

PROJECT INFORMATION

<b>Lead Principal Investigator</b>	Marco Tedesco
<b>Institute</b>	City College of New York, Earth and Atmospheric Science
<b>Project Title / Grant #</b>	Improving surface mass balance estimation of the Greenland ice sheet through assimilation of multi-sensor satellite products and ground measurements into a regional climate model (0909388)
<b>NSF Program and Manager</b>	NSFOD\OPPARCIANS, Dr. William Wiseman; Dr. Tom Wagner, NASA*
<b>PFS Project Manager</b>	Katrine Gorham (Summit Station ) and Susan Zager (Ilulissat, Greenland)

\*NASA funds are paying for this project's field work.

LOGISTICS SUMMARY

This project, funded by NSF and NASA, will advance the ability to map, quantify, and assess the surface mass balance (SMB) of the Greenland Ice Sheet (GIS).

Field work in 2010 involves visits to Summit Station and to Ilulissat. First, in late June, a team of three will travel via Air National Guard to Kangerlussuaq and on to Summit Station. They will spend about six days there digging and testing a series of snow pits, including a large (~4 m depth) pit, for which Summit equipment operations staff will use heavy equipment to complete the initial digging effort. When this work is finished, the team will return via ANG to Kangerlussuaq; one will depart Greenland and two will travel on via commercial air to Ilulissat for the second part of the work.

In Ilulissat, the two will rendezvous with an additional colleague for a ~10-day research effort. They will fly via helicopter to the area of interest, melt lakes near Swiss Camp. They will establish a tent camp at one of the lakes and conduct measurements, including specific surface area observations with near infra-red photography. The duration of this effort will be about a week. When they have finished the work, the team will pull out of the field and return to Ilulissat. From there, they will depart the island via commercial air. CPS staff in Ilulissat will forward shipments from camp including frozen samples and team cargo to Kanger and then the US.

In 2011, the researchers will return to Swiss Camp and continue conducting measurements at previous sites.

Note: With funding via an interagency transfer from NASA to NSF, CPS will provide ANG transport to/from Scotia and Kanger for people and cargo, en route user days in Kangerlussuaq, Summit user days, cargo transport to Summit, en route travel/freight to/from Ilulissat and lodging in Ilulissat, air travel to/from the field camp and camping/safety gear. The PI will arrange all other support and pay for it 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=0909388](http://www.polar.ch2m.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=0909388)

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

OUTSTANDING ACTIONS AND NOTES

Issue	Responsibility	Date Due	Date Complete
Review support plan for accuracy and distribute to all field team members	PI	6/1/2010	
Obtain all necessary permits for fieldwork	PI	6/1/2010	
Visit all hyperlinks and review all documents referred to in the support plan	Entire Field Team	6/1/2010	
Contact the GEOSummit Science Coordination Office (SCO) <a href="mailto:sco@summitcamp.org">sco at summitcamp.org</a> regarding your project's plans for the season	PI	6/1/2010	Complete

Complete medical clearance process 6-8 weeks before desired deployment date	Entire field team	6/1/2010	
<b>Note: Passports are required for Air National Guard and international travel. Also, please bring TWO copies of your passport to Greenland with you.</b>	Entire field team	6/1/2010	
Complete cost estimate for interagency funds transfer Provide end-of-season actual costs	CPS		
Complete Critical Success Factors	PI	6/1/2010	Complete

## FIELD TEAM INFORMATION

Name	Location	Date In	Date Out	Email
Marshall, Hans-Peter	Kangerlussuaq Summit	06/21/10 06/23/10	7/1/10 6/29/10	<a href="mailto:Hpmarshall@boisestate.edu">Hpmarshall at boise.edu</a>
Steiner, Nick	Kangerlussuaq Summit Ilulissat	06/21/10 06/23/10 06/30/10	06/30/10 06/29/10 07/10/10	<a href="mailto:nick.steiner@gmail.com">nick.steiner at gmail.com</a>
Tedesco, Marco	Kangerlussuaq Summit Ilulissat	06/21/10 06/23/10 06/30/10	06/30/10 06/29/10 07/10/10	<a href="mailto:mtedesco@sci.cuny.cuny.edu">mtedesco at sci.cuny.cuny.edu</a>
Rios, James	Ilulissat	06/30/10	07/10/10	<a href="mailto:marquis@seas.ucla.edu">marquis at seas.ucla.edu</a>

## SUPPORT SCHEDULE

Approx Date	Location	Activity
6/21/10	Scotia ANGB>SFJ	Tedesco/Marshall/Steiner fly to Kangerlussuaq
6/23/10	SFJ-SUM	Tedesco/Marshall/Steiner arrive at Summit
6/29/10	SUM-SFJ	Tedesco/Marshall/Steiner depart Summit, return via C-130 to Kanger
7/1/10	SFJ>Scotia ANGB	Field team member (Marshall) returns to NY
29 Jun 10	Commair	James Rios arrives in JAV.
6/30/10	SFJ > JAV	Tedesco, Steiner travel from Kanger to Ilulissat via AirGL & rendezvous with Rios. The group prepares for the upcoming heli flight.
7/1/10	JAV	Tedesco, Steiner and Rios leave for camp via AirGL Bell212 helicopter, making surveys of melt lakes along the way. The field team makes camp near JAR1.
7/2 - 7/5	JAV	The field team traverses by foot around the JAR1 surveying for sensors and taking core samples.
7/6/10	Field > SWC > JAV	Camp pull-out at JAR1. Field team stops at lake near Swiss Camp to collect sensor. Heli waits for researchers to complete work and continues to JAV.
7/7/10	JAV	Field team puts cargo away and prepares for departure.
7/8/10	JAV > Iceland > US	Tedesco, Steiner, Rios depart JAV via commair for US.

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 LOCATION 1: SUMMIT STATION, GREENLAND

### ALLOCATIONS AND SERVICES

#### Allocations from Inventory: Summit

Quant/Unit	Item
2	4-stroke snowmobiles. Note: These snowmobiles will be available for off-station travel to pit sites. These are not to be used for transportation around camp.
2	Nansen Sleds
1	15 ft ladder
1	GPS
1	Iridium Phone
2	2-person survival bags
3	Shovels

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: Summit

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 <a href="mailto:manager@summitcamp.org">manager at summitcamp.org</a> to prep the cook for special diet requirements.</p>
ANG travel: NY-Kanger-Summit-Kanger-NY	
Cargo Services	
Power: Battery Charging	Power outlets will be available in the Science and Operations Barn for recharging of science. The researchers will provide their own chargers. Additionally, the researchers will be responsible for providing any non-US power requirements (i.e. converters or adaptors).
Instrument Frequency Interference	The researchers agree to coordinate their measurements with the ICECAPS project to avoid instrument frequency interference. As part of the coordination the Science Coordination Office (SCO) and Project Manager (Katrine Gorham) will be involved to facilitate the discussion. The researchers will be conducting measurements at 8-20 GHz and 35 GHz. Possible interferences include the ICECAPS Radar (transmitting at 34.86 GHz) and HF communications antenna.
Off-Station Snow Pits	The researchers will travel off-station to dig snow pits at Summit. This work will be done to the North and/or Northwest of camp in order to avoid interference with the clean air sector and drill site. The researchers will coordinate with their Project Manager (Katrine Gorham) prior to arrival on station and will confirm their plans with the Summit Science Techs prior to commencing with off-station work. Additionally, the researchers will be responsible for backfilling all pits and recording site coordinates. The site coordinates will be provided to the Project Manager and Science Techs.

Heavy Equipment Assistance	The CPS heavy equipment operators will assist the researchers with digging one ~4 meter pit at Summit. The location of the pit is detailed in the map (Figure 1) in the appendices. The researchers acknowledge that these pits will resemble trenches with gradual entrance/exit, and will be dug prior to arrival of the research team at Summit.
Safety protocols	The researchers will adhere to all safety protocols outlined by CPS. This includes reading and signing off on Activity Hazard Analysis (AHAs) prior to completing relevant tasks. Additionally, the researchers will adhere to the established clean air protocols and travel policies.

### Cargo List

Items	Weight/Cube
Science Equipment (NY to Kanger)	~500 lbs / 400 cu ft
Science Equipment (Kanger to Summit)	~400 lbs / 300 cu ft
Retro Science Equipment (Summit to Kanger)	~400 lbs / 300 cu ft

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## FIELD LOCATION 2: ILULISSAT (JAV), GREENLAND

### ALLOCATIONS AND SERVICES

#### Allocations from Field Equipment Inventory: Ilulissat

Quan/Unit	Item	Quan/Unit	Item
mult.	Coleman Fuel	2	Extension Cord
1	Fuel Funnel	2	Powerstrip
3	Plywood	2	Jerrycan
15	Bamboo	1	Bottle, Can opener
15	Flag	1	Can opener
9	Ice Screw	1	Coffee pot
3	Basin	1	Detergent
3	Bowls, soup	1	Fry pan, teflon 10"
3	Fork	1	Knife, paring
3	Mug	1	Ladle
3	Pot, 10qt	1	Pot Holder
3	Spoon	1	Rubber scraper
3	Chair, camp	1	Sponge
3	Mt. Tent	1	Strainer
3	Core Tubes	1	Thermos
2	Bowls, mixing	1	ziplock bags
2	Cook pots	1	Coleman Stove
2	Cutting board	1	Lighter
2	Dish cloths	1	Matches
2	Handi wipes	1	Mallet

2	Spoon, serving	1	Table
2	Fuel Bottle	1	Tarp
2	Generator	1	Toilet paper
1	Medical kit	1	Kitchen box
1	Auger, gas power		

**Allocations from Communications Equipment Inventory: Ilulissat**

Quan/Unit	Item	Quan/Unit	Item
2	Iridium phone	0	PLB; researcher will provide

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: Ilulissat**

Service	Comments
Commercial cargo, SFJ > JAV > SFJ	For both researcher cargo and CPS equipment
Commercial travel via AirGL SFJ>< JAV	
Lodging before/after camp in JAV	
Truck rental in JAV	
Helicopter charter in JAV	Bell 212, put-in and pull-out of camp.
Frozen sample transport, JAV > SFJ > NY	
<ul style="list-style-type: none"> <li>- Researcher will have one core box containing three core tubes of frozen samples when they come out of the field.</li> <li>- The core box, packed with snow, will be sent via AirGreenland cargo to SFJ.</li> <li>- CPS will coordinate shipping onsite at JAV.</li> <li>- In SFJ, the core box will be repacked with eutectics and held in a freezer until the next available C-130 flight.</li> <li>- The core box will be transported via C-130 to Scotia, NY.</li> <li>- The core box will be sent to the researcher via FedEx with the alternate option of a member of the research team personally picking up the core box.</li> <li>- CPS will coordinate with research team as the core box advances through each waypoint.</li> </ul>	

**Cargo List: Ilulissat**

Items	Weight/Cube
Science equipment, camp consumables, SFJ to JAV	~400 lbs / 200 cu ft
Retrograde science equipment plus core box JAV to SFJ	~250 lbs.

**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.

**PERSONNEL INFORMATION**
**Research Team**

Role	Name	Email	Phone / Fax
Co-PI	Steven Margulis	<a href="mailto:margulis@seas.ucla.edu">margulis@seas.ucla.edu</a>	310 267-5490 /310 206-2222
Principal Investigator	Marco Tedesco	<a href="mailto:mtesesco@sci.cuny.cuny.edu">mtesesco@sci.cuny.cuny.edu</a>	212 650-7000 /

**CPS Team Members**

Contact for	Name	Email	Primary Phone
Summit science planning & support	Katrine Gorham	<a href="mailto:Katrine@polarfield.com">Katrine@polarfield.com</a>	Denver: 303.349.2884
Greenland science planning & support	Susan Zager	<a href="mailto:Susan@polarfield.com">Susan@polarfield.com</a>	Denver: 720.320.6159
Greenland science planning & support	Robin Abbott	<a href="mailto:Robin@polarfield.com">Robin@polarfield.com</a>	Denver: 303.748.8507
Kangerlussuaq base operations	Kathy Young	<a href="mailto:Kathy@polarfield.com">Kathy@polarfield.com</a>	Denver: 720.320.6160 Greenland: 011.299.524218
Scotia (Stratton Air Base) operations & customs	Earl Vaughn	<a href="mailto:Earl.Vaughn@gmail.com">Earl.Vaughn@gmail.com</a>	Scotia cell: 518.605.0979
Sat phones & comms	Roy Stehle	<a href="mailto:Roy.Stehle@sri.com">Roy.Stehle@sri.com</a>	Menlo Park: 650.859.2552
Remote Medical (kits/service) and Medical/Dental Clearance (PQ)	Robbie Score	<a href="mailto:Robbie@polarfield.com">Robbie@polarfield.com</a>	Denver: 303.906.0093

**PROJECT CONTACT INFORMATION**
**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 Postboks 1015 DK-3910 Kangerlussuaq, Greenland Tel: 011.299.841598 Fax: 011.299.841599	Earl Vaughn C/O 109 <sup>th</sup> Aerial Port, Bldg. 20 1 Air National Guard Rd. 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 <sup>th</sup> Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel:518.344.2635 Fax: 518.344.2537

**Other**

<b>Organization</b>	<b>Internet</b>	<b>Phone</b>
Medical Advisory Service (MAS) <b>(see below for Remote Telemed #)</b>	<a href="http://www.medaire.com/corp_medlink.html">http://www.medaire.com/corp_medlink.html</a>	Office: 480.333.3771
Summit Science Coordination Office (SCO)	<a href="http://www.geosummit.org">http://www.geosummit.org</a> <a href="http://sco.at.summitcamp.org">sco at summitcamp.org</a>	John Burkhart +47 96 82 5011
Hotel Contact Info for JAV	Silver, Ilulissat Tourist Nature	299 944420

## 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.

### 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

Critical Success Factors are the factors most important for the success of your project and are used to measure the success of CPS support. When developing these factors please keep in mind that they should be deliverable and controllable from a logistics standpoint (i.e. factors related to weather are not controllable).

<b>Factors: Summit</b>
Availability of power to recharge batteries for instruments.
Availability of heavy equipment assistance for digging the 4 meter pit.
Availability of snowmobiles.
Coordination with other science groups to minimize/eliminate interference from instruments operating at similar frequencies.

<b>Factors: Ilulissat</b>
Contract for helicopter in place
Availability of power to recharge batteries for instruments
Allocated equipment in working order
Timely cargo handling
Lodging arranged

## 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.

## APPENDICES FOLLOWING SUMMIT AND ILULISSAT FIELD PLANS

Table 1: Risk factors and mitigation for Summit work.

Table 2: Risk factors and mitigation for Ilulissat work.

## APPENDICES

**Table 1: Risk factors and mitigation for Summit work.**

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 -Carry a GPS (Global Positioning System) unit
Cold Related Injuries-weather	-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	-Compile a list of emergency contacts for your field team and share it with critical participants including your home institution and CPS. -Share your satellite phone number as a means for others to contact you.
Communications	-Carry the appropriate communications system (satellite phone) -Assure your phone and/or radio is fully charged before going out and carry a spare battery.
Foot/ski travel	-Have a communication plan in place (carry a radio) -Have a check out policy in place
High Altitude	-Participate in high altitude training -Have medical call in service available -Have SAR plan in place -Have oxygen available in high altitude camps -Develop plan to acclimatize -Consult with physician on use of medication for acclimatization
Medical fitness for remote work outside ANG flight period	-Follow NSF Physical Qualification process
Trench/pit Work	-Use appropriate PPE (Personal Protection Equipment)

**Table 2: Risk factors and mitigation for Ilulissat work.**

<b>Factor</b>	<b>Mitigation and Control</b>
Cold Weather	<ul style="list-style-type: none"> <li>-Team members attend a cold weather injury training course such as Wilderness First Aid or Wilderness First Responder</li> <li>-Proper clothing</li> <li>-Appropriate camping gear, insure sleeping bags are adequately rated</li> <li>-Check forecast before going out of camp/town.</li> </ul>
Helicopter Travel	<ul style="list-style-type: none"> <li>-Participate in helicopter training</li> <li>-Have a SAR plan in place</li> <li>-AHA working around aircraft</li> <li>-Carry survival bags on the aircraft if doing day trips, or if multiple put in flights insure people travel with survival items from camp supplies</li> </ul>
Remote Camp	<ul style="list-style-type: none"> <li>-Have a remote medical call in service</li> <li>-Have a SAR plan in place</li> <li>-Have a First Aid kit available</li> <li>-Participate in First Aid training- be sure that someone or all field personnel have</li> <li>-Basic First Aid training at a minimum</li> <li>-Have a communication/ check-out/check-in plan in place</li> <li>-Develop a list of current camp member's training levels and certifications</li> <li>-Maintian an emergency contact list, include all applicable agencies, field team members, provide camp location and description to local SAR groups</li> <li>-Develop a plan for general camp operations including camp hygiene and handling human waste</li> <li>-Participate in PLB training</li> <li>-Participate in GPS training</li> </ul>
Water – Availability, Potability	<ul style="list-style-type: none"> <li>-Filtration system</li> <li>-Carry in</li> </ul>