

PROJECT INFORMATION

Lead Principal Investigator	Robert Hawley
Institute	Dartmouth College, Earth Sciences
Project Title / Grant #	Understanding the physical properties of Northern Greenland near-surface snow: A spatial variability study (0909265)
NSF Program and Manager	NSFOD\OPPARCVANS, Dr. Henrietta Edmonds
PFS Project Manager	Katrine Gorham

LOGISTICS SUMMARY

The PIs will study the physical properties of near-surface snow in northern Greenland in a sampling transect between Thule Air Base, and Summit Greenland, using a resupply traverse as a logistics platform. As part of this work, the team will drill a 30m core near Thule Air Base, a 100m core near Summit Station, and samples will be collected en-route between Thule and Summit.

In 2010, a team of three will travel to Summit and take a 100m core, log the borehole, and dig a 1-2 meter snow pit for measurements. The cores will be returned to the US and analyzed at the researchers' institute. Additionally, if there is time available during the 2010 field deployment, they will also perform additional tasking including, 1) a dense grid re-survey and GPS work for the ICESAT line, 2) a ground-based LiDAR experiment, and 3) a snowmobile trip to the former GRIP site to complete casing work for Danish colleagues.

During 2010, one of the researchers will travel with the traverse from NEEM to Summit. The researcher will serve to replace one of the traverse crew and will continue with sample collection en route.

Ice core samples collected at Summit will be packed into ISC boxes and prepared for shipment by the researchers (CPS will supply ISC boxes and eutectics). While at Summit it will be the researchers' responsibility to ensure that the samples remain at the proper temperature. At the end of the campaign, samples will be flown from Summit to Kangerlussuaq, where they will be stored in a freezer facility before being flown to Stratton Air Base in New York. The CPS team will make arrangements for the samples to be retrieved in NY for shipment onward to the home institutions.

In spring of 2011, a team of two will travel to Thule to train CPS traverse staff on sampling techniques and to take a 30m core and log the borehole. They will also return to Summit to log that borehole and dig/sample another snowpit. Snow samples will be collected during the 2011 traverse either by one of the researchers, or as a secondary plan, the traverse crew.

CPS will provide AMC/ANG coordination, lodging in Kangerlussuaq/Thule, user days at Summit, camping gear for the Thule drilling effort, air charters to access the Thule site, core boxes and eutectics, and core storage/retrograde. IDDO-ICDS will provide the drills and a driller. All other logistics will be covered by the researcher from 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=0909265

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	5/10/2010	In progress
Obtain all necessary permits and insurance for fieldwork	PI	5/10/2010	
Visit all hyperlinks and review all documents referred to in the support plan	Entire Field Team	5/10/2010	In progress
Contact the GEOSummit Science Coordination Office (SCO) sco at summitcamp.org regarding your project's plans for the season	PI	5/10/2010	completed
Complete medical clearance process 6-8 weeks before desired deployment date	Entire field team	5/10/2010	In progress
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	5/10/2010	okay
Complete Critical Success Factors	PI	5/10/2010	completed

ALLOCATIONS AND SERVICES

Allocations from Inventory

Quant/Unit	Item
2	4-stroke snowmobiles
2	Nansen sleds
1	3 kW generator (backup)
1	12 Volt, 20+ Ah Battery
1	Polypod sled and survival bag (only needed for GRIP trip)
1	Iridium phone (only needed for GRIP trip)
2	Full sheets of plywood
1	8x8 Arctic Oven tent for drill site
1	Scott tent (field toilet) for drill site
~10	Bamboo poles
2	VHF radios
10	Ice Core Boxes (4 additional boxes provided by researchers)
120 m	layflat tubing
100	Johnny Blue Ice, XCB-24Y-24 (9.5"x5"x1") minus 10F degree

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
User days Kangerlussuaq	
User days Summit, including meals	<p>The researchers will sleep in tents provided by CPS. Researchers will provide their own sleeping bags and ECW gear.</p> <p>All personnel will use the Big House facilities for meals and observe regular meal times. They should notify the camp manager and chef if they plan to eat outside normal meal times. Any special diets or food allergies should be reported to the chef upon arrival at Summit. If possible, the science group can send an early email to manager at summitcamp.org to prep the cook for special diet requirements.</p>

ANG travel: NY-Kanger-Summit-Kanger-NY	
ANG travel: Kanger-NEEM	
Cargo Services	
Green House Bench Space	The researchers will be provided with bench space in the Greenhouse east lab. The researchers will be allocated the north bench in this lab. Researchers acknowledge that they will need to work around the science techs who may need access to this area for the daily tasking duties.
Drill Site	The researchers will drill their 100 m core at the drill site located to the west of camp. Power will be supplied to the site by generator and an 8x8 Arctic Oven tent will be provided for shelter. A Scott tent will be erected for use as a rustic toilet.
ICESAT Work and Polypod Sled	The researchers will coordinate with the science technicians to arrange use of the Polypod sled.
Cold Deck Flight	A cold deck flight out of Summit is planned on June 23 rd . The ice core samples will travel from Summit to Kanger on this flight. Once in Kanger, CPS has made arrangements for the samples to be kept in a freezer before traveling south on cold deck from Kanger to Stratton Air National Guard Base in Scotia. The CPS team will be responsible for arranging cold transportation that will transport the ice core samples to their home institution.
Safety protocols	The researchers will adhere to all safety protocols outlined by CPS. This includes reading and signing off on relevant Activity Hazard Analysis (AHAs) prior to completing relevant tasks. Additionally, the researchers will adhere to the established clean air protocols and travel policies.

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.

If you are a **new user** requiring access to the Cargo Tracking System, contact [Jason Buenning](#).

(If you need **technical support** with the Cargo Tracking System, contact [Mike Dover](#) .

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
Miscellaneous equipment and snow kit	350 lbs / 20 cu ft
LiDAR	60 lbs / 5 cu ft

Core Boxes (4 provided by researchers)	Sent on C5
Core Boxes (10 provided by CPS)	Sent on C5
Drill Parts (provided by IDDO-ICDS)	2055 lbs / 100 cu ft
4" Drill System (provided by IDDO-ICDS)	1985 lbs / 109 cu ft
Power Supply, 5 kW and 6 kW generators (provided IDDO-ICDS)	468 lbs / 24 cu ft

SUPPORT SCHEDULE

Approx Date	Location	Activity
5/10/10	Scotia-Kanger	Researcher (Courville) flies from Scotia to Kangerlussuaq
5/11/10	Kanger-NEEM	Researcher (Courville) flies from Kangerlussuaq to NEEM to meet/join the GrIT traverse
5/25 -6/4	NEEM-Summit	Researcher (Courville) arrives at Summit with GrIT
6/2/10	Scotia-Kanger	Researchers (Hawley/Wong) and Driller (Gacke) fly from Scotia to Kangerlussuaq
6/4/10	Kanger-Summit	Researchers (Hawley/Wong) and Driller (Gacke) arrive at Summit
6/23/10	Summit-Kanger	Researchers (Hawley, Courville, Wong) and Driller (Gacke) depart Summit and arrive in Kangerlussuaq
6/23/10	Summit-Kanger	Cold deck flight from Summit to Kangerlussuaq
6/23/210	Kanger	Ice core boxes are transported to the Kangerlussuaq freezer for cold storage until cold deck flight south
6/26/10	Kanger-Scotia	Researchers (Hawley/Courville/Wong) and Driller (Gacke) fly from Kangerlussuaq to Scotia
7/1/10	Kanger-Scotia	Cold deck flight from Kangerlussuaq to Scotia
7/1/10	Scotia	The CPS team will make arrangements for a cold truck to transport the ice core samples to their home institution

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
Courville, Zoe	Kangerlussuaq	05/10/10	06/26/10	zoe.r.courville at usace.army.mil
	NEEM	05/11/10	05/12/10	
	Summit	~05/25/10	06/23/10	
Hawley, Robert	Kangerlussuaq	06/02/10	06/26/10	robert.hawley at dartmouth.edu
	Summit	06/04/10	06/23/10	
Wong, Gifford	Kangerlussuaq	06/02/10	06/26/10	gifford.j.wong at dartmouth.edu
	Summit	06/04/10	06/23/10	
Gacke, Terrance	Kangerlussuaq	06/02/10	06/26/10	tlgontheice at hotmail.com
	Summit	06/04/10	06/23/10	

PROJECT CONTACT INFORMATION

Research Team

Role	Name	Email	Phone / Fax
Principal Investigator	Robert Hawley	robert.hawley at dartmouth.edu	(603) 646-1425

CPS Team Members

Contact for	Name	Email	Primary Phone
Summit science planning & support	Katrine Gorham	Katrine at polarfield.com	Denver: 303.349.2884
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

Summit Station

Winter	Summer
Polar Field Services Attn: Name of Employee/Researcher 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 - Summit Station C/O Earl Vaughn 109 th Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel: 518.344.2635 Fax: 518.344.2537

Other

Organization	Internet	Phone
Medical Advisory Service (MAS)	http://www.medaire.com/corp_medlink.html	Office: 480.333.3771
Summit Science Coordination Office (SCO)	http://www.geosummit.org sco at summitcamp.org	John Burkhart +47 96 82 5011

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 Clearance

Arctic Program participants traveling into the Greenland field generally must pass a National Science Foundation-mandated physical and dental exam. All field team members should plan to complete their Physical Qualification (medical and dental clearance) process 6-8 weeks prior to travelling to Greenland. For more information, refer to CPS' *Greenland Guide*, available at <http://www.polar.ch2m.com/> under Greenland.

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
Cargo arrives complete and in a timely fashion.
Equipment provided by CPS performs to expectations (i.e. snowmobiles, generators, etc.).
Ice core arrives at CRREL intact: cold deck flights, transition in Kanger, freezer in Kanger, ground transportation at Scotia.

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
Heavy lifting/body strains and sprains	-Use proper lifting techniques
Snowmobile Travel	-Participate in a snowmobile training
	-Have SAR plan in place
	-Use appropriate Personal Protection Equipment/helmets
	-Carry Survival Gear on extended trips
	-Use radio communications between snowmachines

	<ul style="list-style-type: none"> -Carry a PLB (Personal Locator Beacon) -Carry a GPS (Global Positioning System) unit
Cold Related Injuries-weather	<ul style="list-style-type: none"> -Team members participate in a cold weather injury training course such as Wilderness First Aid or Wilderness First Responder -Wear proper clothing -Appropriate camping gear, insure sleeping bags are adequately rated -Check the forecast before going out of camp/town -Watch the weather while out -Be mindful of hydration, carry sufficient food -Develop and share your travel plans -Have and share an emergency plan for bad weather
Emergency Plan	<ul style="list-style-type: none"> -Compile a list of emergency contacts for your field team and share it with critical participants including your home institution and CPS.
Communications	<ul style="list-style-type: none"> -Carry the appropriate communications system -Assure your phone and/or radio is fully charged before going out and carry a spare battery.
Drills/augers	<ul style="list-style-type: none"> Participate in drill/auger training
Foot/ski travel	<ul style="list-style-type: none"> -Have a communication plan in place (carry a radio) -Have a check out policy in place
Fuel Handling	<ul style="list-style-type: none"> -Participate in fuel handling training -Review current AHA (Activity Hazard Analysis) -Have a plan for fuel spills/first aid
Generator	<ul style="list-style-type: none"> -Attend generator training -Review current AHA (Activity Hazard Analysis)
High Altitude	<ul style="list-style-type: none"> - Have SAR plan in place -Develop plan to acclimatize -Consult with physician on use of medication for acclimatization