies to Kangerlussuaq to do multiple loads to establish the Camp and Drill sites
10 – 27 June	Drill site #1	18 days drilling at Site 1 near the ice margin.
28 June	Drill site #1 > Drill site #2	Bell 212 from Nuuk flies to Kangerlussuaq to do multiple loads from original drill site to new drill site.
29 June – 04 July	Drill site #2	6 days drilling at Site 2
05 July	Drill site # 2 > Campsite > Pt 660	Camp Pull Out for both the camp and drill site. Return everything to Pt 660
06-08 July	Shuttle drill and cargo back to town	GLV Flatbed truck to transport gear back to Kangerlussuaq
09 July	Depart Kanger > Copenhagen	Field team departs on evening flight from Kangerlussuaq to Copenhagen (Researchers pay for tickets)
Sept TBD	Arrive Kanger	Team of 3-4 arrives SFJ via commercial air to winterize experiment
Sept TBD	Kanger> drill site	Team drives to end of road and hikes to first instrument site for data retrieval, instrument adjustment. Estimated number of days in the field: 3.
Sept TBD	Drill site>Kanger	Team returns to Kangerlussuaq via rented truck.
Sept TBD	Depart Kanger	Team departs via commercial air (Researchers pay for tickets)

For the most up-to-date information on the project's schedule, please view the online Greenland calendar (<http://www.polar.ch2m.com/> > Greenland > Calendars/Schedules).

FIELD TEAM INFORMATION

Name	Location	Date In	Date Out	Email
Harper, Joel	Kangerlussuaq	06/02/10	07/09/10	Joel at mso.umt.edu
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	
	Fall Maint Trip	TBD		
Humphrey, Neil	Kangerlussuaq	06/02/10	07/09/10	neil at uwyo.edu
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	
	Fall Maint Trip	TBD		

Brinkerhoff, Douglas	Kangerlussuaq	06/02/10	07/09/10	
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	
Johnson, Erin Kathryn	Kangerlussuaq	06/02/10	07/09/10	
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	
Landowski, Claire	Kangerlussuaq	06/02/10	07/09/10	
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	
Meierbachtol, Toby	Kangerlussuaq	06/02/10	07/09/10	
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	
	TBD Fall Maint Trip			
Cox, Christopher	Kangerlussuaq	06/02/10	07/09/10	
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	
Maddux, Luke	Kangerlussuaq	06/02/10	07/09/10	
	Drill / Campsite Area at the Ice Margin	06/09/10	07/05/10	

PROJECT CONTACT INFORMATION

Research Team

Role	Name	Email	Phone / Fax
Principal Investigator	Joel Harper	Joel at mso.umt.edu	406 243.5867 /406 243.4028
Collaborator	Neil Humphrey	neil at uwyo.edu	307 766.2728 /
Collaborator	W. Tad Pfeffer	pfeffer at tintin.colorado.edu	303 492.3480 /303 492.6388

CPS Team Members

Contact for	Name	Email	Primary Phone
Greenland science planning & support	Susan Zager	Susan at polarfield.com	Denver: 720.320.6159
Greenland science planning & support	Robin Abbott	Robin at polarfield.com	Denver: 303.748.8507
Kangerlussuaq base operations	Kathy Young	Kathy at polarfield.com	Denver: 720.320.6160 Greenland: 011.299.524218
Scotia (Stratton Air Base) operations & customs	Earl Vaughn	Earl Vaughn at gmail.com	Scotia cell: 518.605.0979
Sat phones & comms	Roy Stehle	Roy.Stehle at sri.com	Menlo Park: 650.859.2552
Remote Medical (kits & service) and Medical/Dental Clearance (PQ)	Robbie Score	Robbie at polarfield.com	Denver: 303.906.0093

CPS Offices

Denver	Kangerlussuaq	Scotia
Polar Field Services 8110 Shaffer Parkway Suite 150 Littleton, CO 80127 Tel: 303.984.1450/1439 Fax: 303.984.1445	CH2M HILL Polar Services Attn: Name of Employee/Researcher Postboks 1015 DK-3910 Kangerlussuaq, Greenland Tel: 011.299.841598 Fax: 011.299.841599	Earl Vaughn C/O 109 th Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel: 518.344.2635 Cell: 518.605.0979 Fax: 518.344.2537

Other

Organization	Internet	Phone
Medical Advisory Service (MAS) (see below for Remote Telemed #)	http://www.medaire.com/corp_medlink.html	Office: 480.333.3771

SAFETY, ENVIRONMENT, HEALTH and PERMITS

Effective January 1, 2010 the Government of Greenland assumed responsibility for the permitting process for research in Greenland. All science teams planning to conduct research in Greenland must complete an **annual application** in order to obtain approval from the Government of Greenland. The application forms are available from the Department of Domestic Affairs, Nature and Environment at <http://www.nanoq.gl/expeditions> or by sending an email to [ekspeditioner at gh.gl](mailto:ekspeditioner@gh.gl). Applications are submitted directly through the Department of Domestic Affairs, Nature and Environment. Be advised that a new fee of 4000 DKK has been put in place for permits. For assistance with the application process, contact:

Martin Schiøtz
 Head of Section
 Section of Nature
 Department of Domestic Affairs, Nature and Environment P.O. Box 1614
 3900 Nuuk
 Greenland
 e-mail: [ekspeditioner at gh.gl](mailto:ekspeditioner@gh.gl)

Medical Advisory Service (MAS) Support

If you need medical advice/assistance, do not hesitate to contact Medical Advisory Service (MAS) using the card included with the medical kit or the information below. Be sure that each team member knows where the kit is located and understands how to use the MAS service in the field. For further information on MAS, please visit our Web site <http://www.polar.ch2m.com/> and navigate to Medical>Remote Medical Services/Kits.

MAS 24/7 Telemed Service

Worldwide Phone: 1.480.333.3876
 Fax: 1.480.333.3821
 Member ID: CH2M HILL Polar Services

RISK ASSESSMENT

See Appendix for Risk Factors and Mitigation.

CRITICAL SUCCESS FACTORS

Please list the factors that are most important for the success of your science. We track these factors in order to measure the success of CPS' support. Examples might be the availability of the helicopter or camp gear.

Factors
Provide field camping equipment in working order
Provide general information regarding field transportation and logistics
Provide support for shipping equipment to Greenland
Provide or arrange for temporary storage, work space and accommodation in Greenland

GOVERNMENT AND PERFORMANCE REPORTING ACT OF 1993 (GPRA)

NSF/OPP requires your help in complying with the Government Performance and Reporting Act of 1993 (GPRA). One measure of CPS' performance is a "facility-performance metric" which counts the number of productive days your project has in the field while relying on CPS facilities or support. Please keep track of any "lost days" and report these to us at the end of the season.

APPENDIX

RISK FACTORS and MITIGATION

Factor	Mitigation and Control
Chainsaw	Only people using the chainsaw will be Joel Harper or Neil Humphrey who are experienced handlers
Cold Weather	Team members have been well informed about cold weather injuries. There is an experienced Paramedic, a Wilderness First Responder and others with First Aid training who are on the Harper team. Everyone will bring proper clothing for wet and windy weather. Appropriate camping gear, and sleeping bags are adequately rated
Drills/augers	Drill/auger training/AHA - Experience team members will instruct others about the operation of their hot-water drill. There will always be at least 1 experienced drilling person on site when the drill is running.
Foot/ski travel	Have a communication plan in place, carry an Iridium phone, and never travel alone Have a check out policy in place at camp.
Fuel Handling	Participate in fuel handling training/AHA Have a plan for fuel spills/first aid
Generator	Familiarize the field team with generator training/AHA
Heavy lifting/body strains and sprains	Use proper lifting techniques
Helicopter Travel and working around	Experienced field team members will go over helicopter safety protocols. AHA or similar worksheet will be sent to team members regarding working around aircraft Pilots will give a helicopter safety briefing before he begins flying
Remote Camp	Have a remote medical call in service Have a SAR plan in place Have a First Aid kit available Participate in First Aid training. There is a person who is a Paramedic on the field team as well as a Wilderness First Responder. Keep a camp roster by each radio to be used in conjunction with the check-out/check-in Develop a list of current camp member's training levels and certifications Maintain back-up equipment and supplies in case of emergency (comms, generators, tents, food) Maintain an emergency contact list, include all applicable agencies, field team members, provide camp location and description to local SAR groups Develop a plan for general camp operations including camp hygiene and handling human waste Participate in PLB training Participate in GPS training
Sling loads	Only experienced people who have worked with hooking up slingloads before will be working with the helicopters in this way this year.
Truck Travel	Truck training - Don't ride in the bed Insure the truck has spare tire and jack for extended trips Carry survival gear and warm clothes for extended trips Carry an Iridium phone for extended trips
Water – Availability, Potability	Purify or Filtration system from a stream Carry in fresh water