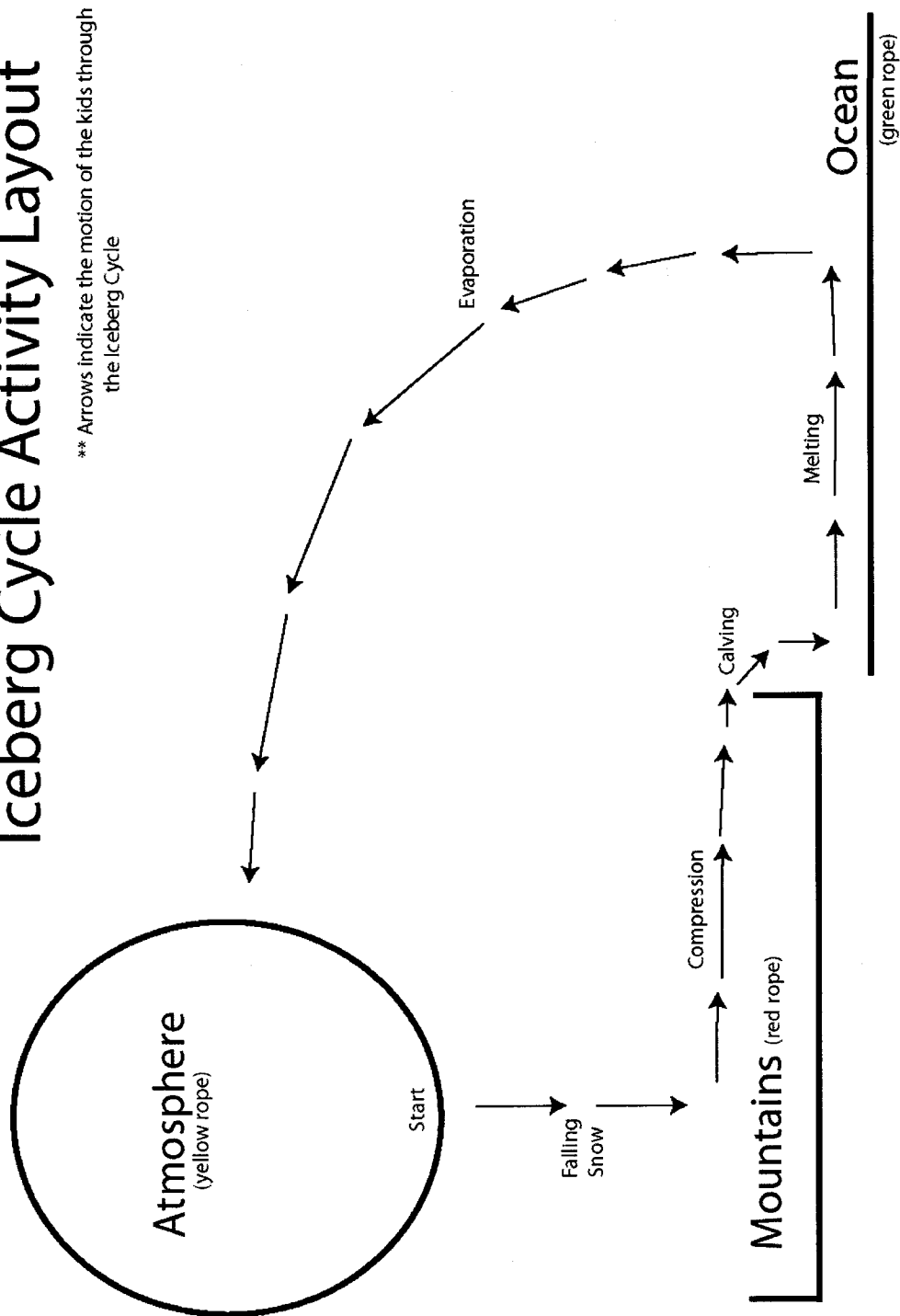


# Iceberg Cycle Activity Layout

\*\* Arrows indicate the motion of the kids through the Iceberg Cycle



### **Powerpoint Slides for Iceberg and Sea Ice Lessons**

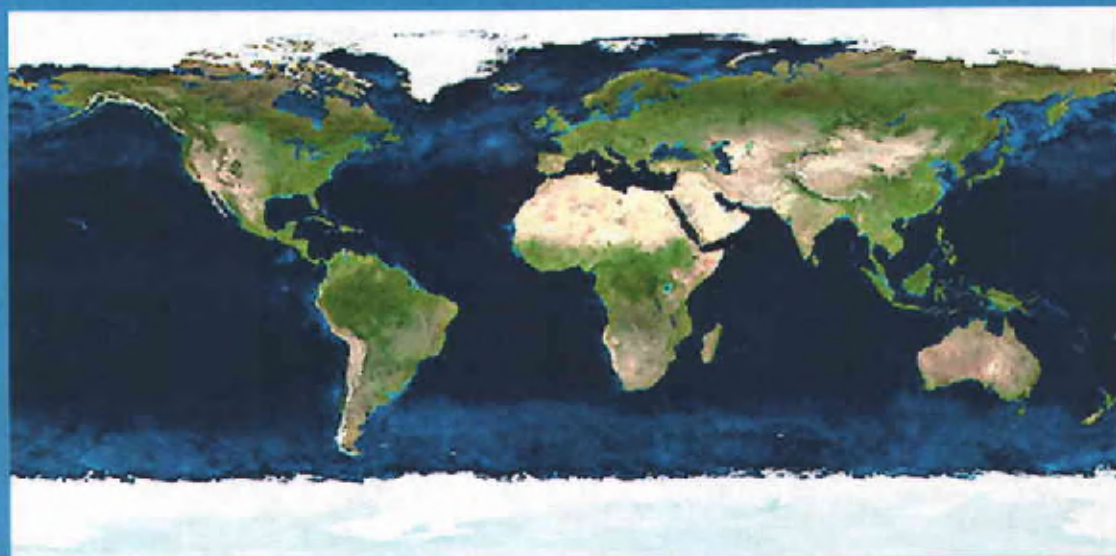
Slide 1

## Suitcase Lesson

- Lesson 1: Where do Icebergs come from?
  - Slides 2-16
- Lesson 2: Why is Sea Ice Formation Important?
  - Slides 17-21

## Slide 2

## World Map



\* The ice caps on Greenland and Antarctica along with the sea ice near the poles are shown in white.

## Slide 3





Slide 4

Where do most icebergs in the Arctic come from?



Slide 5

## Between Northern Greenland and Canada



Slide 6

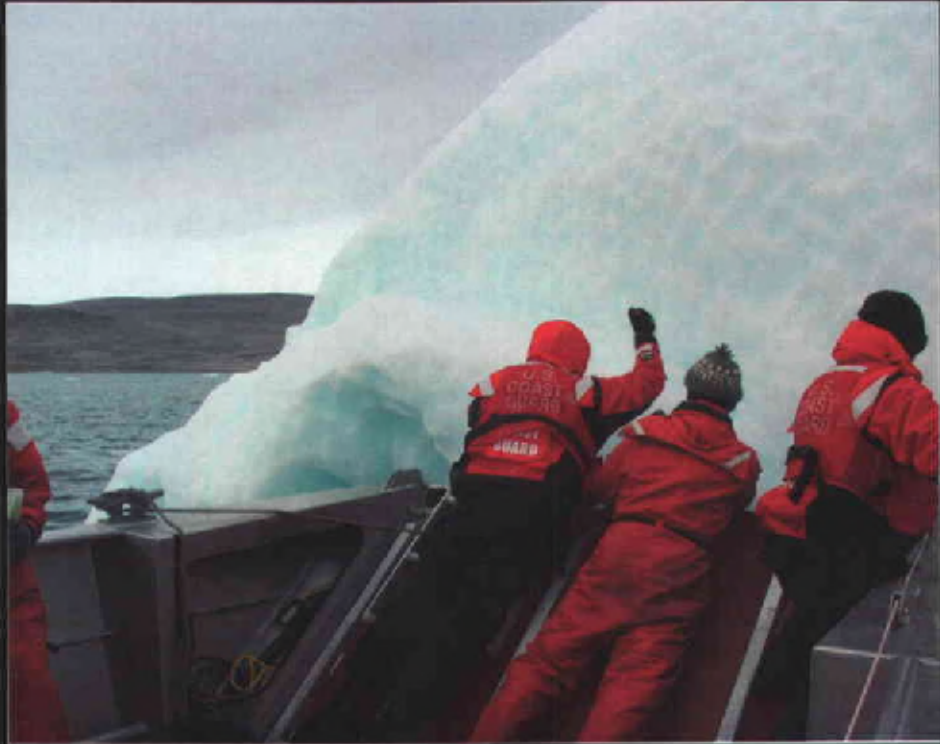
Sea Ice turned over by an Icebreaker





Slide 7

Chipping ice off of an iceberg

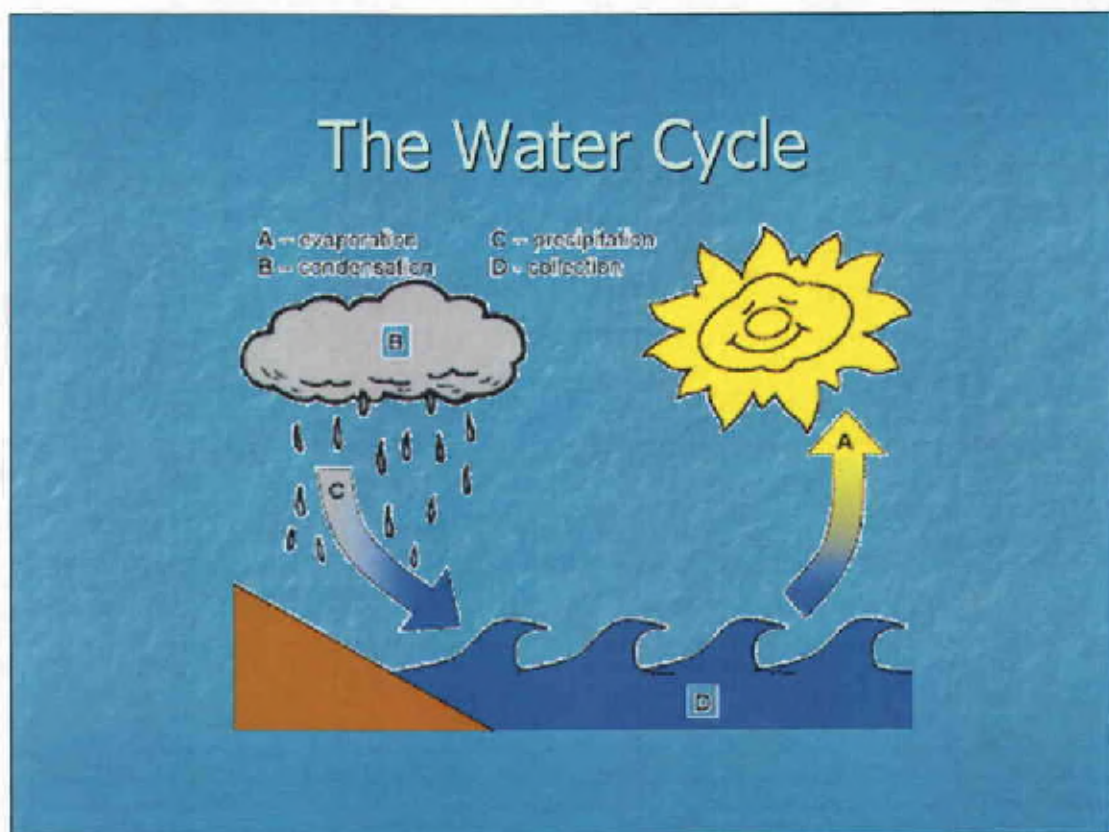


## Slide 8

## Vocabulary

- **Glacier -** large body of ice formed when snow falls throughout the year but doesn't melt
- **Calving -** when a glacier breaks off into the ocean. This is how icebergs are formed
- **Compression -** to press or squeeze together
- **Molecule -** smallest particle of a substance; in this case water.
- **Crystallization -** to form crystals; in our case ice crystals and snow flakes from water molecules.
- **Adapt -** changing the way you live depending on what your surrounding environment is like.

## Slide 9



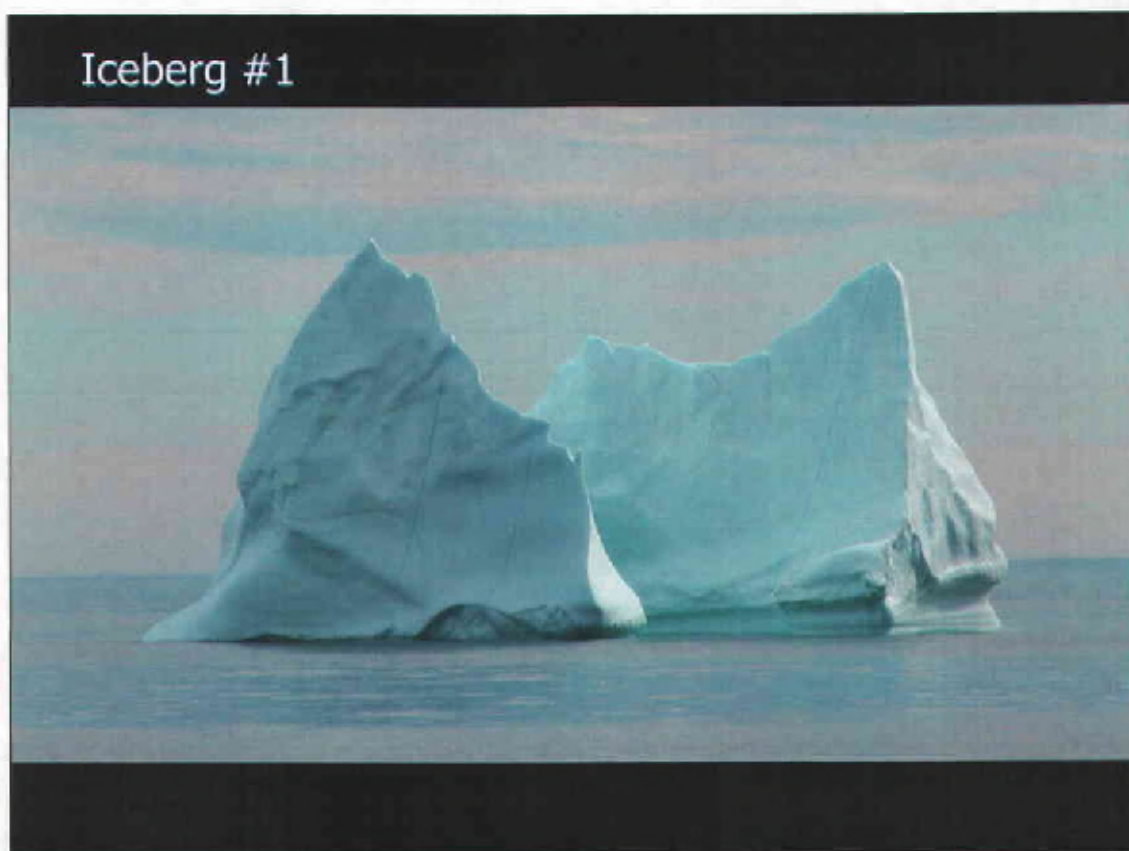


## The Iceberg Cycle

- Melting
- Heat/Evaporation
- No Melting/Compression
- Calving
- Falling



Slide 11



Slide 12

Iceberg #2



Slide 13

Iceberg #3



Slide 14

Iceberg #3 with boat





Slide 15

How much of an Iceberg is underwater?



Slide 16

Iceberg Wrangler – Jerome Baker



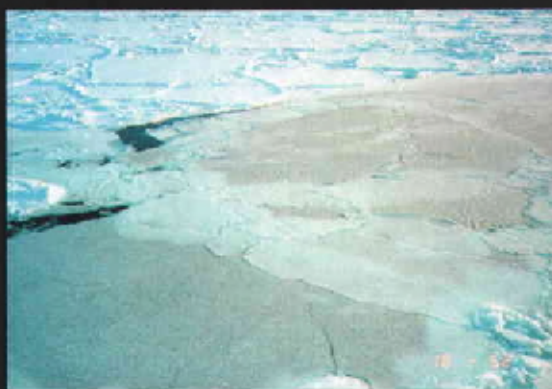
Slide 17

## Grease Ice



Slide 18

## Nilas Ice





Slide 19

Pancake Ice



Slide 20

First Year Ice



Slide 21

### Multi-year Ice



**APPENDIX 3**



# **CRUISE PROSPECTUS FORM**

SHIP NAME: USCCG Healy

OPERATING INSTITUTE OR AGENCY: United States Coast Guard

PROJECT TITLE: Variability and Forcing of Fluxes through Nares Strait and Jones Sound: A Freshwater Emphasis

CRUISE DATES (INCLUSIVE): July 21- August 15, 2003

**ACTION REQUIRED:**

**Research Clearance**

☒ Request State Dept. to Initiate  
☒ Request State Dept. Advice  
☐ Being Handled Privately - FYI  
☐ None Required - FYI  
☐ Other (Specify on Reverse)

**Port Call Clearance**

☐ Public Vessel - State Dept. Initiate  
☐ Part of Research Clearance - State Dept. Initiate  
☒ Being Handled by USCG - FYI  
☐ Unusual Problem - State Dept. Assistance

**CRUISE COORDINATOR (name, affiliation, address, phone, fax, e-mail):**

David Forcucci PH-206-217-6648 Address: USCGC HEALY  
 US Coast Guard Fax 206-217-6878 1519 Alaska Way S.  
 DForcucci@pacnorwest.uscg.mil Seattle, WA 98134

**CHIEF SCIENTIST (name, affiliation, address, phone, fax, e-mail):**

Dr. Kelly Falkner PH-541-737-3625 address: College of Oceanic & Atmospheric Sciences  
 Oregon State University Fax-541-737-2064 Oregon State University  
 kfalkner@coas.oregonstate.edu 104 Ocean Admin Bldg  
 Corvallis, OR 97331-5503

NUMBER OF SCIENTISTS: 35

**SHIP DESCRIPTION:**

LOA 420' Draft 30' Gross Tons 16,000  
 Name of Master Captain Daniel Oliver  
 Number of Crew 75  
 Radio Call Sign NEPP  
 Emergency Frequency Monitored CH 16

FUNDING AGENCY(S): National Science Foundation (NSF)

COOPERATING INSTITUTION(S): See attached sheets

THE OBJECTIVE OF THIS RESEARCH IS TO: See attached sheets

**ITINERARY:**

Indicate Transit/Port Call/Research & Locations ..... Duration (Inclusive Dates) See attached sheets

ATTACHMENT (Cruise Chart) See attached sheets

## USCGC HEALY July 21- August 15, 2003

## Cooperating Institutions :

Oregon State University  
 University of Delaware  
 University of Rhode Island  
 Institute of Ocean Sciences, Department of Fisheries & Oceans, Sidney BC  
 Canada  
 Bedford Institute of Oceanography, Department of Fisheries & Oceans,  
 Dartmouth NS Canada  
 Atmospheric Environment Service, Downsview, Ontario, Canada  
 University of Victoria, Victoria BC Canada

**The Objective of this Research is to:** quantify the fluxes and variability of seawater and ice through Nares St. and Jones Sound. The specific objectives of this research cruise are to:

- Emplace 26 sub-surface moorings in Kane Basin and Kennedy Channel with instrumentation to examine currents, temperature, conductivity, pressure and ice fluxes; these will be retrieved and redeployed by aircraft from the ice in early spring 2005 and finally retrieved by aircraft in early spring 2007
  - Conduct hydrographic measurements in northern Baffin Bay, Nares Strait and the Lincoln Sea
  - Retrieve 4 long piston cores in about 700 m water depth adjacent to Baffin Island
  - Retrieve approximately 100 bi-valve shells to examine for their chemical records
- Collect single beam and multi-beam bottom mapping information where possible

## Itinerary

Location	LonDec	LatDec	Depth m	Activity	Estimated Start Date/Time (PDT)
St. John's	-52.7500	47.6250		Port Call	19-Jul 12:00
St. John's	-52.7500	47.6250			21-Jul 06:00
Cape Dyer	-61.1667	66.6667	62	Doppler	25-Jul 17:44
Baffin Bay	-67.2222	72.7333	2000	Begin section	26-Jul 21:13
	-74.4444	72.3333	2000 12 stn	Rosette/CTD & Doppler	28-Jul 20:14
TBD	-74.4444	72.3333	1500	Piston cores	30-Jul 20:14
	-67.2222	72.7333	2000	Doppler	31-Jul 07:15
	-67.2222	75.9333	2000 12 stn	Rosette/CTD & Doppler	02-Aug 11:15
Baffin Bay	-74.0000	76.5000		Transit	02-Aug 19:48
Smith Sound	-72.8750	78.3333	100	Rosette/CTD & Doppler	03-Aug 19:00
Kane Basin	-71.1333	78.6500	20	Mooring (pressure)+clams	04-Aug 17:55
Kennedy Channel	-67.5917	80.3667	200	Mooring (SBE37)	07-Aug 02:59
Lincoln Sea	-60.0000	84.0000	1000	Rosette/CTD & Doppler	12-Aug 04:27
Kennedy Channel	-61.0000	82.0000		Transit	13-Aug 04:29
Smith Sd	-74.0000	78.0000		Transit	15-Aug 02:11
	-71.5000	76.6000		Transit	15-Aug 13:27
Thule	-68.7833	76.5667		Port Call	15-Aug 17:14

**USCGC HEALY July 21- August 15, 2003**

**Figure Caption:** *Map of proposed science cruise track for July-August 2003 USCGC Healy Nares St. Expedition.* The expedition will begin at St. John's, Newfoundland on 21 July and we expect to arrive at B1 on about 24 July. Lines B1-BW12 and B1-BN12 indicate sections consisting of approximately 12 hydrographic stations each in northern Baffin Bay. The red box encloses the region from which we expect to retrieve 4 long piston cores in Canadian waters. From BN12 to S1 is a transit. Stations S1 to S5 are hydrographic stations. Stations P1-P8 are target sites for shallow water (< 20 m) subsurface pressure moorings. These moorings will be put in place with the aid of a small boat and divers and/or helicopter depending upon the ice conditions. The K's indicate the array of instrumentation that is to be deployed on sub-surface moorings in Kennedy Channel. Exact placement will depend upon ice conditions. Time and conditions permitting, we will conduct hydrographic stations along a section in the Lincoln Sea. The plan is to then return directly to Thule arriving 15 August. We anticipate retrieving and redeploying the moorings from the ice via aircraft in early spring 2005 and conducting a final retrieval in early spring 2007. Important note: Ice and weather conditions in this region are difficult and variable. We expect to adjust the order of the proposed 2003 activities north of Baffin Bay as ice and weather permit. We will carry out ice reconnaissance missions by helicopter to assist us in the planning process.





**APPENDIX 4**

**Application for Consent to Conduct Marine Scientific Research  
in Areas Under National Jurisdiction of**

**Canada**  
(Nunavut)

**Date:**

**1. General Information**

**1.1 Cruise name and/or #: HLY-03-01**

**1.2 Sponsoring institution:**

Name: National Science Foundation  
Address: 4201 Wilson Boulevard, Arlington, Virginia 22230, USA  
Name of Director: Dr. Rita R. Colwell

**1.3 Scientist in charge of the project (include CV and passport photo):**

Name: Dr. Kelly Kenison Falkner  
Address: 104 Ocean Admin Bldg, COAS-OSU,  
Corvallis OR 97331-5503 USA  
Telephone: 541-737-3625  
Fax: 541-737-2064  
Email: kfalkner@coas.oregonstate.edu

**1.4 Scientist(s) from coastal state involved in the planning of the project:**

Name(s): Humfrey Melling, Robie Macdonald, Fiona McLaughlin and Ed Carmack  
Address: Institute of Ocean Science, Dept Fisheries & Oceans,  
9860 W. Saanich Rd,  
Sidney BC, V8L 4B2 CANADA  
Marty Bergmann, Director of Arctic Program Development  
Fisheries and Oceans Canada  
Freshwater Institute  
501 University Crescent  
Winnipeg Manitoba R3T 2N6  
Tom Agnew  
Climate Research Branch  
Meteorological Service of Canada  
4905 Dufferin Street  
Downsview, Ontario M3H 5T4

**1.5 Submitting officer:**

Name and address: David Forcucci  
1519 Alaskan Way S  
Seattle, WA 98134  
Nationality: USA  
Telephone: 206-217-6648  
Fax: 206-217-6878  
Email: Dforcucci@pacnorwest.uscg.mil

## 2. Description of Project (Attach additional pages as necessary)

### 2.1 Nature and objectives of the project:

The scientific goal of this research program is to determine the forcing and variability of seawater and ice fluxes through Nares St. Specific objectives of this cruise are to:

- 1) conduct CTD-rosette based tracer hydrographic sections in northern Baffin Bay and throughout Nares St to the Lincoln Sea
- 2) deploy 26 moorings in Nares St.-see attached figure for target placement
- 3) recover at least 4 long piston cores in the slope region just south of Bylot Island
- 4) retrieve bivalves from Nares St.
- 5) launch 48 XCTD's at locations near western Davis St. and between Lancaster Sound and Barrow.
- 6) conduct outreach for the science program by having teachers on board post daily web-based journals of their observations and involving members of the native communities in the cruise

### 2.2 Relevant previous or future research cruises:

.

### 2.3 Previously published research data relating to the project:

None.

## 3. Methods and Means to be Used

### 3.1 Particulars of vessel:

Name: USCGC Healy  
 Nationality (Flag state): USA  
 Owner: United States Coast Guard  
 Operator: United States Coast Guard  
 Overall length (meters): 128  
 Maximum draught (meters): 8.9  
 Displacement/Gross tonnage: 16,000 LT  
 Propulsion: Diesel Electric  
 Cruising & Maximum speed: 12knts & 15 knts  
 Call sign: NEPP  
 Method and capability of communication (including emergency frequencies): INMARSAT (A, B & C), UHF, HF, VHF  
 Name of master: Captain Daniel Oliver  
 Number of crew: 75  
 Number of scientists on board: 35

### 3.2 Aircraft or other craft to be used in the project:

HH-65 helicopter; Arctic Survey Boat

### 3.3 Particulars of methods and scientific instruments

Types of samples and data	Methods to be used	Instruments to be used
Water samples-hydrography	CTD-rosette casts	Seabird CTD-911+SBE32 Carousel
Current profiling	ADCP's	75kHz and 150 kHz in-hull
Bottom mapping	Single and multi-beam echosounders	Bathy2000 Seabeam Swath Mapper
Long sediment cores ( $\approx$ 30 m)	Piston corer	Broda 30-m design
Moored current profiling	ADCP	RDI Workhorse LongRangers
Moored ice-draft profiling	ADCP	ASL ice sonars
Moored pressure sensors		Paracientific Digiquarz

		sensors
Moored conductivity-temp records	CT sensors	Seabird
Bi-valve shells	Divers	
Conductivity-temperature profiles	XCTD deployment	TSK-XCTD's

3.4 Indicate whether harmful substances will be used:

No harmful substances will be released as part of science operations

3.5 Indicate whether drilling will be carried out:

No drilling will be done

3.6 Indicate whether explosives will be used:

No explosives will be used

#### 4. Installations and Equipment

#### 4. INSTALLATIONS AND EQUIPMENT

Details of installations and equipment (dates of laying, servicing, recovery; exact locations and depth):

#### Summary of HLY-03-01 Cruise Plan with Target Station Locations

Location	Station	Lat dec degree N	Long dec degree W	Depth m	Activity	Est Begin Date/Time
St. John's	depart	47.63	52.75			7/21/03 6:00
Cape Dyer	Waypoint	66.67	61.17	62	Doppler	7/25/03 17:44
Baffin Bay	central	72.73	67.22	2000	Begin section	7/26/03 21:13
	Baffin-W	72.33	74.44	2000	12 stn Rosette/CTD & Doppler	7/28/03 20:14
TBD	coring	72.33	74.44	1500	Piston cores	7/30/03 20:14
	central	72.73	67.22	2000	Doppler	7/31/03 7:15
	Baffin-N	75.93	67.22	2000	12 stn Rosette/CTD & Doppler	8/2/03 11:15
Baffin Bay	Waypoint	76.50	74.00		Transit	8/2/03 19:48
Smith Sound	S01	78.33	72.88	100	Rosette/CTD & Doppler	8/3/03 19:00
	S02	78.33	73.39	300	Rosette/CTD & Doppler	8/3/03 21:15
	S03	78.33	73.90	600	Rosette/CTD & Doppler	8/3/03 23:29
	S04	78.33	74.43	500	Rosette/CTD & Doppler	8/4/03 1:46
	S05	78.33	74.95	200	Rosette/CTD & Doppler	8/4/03 4:02
Kane Basin	P08	78.65	71.13	20	Mooring (pressure)+clams	8/4/03 17:55
	P03	78.90	75.53	20	Mooring (pressure)+clams	8/5/03 8:38
	Waypoint	78.90	75.00	180	Transit	8/5/03 9:52
	KS	79.68	71.00	225	Mooring (ADCP)	8/6/03 2:44
	P06	79.87	71.10	20	Mooring (pressure)+clams	8/6/03 8:05
	P05	80.13	67.10	20	Mooring (pressure)+clams	8/6/03 21:00
Kennedy Channel	K01	80.37	67.59	200	Mooring (SBE37)	8/7/03 2:59
	K01	80.37	67.59	200	CTD & Doppler	8/7/03 3:29
	K02	80.37	67.72	210	Mooring (ADCP)	8/7/03 6:44
	K02	80.37	67.72	210	Rosette/CTD & Doppler	8/7/03 7:44
	K03	80.39	67.82	240	Mooring (SBE37)	8/7/03 11:01
	K03	80.39	67.82	240	CTD & Doppler	8/7/03 11:31



	K04	80.40	67.92	290	Mooring (ADCP)	8/7/03 14:46
	K04	80.40	67.92	290	Rosette/CTD & Doppler	8/7/03 15:46
	K05	80.41	68.05	311	Mooring (SBE37)	8/7/03 19:04
	K05	80.41	68.05	311	CTD & Doppler	8/7/03 19:34
	K06	80.42	68.13	380	Mooring (ADCP)	8/7/03 22:48
	K06	80.42	68.13	380	Rosette/CTD & Doppler	8/7/03 23:48
	K03	80.43	68.25	380	Mooring (SBE37)	8/8/03 3:03
	K03	80.43	68.25	380	CTD & Doppler	8/8/03 3:33
	K08	80.45	68.37	380	Mooring (ADCP)	8/8/03 6:50
	K08	80.45	68.37	380	Rosette/CTD & Doppler	8/8/03 7:50
	K09	80.46	68.50	303	Mooring (SBE37)	8/8/03 11:08
	K09	80.46	68.50	303	CTD & Doppler	8/8/03 11:38
	K10	80.47	68.63	303	Mooring (ADCP)	8/8/03 14:56
	K10	80.47	68.63	303	Rosette/CTD & Doppler	8/8/03 15:56
	K11	80.48	68.75	303	Mooring (SBE37)	8/8/03 19:13
Location	Station	Lat dec degree N	Long dec degree W	Depth m	Activity	Es t Begin Date/Time
	K11	80.48	68.75	303	CTD & Doppler	8/8/03 19:43
	K12	80.50	68.87	300	Mooring (ADCP)	8/8/03 23:00
	K12	80.50	68.87	300	Rosette/CTD & Doppler	8/9/03 0:00
	K13	80.51	69.00	200	Mooring (SBE37)	8/9/03 3:18
	K13	80.51	69.00	200	CTD & Doppler	8/9/03 3:48
	P04	80.53	69.20	20	Mooring (pressure)+clams	8/9/03 8:18
	P03	80.52	66.67	20	Mooring (pressure)+clams	8/9/03 17:18
	KN	81.03	65.60	300	Mooring (ADCP)	8/10/03 2:50
	P02	81.23	65.95	20	Mooring (pressure)+clams	8/10/03 9:13
	P01	81.20	63.38	20	Mooring (pressure)+clams	8/10/03 17:56
	Waypoint	82.00	61.00	400	Doppler	8/11/03 4:24
Lincoln Sea	section	84.00	60.00	1000	Rosette/CTD & Doppler	8/12/03 4:27
Kennedy Channel	Waypoint	82.00	61.00		Transit	8/13/03 4:29
Smith Sd	Waypoint	78.00	74.00		Transit	8/15/03 2:11
	Waypoint	76.60	71.50		Transit	8/15/03 13:27
Thule	Port call	76.57	68.78		Final transit	8/15/03 17:14

Details of installations and equipment (dates of laying, servicing, recovery; exact locations and depth):

See details in Geographical Areas spreadsheet. Exact positions of moorings will depend upon ice conditions encountered in this challenging strait.

##### 5. Geographical Areas

5.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude):

See attached

5.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical areas of the intended work and, as far as practicable, the positions of intended stations, the tracks of survey lines, and the locations of installations and equipment.

Figure Caption: Map of proposed science cruise track for July-August 2003 USCGC Healy Nares St. Expedition. The expedition will begin at St. John's, Newfoundland on 21 July and we expect to arrive at B1 on about 24 July. Lines B1-BW12 and B1-BN12 indicate sections consisting of approximately 12 hydrographic stations each in northern Baffin Bay. The red box encloses the region from which we expect to retrieve 4 long piston cores in Canadian waters. From BN12 to S1 is a transit. Stations S1 to S5 are hydrographic stations. Stations P1-P8 are target sites for shallow water (< 20 m) subsurface pressure moorings. These moorings will be put in place with the aid of a small boat and divers and/or helicopter depending upon the ice conditions. We will also attempt to retrieve bi-valves near these sites. The K's indicate the array of instrumentation that is to be deployed on sub-surface moorings in Kennedy Channel. Exact placement will depend upon ice conditions. Time and conditions permitting, we will conduct hydrographic stations along a section in the Lincoln Sea. The plan is to then return directly to Thule arriving 15 August. We anticipate retrieving and redeploying the moorings from the ice via aircraft in early spring 2005 and conducting a final retrieval in early spring 2007. Important note: Ice and weather conditions in this region are difficult and variable. We expect to adjust the order of the proposed 2003 activities north of Baffin Bay as ice and weather permit. We will carry out ice reconnaissance missions by helicopter to assist us in the planning process.



## 6. Dates

6.1 Expected dates of first entry into and final departure from the research area of the research vessel:

Date of first entry-21July03; Date of final departure-28August03

6.2 Indicated if multiple entry is expected:

The cruise track alternates between Canadian and Greenland waters.

## 7. Port Calls

7.1 Dates and names of intended ports of call: St John's arrive July 15, 2003 and depart July 21, 2003. Thule, Greenland- Arrive Aug 15, 2003 and depart Aug 19, 2003.

7.2 Any special logistical requirements at ports of call: No

7.3 Name/Address/Telephone of shipping agent (if available):

## 8. Participation:

8.1 Extent to which coastal state will be enabled to participate or to be represented in the research project:

The project is a collaborative with Canadian scientists from several institutions. Canadian Scientists from the Institute of Ocean Science and from Bedford Institute of Oceanography will sail on the research cruise. We are in the process of engaging members of the Nunavut community to participate in the cruise and larger project as well. The USGC will engage Ice Pilot and Ice Technician experts from the Canadian community to aid in navigation.

8.2 Proposed dates and ports for embarkation/disembarkation:

Embarkation St. John's, Newfoundland 21Jul03; Majority of science party debarks Thule, Greenland 15Aug03; Remaining science party rides through the Northwest Passage to Barrow AK 29Aug03

## 9. Access to data, samples and research results

9.1 Expected dates of submission to coastal state of preliminary reports, which should include the expected dates of submission of the final results:

No more than 30 days from the end date of the cruise.

9.2 Proposed means for access by coastal state to data and samples:

Data will be placed in public archives in the US and Canada.

9.3 Proposed means to provide coastal state with assessment of data, samples and research results or provide assistance in their assessment or interpretation:

Contacts in the science and local communities will be forwarded copies of the cruise report. The report and subsequent data summaries and findings and names and contact information of cognizant personnel will be posted at a project web-site in a timely fashion. All data will be archived in timely fashion in accordance with policy established by the National Science Foundation office of Polar Programs. PI's will visit local communities to conduct science



exchanges in conjunction with field efforts in 2005 and 2007.
---

<b>9.4 Proposed means of making results internationally available:</b>
--

The archival systems for the data are internationally accessible. The PI's will provide additional assistance upon request..
--

(Revised June 5, 2002)

**APPENDIX 5**

Ref. N:

COLLEGE OF OCEANIC &amp; ATMOSPHERIC SCIENCES



OREGON STATE UNIVERSITY

Oceanography Administration Building 104 • Corvallis, Oregon • 97331-5503

Telephone 541-737-3625 • Fax 541-737-2064

**Project Title : Variability and Forcing of Fluxes through Nares Strait****Project Description:**

Our science goal is to determine how much seawater and ice flow south through Nares Strait and how that flow varies over a three-year period. We will use satellite information, models and ocean observations to do this. Ocean studies will begin from the USCG Icebreaker Healy in late-July to mid-August, 2003. We will examine water properties, take water samples and place instruments on the seafloor in Baffin Bay, Kane Basin and Kennedy Channel. The instruments will measure currents, sea level, temperature and salt content and are designed and placed to avoid damage from deep iceberg keels. We intend to retrieve and redeploy the equipment using helicopter and Twin Otter in April 2005. We would retrieve the equipment in April 2007. Aircraft based work would be conducted from camps lasting about 6 weeks and made of temporary structures. These camps will be located on the Greenland side of Kennedy Channel.

We are also proposing to study past flow conditions in two ways. Clams lay down their shells in distinct annual layers and can live to be 40 years old. We will test the idea that the chemistry of clamshell layers can teach us about how the flow changed over past decades. For this purpose, divers will collect about 100 clams and water samples at about 8 locations distributed along the Canadian and Greenland sides of Nares Strait. To study past flow changes over hundreds and thousands of years, we will collect 4 sediment cores from the seafloor in Northern Baffin Bay. Provided the ship's unique mapping system is working well, we will collect detailed maps of the seafloor over the regions that we travel and make this data available.

We hope both to learn from the Nunavut community and engage Nunavut participation in several aspects of our project.







**APPENDIX 6**



Fisheries and Oceans Pêches et Océans  
Canada Canada

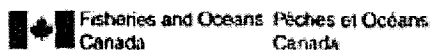
**GUIDELINES FOR OBTAINING A LICENCE TO FISH FOR SCIENTIFIC PURPOSES, FROM THE MINISTER OF FISHERIES AND OCEANS (DFO) PURSUANT TO SECTION 52 OF THE FISHERY (GENERAL) REGULATIONS MADE UNDER THE FISHERIES ACT, IN THE WATERS OF THE NUNAVUT TERRITORY**

The following information is required to review and process an application to fish for scientific purposes: The Fisheries Act defines fish as: includes fin fishes, shellfish, crustaceans, marine animals and their eggs, spawn, spat and juvenile stages.

Please fill the attached "**APPLICATION TO OBTAIN A LICENCE TO FISH FOR SCIENTIFIC PURPOSES**" according to the following guidelines:

1. **NAME OF AGENCY OR INDIVIDUAL** - the name of the organization or individual applying for the licence.
  2. **NAME OF PROJECT AUTHORITY** - the name of the person in charge of the program.
  3. **ADDRESS** - complete address of the agency or individual applying for the licence.
  4. **OTHER PERSONNEL** - provide the names of any other individuals, particularly supervisors, who will do the actual collecting of samples in the field.
  5. **OBJECTIVE(S)** - a short summary of the purpose/objectives of the research project.
  - 6 - 9. **LOCATION** - provide the exact location of water bodies to be sampled using proper names and coordinates. The "Legal Name" and the "Latitude" and "Longitude", (not UTM) as per the Gazetteer of Canada, Northwest Territories 1980 (reprinted in 1984), must be provided. This information is also available at the Natural Resources Canada, Geomatics Canada, website (<http://geonames.nrcan.gc.ca>).
- If the water body is not in the Gazetteer, then the "Local Name(s)" and estimated coordinates must be provided. If there are many unnamed water bodies within a small, contained, geographic area, provide a detailed map showing at least three coordinates which, when connected, enclose the water bodies you propose to sample.
10. **DURATION OF FIELD PROGRAM** - for each water body, provide the start and finish date for the study period.
  11. **SPECIES** - for each water body provide a list of the species you wish to collect and any species that you may take as incidentals. Use both scientific and common names. Do not use "miscellaneous" species.
  12. **SAMPLE SIZE** - for each water body and species indicate the number that you wish to collect. **Please distinguish between live and dead sampling.**
  13. **SAMPLING METHOD** - for each water body and species, list each type of gear, and mesh size(s) if applicable, you intend to use for collecting, marking or tagging, the manner in which you wish to use it, and explain your method(s) for obtaining the required data from the collection.

Canada



Nunavut Guidelines  
Scientific Licenses  
Pg. 2

**YOU MAY ALSO BE REQUIRED TO COMPLETE AN ANIMAL PROTOCOL FORM TO ENSURE DFO ANIMAL CARE GUIDELINES ARE BEING MET (SEE ATTACHED)**

**APPLICATIONS MUST BE SUBMITTED AT LEAST 30 DAYS IN ADVANCE OF YOUR ANTICIPATED STARTING DATE, TO PROVIDE FOR REVIEW AND PROCESSING.**

APPLY TO: Fisheries Management  
Fisheries and Oceans Canada  
PO Box 358  
Iqaluit, NT  
XOA OHQ

Attention: Garth Reid

Phone: (867) 979-8005  
Fax: (867) 979-8039  
E Mail: [reidgw@dfo-mpo.gc.ca](mailto:reidgw@dfo-mpo.gc.ca)

A letter from the appropriate Nunavut Wildlife Management Board or local hunter's and trapper's committee indicating support for your program will be required before the license is granted. It will be your responsibility to deal directly with the board or the HTA to ensure that the letter of support is provided to this office.

In addition, proponents must also obtain a scientific research license under the Northwest Territories Scientists Act. For projects within Nunavut, application should be made to the Nunavut Research Institute in Iqaluit, while in the western Arctic; application should be made to the Aurora Research Institute in Inuvik.

**APPLICATION TO OBTAIN A LICENCE TO FISH FOR SCIENTIFIC PURPOSES**

1.) Name of Agency:		
2.) Project Authority:		
Last Name:		
First Name & Initial:		
Mr./Ms./Mrs./Dr.:		
3.) Address:		
Number/Street/P.O. Box:		
City:		
Province/Territory/State:		
Country:		
Postal Code/Zip Code:		
Phone #:	( )	-
Fax #:	( )	-
e-mail address:		
4.) Other Personnel:		
Last Name:	First Name & Initial:	
5.) Objectives (add attachment if necessary):		





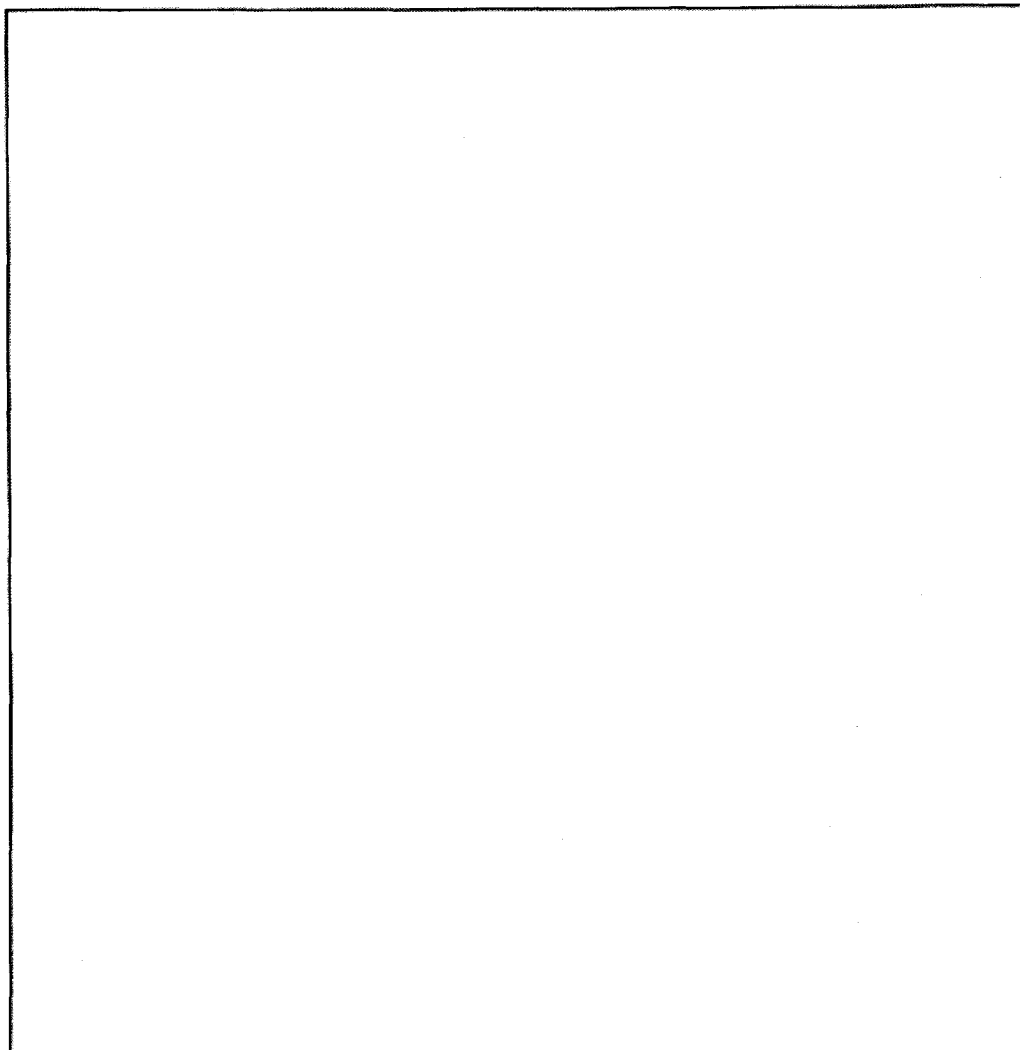
**APPLICATION TO OBTAIN A LICENCE TO FISH FOR SCIENTIFIC PURPOSES (Cont'd)**

**For each water body** you wish to sample, please provide the following information (fill in additional copies of this form as required):

6.) Legal Name ( <a href="http://geonames.nrcan.gc.ca">http://geonames.nrcan.gc.ca</a> ):		
7.) Local Name:		
8.) Latitude:		
9.) Longitude:		
<p>If the locations to be sampled are numerous water bodies, in a localized geographic area, with local names only, or are not named, please attach a detailed map showing at least three coordinates which, if connected, enclose the proposed study area(s).</p>		
10.) Duration of Field Program (year/month/day):		From: To:
11.) Species (common & scientific name):	12.) Sample Size (# or kgs) for each Species:	13.) Sampling Method Details for each Species:



### Detailed Project Description



**APPENDIX 7**

**Application Form  
for  
U.S. Research Projects and Expeditions in Greenland**

---

Reserved U.S. Department of State

Reserved Danish Polar Center

Please read carefully DPC's on-line Planning Guide before you start to fill in the form.

**GENERAL INFORMATION**

**Title of project or expedition**

Variability and Forcing of Fluxes through Nares Strait and  
Jones Sound: A Freshwater Emphasis

**Total number of participants**

**Sponsors / Name of US agency (contact person)**

National Science Foundation-Office of Polar Programs-  
Arctic Climate System Studies  
Dr. Luie Tupas, Program Manager  
Dr. Simon Stephenson, Logistics Program Manager

**Phone**

**Fax**

**E-mail**

**Name of responsible project or expedition leader**

Dr. Kelly Kenison Falkner

**Address of responsible project or expedition leader**

College of Oceanic & Atmospheric Science  
104 Ocean Admin Bldg.  
Oregon State University  
Corvallis, OR 97331-5503

Citizenship **United States of America** Date of birth **1 March 1960**

Phone **541-737-3625** Fax **541-737-2064**

E-mail **kfalkner@coas.oregonstate.edu**

Have you applied for a permit before ? Yes ☐ No ☒

Will you need access to the National Park ? Yes ☐ No ☒

If yes, please cf. Cover Letter and Firearm Licence Form

#### Activity area in Greenland

(Indicate local place names and state geographical longitude and latitude of boundaries and base camp locations. Enclose a map, preferably in scale 1: 250000, with the information)

Work is to take place in the ocean in Northern Baffin Bay, throughout Nares Strait to the Lincoln Sea. The work area is bounded by 74 to 84 degrees N and 60 to 76 degrees W. See attached map.

#### Points of arrival and departure in the activity area

Thule Air Base; point of departure for scientific personnel.

#### Planned dates of arrival to and departure from Greenland

26 July-16 August, 2003

#### Which radio equipment will be used in Greenland ?

VHF ☒ HF ☒ ELT/PLB ☐ None ☐ Other ☐ please specify

Please see the Radio Licence application form





**USCGC HEALY July 21- August 15, 2003**

**Figure Caption:** *Map of proposed science cruise track for July-August 2003 USCGC Healy Nares St. Expedition.* The expedition will begin at St. John's, Newfoundland on 21 July and we expect to arrive at B1 on about 24 July. Lines B1-BW12 and B1-BN12 indicate sections consisting of approximately 12 hydrographic stations each in northern Baffin Bay. The red box encloses the region from which we expect to retrieve 4 long piston cores in Canadian waters. From BN12 to S1 is a transit. Stations S1 to S5 are hydrographic stations. Stations P1-P8 are target sites for shallow water (< 20 m) subsurface pressure moorings. These moorings will be put in place with the aid of a small boat and divers and/or helicopter depending upon the ice conditions. The K's indicate the array of instrumentation that is to be deployed on sub-surface moorings in Kennedy Channel. Exact placement will depend upon ice conditions. Time and conditions permitting, we will conduct hydrographic stations along a section in the Lincoln Sea. The plan is to then return directly to Thule arriving 15 August. We anticipate retrieving and redeploying the moorings from the ice via aircraft in early spring 2005 and conducting a final retrieval in early spring 2007. Important note: Ice and weather conditions in this region are difficult and variable. We expect to adjust the order of the proposed 2003 activities north of Baffin Bay as ice and weather permit. We will carry out ice reconnaissance missions by helicopter to assist us in the planning process.

**LOGISTICS**

**Co-operation established with scientific institution(s) in Denmark / Greenland**  
(reference, name, address, telephone, fax, e-mail)

None at present

**Contact established to institution or authority in Denmark / Greenland**  
(reference, name, address, telephone, fax, e-mail)

Contacting Knud Falk  
Dansk Polar Center  
Research Facilitator  
dpc@dpc.dk  
45 32 8801 30 work, 45 32 8801 01 fax

**Means of transportation to and from the activity area**

Polar icebreaker: USCGC Healy

**Means of transportation within the activity area**

Polar icebreaker: USCGC Healy

**Will you be bringing firearms ?**

Yes ☒

No ☐

If yes, you will need firearms licence

**Do you plan airdrops ?**

Yes ☐

No ☒

**If you plan airdrop(s), state locality / localities**

**Will access to the below locations be required (check appropriate)**

Thule Air Base ☒

Station Nord ☐

Daneborg ☐

Mestersvig ☐

**Description of emergency, safety and general equipment to be used**

- \* HH-65 helicopters will be deployed for ice reconnaissance.
- \* A small rigid-hull Arctic Survey Boat and divers will be deployed in aid of shallow pressure sensor mooring deployments and clam shell retrieval.
- \* Oceanographic sampling equipment will include conductivity temperature depth rosette water samplers, moored current profilers and conductivity-temperature sensors, single-beam and multi-beam echo sounders.

**Details of construction and dismantling of research structure(s)**

None planned

**List of all participants name, address, date of birth, and citizenship**

See attached

Provide separate list if needed. Changes must be reported to DPC before departure for Greenland

<b>Science Participant List</b>					
<b>last</b>	<b>first</b>	<b>middle</b>	<b>institution</b>	<b>date of birth</b>	<b>citizenship</b>
Falkner	Kelly	Kenison	OSU	3/1/60	USA
Melling	Humfrey		IOS	7/17/49	CA
Muenchow	Andreas		UDeI	11/9/61	Germany
Forcucci	David		USCG	10/5/61	USA
Gamble	Peter		IOS	7/26/39	CA
Lindsay	Ron		IOS	5/4/51	CA
Harris	John		IOS	10/10/69	CA
Macdonald	Robie		IOS	5/5/47	CA
Narraway	Lee		Freelance		CA
Huntley	David		UDeI	2/10/69	USA
Zweng	Melissa		UDeI	6/24/79	USA
Ashmankas	Cristin		UDeI	2/27/81	USA
TBD					USA
Meredith	Charlotte	Chase	OSU	4/6/45	USA
Hubbard	Dale		OSU	2/16/70	USA
Jennings	Joe	Cannon	OSU	12/12/49	USA
Behrens	Gerhard		Adams School	6/19/59	USA
Kalk	Peter		OSU	3/8/40	USA
Moser	Chris		OSU	9/17/49	USA
Simpkins	John		OSU	1/1/51	USA
TBD			OSU		USA
Moran	Kate		URI	6/26/55	USA/CA
Henderson	Jennifer	Frances	URI	1/13/79	USA
Schaffrin	Helga		NYU	9/16/77	Germany
Johnson	Helen		UVic		UK
TBD					CA
TBD					Greenland/CA?
TBD					CA
TBD					CA
TBD					Greenland
TBD					CA
TBD					CA
TBD					Greenland/CA?
TBD					CA
TBD					USA
TBD					USA



**SCIENTIFIC INFORMATION****Scientific category**

Atmospheric physics ☐ Biology ☐ Engineering ☐ Geography ☐ Geology ☐  
 Glaciology ☐ Oceanography ☒ Radio propagation ☐ Remote sensing ☐  
 Social sciences ☐ Other ☐ please specify below

**Objectives of the expedition or objectives and scientific content of the project**  
 (a detailed description may be enclosed on separate sheets). The text must be in a form that lends itself to publication. Max. 100 words)

The scientific goal of the project is to determine variability of seawater and ice flow through Nares Strait. The objectives of the expedition are to:

1. emplace mooring equipment to monitor the flow of water and its temperature and salinity and the flow of ice through Kennedy Channel.
2. emplace mooring equipment at 8 shallow (less than 20m) protected embayments at locations along Nares St.
3. measure water properties throughout Northern Baffin Bay, Nares Strait and the Lincoln Sea.
4. collect bi-valve shells to test the idea that their shell layers record properties of the water in which they live.

**Collection of scientific material** (Specify any planned samples; type, numbers etc.)

Approximately 1000 20-liter seawater samples will be collected. Approximately 100 bi-valve shells will be collected. Twenty-six moorings will be deployed in Kane Basin and Kennedy Channel.

**Explosives. If explosives are to be carried or used, details must be stated**

None

Rocket launching, balloons etc. In case of launching, impact area must be indicated and rocket / balloon types must be specified

None

#### ENVIRONMENTAL OR SOCIAL IMPACT

Details of environmental disruptions which may result from the project or expedition

No social impacts are anticipated. Ice will be broken by the icebreaker. The ship uses as sonar system to map the bottom: its frequency is 12 kHz.

Details of social disruptions which may result from the project or expedition

None anticipated.

#### Additional information on disruptions in general

Helicopter and small boat use to and from the ship. Possible short term (hours) landings on the beach in support of shallow water operations.

By my signature below I confirm that I will seek information about the content of the Note Verbale from the Danish Ministry of Foreign Affairs concerning U.S. project and expedition proposals in Greenland. I agree that the information submitted in this application form can be made public

Corvallis OR

14 Feb 03

Place and date

Wiley R Falckner

Signature of responsible leader

Print out the completed form, sign it, and submit the original to

Polar Affairs Officer  
Room 5805  
Office of Oceans Affairs  
Bureau of Ocean, International Environment, and Scientific Affairs  
U.S. Department of State  
Washington D.C., 20520

**DEADLINE**

The signed application must be received by the U.S. Department of State at least 4 months prior to the initiation of the field period for the proposed project

**APPENDIX 8**



Dr. Kelly Kenison Falkner, Associate Professor of Chemical Oceanography  
 College of oceanic & Atmospheric Science, Oregon State University  
 104 Ocean Admin Bldg, Corvallis OR 97331-5503 USA  
 kfalkner@coas.oregonstate.edu, 541-737-3625

14 February 2003

The Mayor  
 Grise Fjord, Nunavut  
 CANADA X0A 0J0

Honorable Mayor of Grise Fjord,

I have recently obtained funding to conduct a five-year study of ocean and ice conditions in Nares Strait. I am writing this letter to you because I would very much like to come to Grise Fjord and to meet with you and the people in your community regarding this project. Our first field expedition is scheduled for July-August, 2003 aboard the ice-breaker Healy. I have enclosed a one-page description of our project, a map depicting our cruise track and a caption for the map. I apologize if these materials are overly technical. I am working on the Nunavut licensing forms and hope to have a straightforward description of the project translated into Inuktitut shortly.

I passed through your community in August 1997 when I was the chief scientist on an expedition of the CCGS Louis St. Laurent in Northern Baffin Bay and Smith Sound. My science party was transferred by helicopter from the ship to Grise Fjord. While I waited for the chartered Twin Otter and everyone to arrive, I enjoyed the opportunity to chat with Larry Audlaluk. I learned quite a bit from our conversation. At that time he suggested that I should really come north again and take the time to speak to the people who lived in the region to gain their understanding of climate changes. I made up my mind to do so and am happy that I now have the chance. I have sent letters to Larry and to the principal of your school in addition to this one to you.

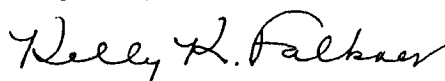
I could come and spend several days near the end of the 2nd week of May via Bjork Air when I will be returning through Alert to Resolute from a project at the North Pole. We would like to involve someone from your community in a meaningful way on our summer cruise aboard the ice-breaker Healy. Clearly I need to talk with Grise Fjord residents to figure out about how best to do that.



If you have access to e-mail, please do get in touch with me at the address given in the letterhead above so that we can communicate further. Otherwise, please respond by letter with your phone number. If you care to learn a bit more about my background, please consult my web-site: <http://chemoc.coas.oregonstate.edu/users/kfalkner>.

I would like to obtain your advice very soon in order to make travel, lodging, interpreter and other such arrangements. I look forward to hearing from you.

Respectfully yours,

A handwritten signature in cursive script, reading "Kelly H. Falkner". The signature is written in dark ink and is positioned below the typed name "Kelly H. Falkner".



Dr. Kelly Kenison Falkner, Associate Professor of Chemical Oceanography  
 College of oceanic & Atmospheric Science, Oregon State University  
 104 Ocean Admin Bldg, Corvallis OR 97331-5503 USA  
 kfalkner@coas.oregonstate.edu, 541-737-3625  
<http://chemoc.coas.oregonstate.edu/users/kfalkner>

14 February 2003

The School Principal  
 Grise Fjord, Nunavut  
 CANADA X0A 0J0

Dear Principal,

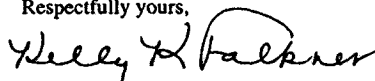
I have recently obtained funding to conduct a five-year study of ocean and ice conditions in Nares Strait. I am writing this letter to you because I would very much like to come to Grise Fjord and to meet with you and the people in your community regarding this project. Our first field expedition is scheduled for July-August, 2003 aboard the ice-breaker Healy. We have one and possibly two teachers who are sailing with us who would like to learn more about your school and its students and possibly arrange for joint ventures. Moreover I am actively involved in outreach projects for schools in my area and would enjoy visiting your school. I have enclosed a one-page description of our project, a map depicting our cruise track and a caption for the map. I apologize if these materials are overly technical. I am working on the Nunavut licensing forms and hope to have a straightforward description of the project translated into Inuktitut shortly.

I passed through your community in August 1997 when I was the chief scientist on an expedition of the CCGS Louis St. Laurent in Northern Baffin Bay and Smith Sound. My science party was transferred by helicopter from the ship to Grise Fjord. While I waited for the chartered Twin Otter and everyone to arrive, I enjoyed the opportunity to chat with Larry Audlaluk. I learned quite a bit from our conversation. At that time he suggested that I should really come north again and take the time to speak to the people who lived in the region to gain their understanding of climate changes. I made up my mind to do so and am happy that I now have the chance. I have sent letters to Larry and to the Mayor in addition to this one to you.

I would like to come and spend several days near the end of the 2nd week of May on a Bjork Air flight when I will be returning through Alert to Resolute from a project at the North Pole. While I realize that this may not be an ideal time, but I am the mother of two young children and so have limited options. I would like to involve someone from the Grise community in a meaningful way on our summer cruise aboard the ice-breaker Healy. I recognize that I need to talk with Grise Fjord residents to figure out about how best to do that and would look forward to getting your views of the matter.

If you would like to learn more about my research program, please consult my web-site: <http://chemoc.coas.oregonstate.edu/users/kfalkner>. If you have access to e-mail, please do get in touch with me at the address given above in the letterhead so that we can communicate further. Otherwise, please respond by letter with your full address and phone number. I very much look forward to hearing from you.

Respectfully yours,

A handwritten signature in cursive script, appearing to read "Kelly H. Falkner".

Dr. Kelly Kenison Falkner



Dr. Kelly Kenison Falkner, Associate Professor of Chemical Oceanography  
 College of oceanic & Atmospheric Science, Oregon State University  
 104 Ocean Admin Bldg, Corvallis OR 97331-5503 USA  
 kfalkner@coas.oregonstate.edu, 541-737-3625

14 February 2003

Mr. Larry Audlaluk  
 PO Box 5  
 Grise Fjord, Nunavut  
 CANADA X0A 0J0

Dear Larry,

We met in August of 1997 at the runway in Grise Fjord. I was the chief scientist on an expedition of the CCGS Louis St. Laurent in Northern Baffin Bay and Smith Sound. My science party was transferred by helicopter from the ship to Grise Fjord. While I waited for the chartered Twin Otter and everyone to arrive, I enjoyed the opportunity to chat with you. I learned quite a bit from that conversation and left you with some satellite imagery of ice conditions in Smith Sound. You mentioned at that time that I should really come north again and speak to the people who lived in the region to gain their understanding of climate changes and to talk to them about our science program. I made up my mind to do so and have finally succeeded in obtaining funding to return to the region for a five-year study of ocean and ice conditions in Nares Strait.

I am writing this letter to you because I would very much like to come to Grise Fjord and to meet with you again and the people in your community. I could come the 2nd week of May on a Bjork Air flight when I will be returning through Alert from a project at the North Pole. I realize that this may not be ideal due to community hunting preparations and commitments but I hope this time can work out because as the mother of two children, ages 3 and 7, I have limited options.

I am also sending a letter to your mayor and to the school principal. Unfortunately I haven't been able to learn their names through the web or other media. I am hoping to telephone once these letters have had a chance to arrive. We would like to involve

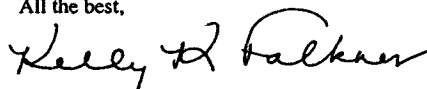
someone from your community in a meaningful way on our summer cruise aboard the ice-breaker Healy. Clearly I need to talk with Grise Fjord residents to figure out about how best to do that.

I have enclosed a one-page description of our project, a map depicting our cruise track and a caption for the map. I am working on the Nunavut licensing forms and will have a straightforward description of the project translated into Inuktitut shortly.

If you have access to e-mail, please do get in touch with me at the address given above. Otherwise, please send a letter with your phone number and the names and numbers of your mayor and principal, or anyone else such as an elder with whom you think I should consult.

I hope you are doing well and that we will indeed get to meet once more. I look forward to hearing from you.

All the best,

A handwritten signature in cursive script, reading "Kelly H. Falkner". The signature is written in dark ink and is positioned below the typed name "Kelly H. Falkner".



*Variability and Forcing of Fluxes through Nares Strait and Jones Sound:  
A Freshwater Emphasis*

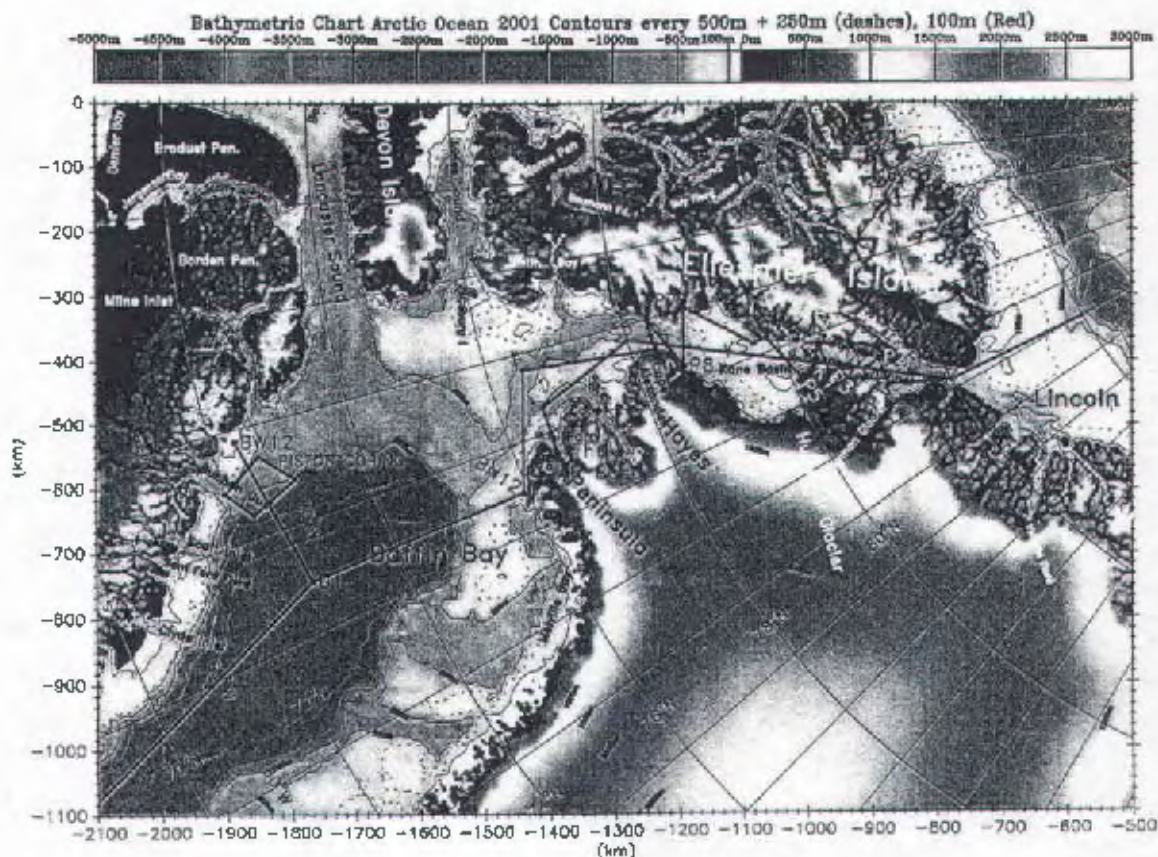
**Intellectual Merit:** The Arctic Ocean plays a pivotal role in the global hydrologic cycle by returning freshwater, in the form of freshened seawater and ice, to the North Atlantic at Fram Strait and through passages of the Canadian Archipelago. Available estimates suggest that freshwater fluxes of comparable magnitude pass through Fram Strait and the combined three main passages of the Archipelago. Spatial and temporal variability in its delivery potentially impacts North-Atlantic Deep Water formation and thus the global thermohaline circulation. Over the past decade it has become clear that forces affecting the Arctic freshwater pump have undergone marked changes and resultant signals are propagating throughout the North Atlantic. Concern about possible consequences of these changes motivated development of the Studies of Environmental Arctic CHange (SEARCH) program and Arctic-Subarctic Ocean Flux (ASOF) study. As a contribution to these initiatives under the Arctic Freshwater Cycle Announcement of Opportunity (NSF-02-071), we here propose to both quantify, determine, and explain fluxes and their driving forces through two of the three main passages of the Canadian Archipelago: Nares Strait and Jones Sound. These account for about half of the freshwater flux through Archipelago, and the remaining Lancaster Sound will be under study by colleagues. Nares Strait constitutes a crucial location to monitor change as its location at the confluence of major Arctic water mass boundaries. Spatial shifts in these boundaries relate directly to changed atmospheric pressure patterns, it is an excellent location to look for change. Specifically, our interdisciplinary American-Canadian-Japanese research team will apply a combination of proven and innovative technologies to:

- monitor water properties and currents over a 3.5 year period in Nares Strait, Cardigan Strait and Hell's Gate via a mooring array that resolves barotropic and baroclinic motions at their relevant scales;
- measure ice fluxes (advection and thickness) by combining moored with satellite-based observations;
- investigate dynamically remote and local forcing and response with a moored pressure sensor array and a sub-mesoscale atmospheric modeling component for Nares Strait;
- interpret water mass histories with hydrographic times series in the straits and Northern Baffin Bay;
- explore long-term variability through proxies stored in bivalve shell records and sediment cores;
- parameterize observations to improve Archipelago throughflow in Arctic and global models

**Broader Impacts:** Our collaborative project takes advantage of currently supported research and expertise in Canada and Japan. The human and engineering skill to conduct Arctic field and especially mooring work was developed over the last three decades in Canada. It is in danger of being lost as little generational and institutional transfer of technical skill and knowledge has taken place in Canada or elsewhere. Our proposed effort thus constitutes an opportunity to train a generation of Arctic field workers who will transcend national, disciplinary, and gender boundaries.

Our proposed project is closely coordinated and leveraged with other work proposed in the Archipelago region. The collective Canadian Archipelago Throughflow Study (CATS) leverages substantial investment by Europeans to document variability in Arctic-Atlantic exchanges east of Greenland and on-going American-lead efforts to monitor fluxes at Bering Strait. The first ever, simultaneous observation of global-Arctic Ocean exchanges will offer unprecedented opportunities to constrain, test, and thus improve regional and global models. Improve predictive capabilities of the earth-system's response to rising greenhouse gases may lead to improved societal responses. Our specific study will indicate critical, more sustainable measurements in the future that are needed to reveal the Arctic's role in decadal climate variability.

Outreach to the secondary education and general public levels via teacher participation in cruises, media and internet, interactions with local communities, undergraduate, graduate and technician training, and communication to the broader scientific community are all integral to our research plan.



**Figure Caption:** Map of proposed science cruise track for July-August 2003 USCGC Healy Nares St. Expedition. The expedition will begin at St. John's, Newfoundland on 21 July and we expect to arrive at B1 on about 24 July. Lines B1-BW12 and B1-BN12 indicate sections consisting of approximately 12 hydrographic stations each in northern Baffin Bay. The red box encloses the region from which we expect to retrieve 4 long piston cores in Canadian waters. From BN12 to S1 is a transit. Stations S1 to S5 are hydrographic stations. Stations P1-P8 are target sites for shallow water (< 20 m) subsurface pressure moorings. These moorings will be put in place with the aid of a small boat and divers and/or helicopter depending upon the ice conditions. We will also attempt to retrieve bi-valves near these sites. The K's indicate the array of instrumentation that is to be deployed on sub-surface moorings in Kennedy Channel. Exact placement will depend upon ice conditions. Time and conditions permitting, we will conduct hydrographic stations along a section in the Lincoln Sea. The plan is to then return directly to Thule arriving 15 August. We anticipate retrieving and redeploying the moorings from the ice via aircraft in early spring 2005 and conducting a final retrieval in early spring 2007. Important note: Ice and weather conditions in this region are difficult and variable. We expect to adjust the order of the proposed 2003 activities north of Baffin Bay as ice and weather permit. We will carry out ice reconnaissance missions by helicopter to assist us in the planning process.

**APPENDIX 9**

## Letter from Pauloosie Akeeagok

### Nunavut Research Institute

My name is Pauloosie Akeeagok, and I am from Grise Fiord, Nunavut. This summer, I had the opportunity to take part in a scientific program in the Canadian Archipelagos, between Ellesmere Island and Greenland. There were 35 scientists from both Canada and the United States, studying the waters from Baffin Bay to the Lincoln Sea. They researched ocean currents, mapped the sea floor, sampled sediments and collected clams to increase their understanding of climate history and fresh water flows in the Arctic.

After seeing a posting on the bulletin board in the Hamlet of Grise Fiord for a summer job opportunity to work with the scientific expedition, I submitted my name and was accepted to participate and represent my people, territory, and culture. I communicated with Kelly Falkner, chief scientist, and Humfrey Melling, co chief scientist for several weeks prior to sailing and joined the scientific team in St. Johns, Newfoundland. I was excited to set sail. This was an opportunity of a lifetime to learn about the projects that are going on in the lands where my ancestors have lived in for thousands of years. Not only did I represent Inuit, I also was a field assistant throughout the voyage and played a huge part in observing the activities. This gave me the chance to learn first hand what scientists do in our area, and also how to use scientific instruments such as the CTD-rosette system. This takes 24, 10 liter niskin (water) bottles down to the ocean and retrieves samples at certain depths. Then it measures the conductivity, temperature, and depth.

On the first couple of days, I was getting oriented to the ship and the people I was going to be working with for 4 weeks. I occasionally felt lost and needed some guidance to find things to do. I had time to meet new people both from the science party and the crew of the ship. This was when the scientist were getting their equipment ready for their 4 week projects.

I participated in the coring of the seabed. The information that we collected from the coring will help us learn more about the climate history of the Arctic through a number of tests such as looking at the magnetic susceptibility (indicates how much magnetic material is in the samples). This was one of the most interesting tasks I had throughout the whole expedition since I was fully part of the coring team. Also, since climate change is affecting the Arctic vastly, it was good to learn their theories, and the analysis they will do once they return to the south.

Throughout the whole project, there were several things that I found quite disturbing. The first was how much garbage the USCGC Healy ship throws away in the Arctic Ocean. I was taught by my parents and the elders that if there's enough room to bring what you brought, there's enough room to bring garbage back to where you received it. There, it would be disposed of properly instead of just dumping it into the ocean. If ships continue to come north and dump their garbage, our beautiful Arctic ocean will be contaminated. This is of great significance to us, the Inuit, as most of the traditional food we eat comes from the ocean.

Secondly, what disturbed me a lot was when we were enjoying the great meals they served on the 12<sup>th</sup> of August and someone from the crew of the USCGC Healy announced through the loud speaker that they were allowing "anyone" to go out and fish for Arctic char. I was stunned to hear the ship announce the fishing free-for-all without any fishing license or permits from the Department of Fisheries and

Oceans (DFO). When I enquired about whether or not they had a license, the response was, "Are you going to arrest us now?" I feel that expeditions into Nunavut should be aware of the restrictions and guidelines contained in the Nunavut Land Claims Agreement. These guidelines are the result of years of hard work and negotiations by the passionate Inuit political leaders. After going to Nunavut Sivuniksavut and studying our history, I am now aware of how the outside world came north and did what ever they wanted to do up here, and how that can no longer continue.

Throughout the Canadian Archipelago Throughflow Study (CATS) project, I have realized the need for communication between the scientists and the Inuit. While growing up in Grise Fiord, Nunavut, I have seen scientific teams come and go. Questions always arose once they left. "What do they do up in the Arctic where we (Inuit) live?"

With me being on the project, it gave the chance to contribute in a lot of ways, such as: giving Inuktitut words every day to the scientific team for them to communicate with Inuit in the future expeditions and giving power point presentations about Inuit history to both the scientific team and the crew of the ship. This gave them a better understanding of what Inuit went through; the loss and regaining of power, independence and control of their own lives and future. These presentations helped me realize where Inuit fit in the world. After hearing comments and feedback from the crew and scientific team, I realized they had great respect for our people and an interest in learning more about who we are.

In conclusion, I would like to thank Kelly Falkner and Humfrey Melling for giving me the chance to participate, help out and learn what they do in the beautiful oceans of the north. I would like to congratulate the scientific team on their success and hope the best for their future voyages. This has been a once in a lifetime experience that I will never forget. I hope that future scientific projects in Nunavut will continue to share and exchange knowledge with the Inuit.

Pauloosie Akeegok



## Chief Scientist's Notes Regarding Inuit Participation

K. Kenison Falkner

16 September 2003

During the last week of the cruise, I requested that Pauloosie Akceagok write a 1 to 2 page summary of his experiences on board the Healy to include in this cruise report. The previous 2 pages constitute his response to my request that he turned in to me on August 13, 2003. I was pleased to receive his thoughtful input. We responded to a few of the issues that he raised while we were still on board the ship because I felt that it was important to be proactive and respectful of his viewpoints.

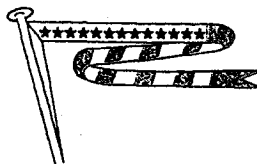
On August 14, we called Pauloosie to the Captain's conference room to discuss overboard dumping of wastes and the fishing incident. Present were the Captain, the Executive Officer, Humfrey Melling and myself. We first assured Pauloosie that our meeting with him was not in any form a reprimand. We told him that we appreciated both the positive and negative observations in his report. He was on board, in part, to sensitize us to issues of which we might otherwise be unaware and had done his job well.

Pauloosie had expressed general concern about dumping wastes over the side. The executive officer informed Pauloosie that the ship was following international marine pollution protocols. Under those protocols, food waste is permitted to be put overboard when greater than 3 nautical miles away from the coast and materials of the cardboard category can be put overboard at greater than 25 nautical miles. The ship was otherwise incinerating or retaining non-burnables in a bin on decks or in other hazardous waste containers. Pauloosie was told that the international protocols (MARPOL Treaty) can be found via the web (i.e. <http://www.epa.gov/OWOW/OCPD/marpol.html>) if he or other members of the Nunavut community wished to view the specifics. Pauloosie asked a few additional questions which the Captain answered.

We then we discussed the fishing incident. The Captain began the discussion by apologizing for the making the call to fish. He also said that he was intending to write a letter to the Nunavut Research Institute formally apologizing for the incident. He also expressed commitment to ensure that proper licenses be obtained in the future before allowing any crew members to put their rods in the water. (A copy of that letter sent on August 16 from Thule follows these notes.)

In wrapping up our discussion, Pauloosie reiterated that I might want to be aware for future missions, during which

people like himself might participate, that he felt a bit "lost" at the beginning. Fortunately a number of people from the science party interacted with Pauloosie and engaged him in a range of activities. Lee Narraway and Chris Moser, in particular, helped Pauloosie get his bearings and make substantial contributions to the success of the cruise.



Commanding Officer  
USCGC Healy (WAGB-20)  
FPO AP 96667-3918

15 August 2003

Mary Ellen Thomas  
Nunavut Research Institute  
Box 1720  
Iqaluit, Nunavut  
X0A 0H0 Canada

Dear Ms Thomas,

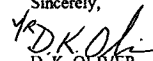
As the Commanding Officer, I wish to offer my apology for an incident that occurred onboard my ship during our recent oceanographic cruise in Nares Strait. We operated in the region from late July through mid-August of this year, supporting a scientific research mission for Dr. Kelly Falkner of Oregon State University. We had onboard the ship as a member of the embarked science party Mr. Pauloosie Akeegok, a student from Nunavut Sivuniksavat College in Ottawa, Canada. He was aboard to assist with science evolutions, provide feedback to the Nunavut Research Institute on the cruise, and help us better understand the Arctic region by providing his own insight into the native way of life in the Arctic.

On 12 August we were anchored in Scoresby Bay, Ellesmere Island conducting diving operations in support of the science mission. While anchored in the bay I gave permission for members of my crew to try fishing off the fantail of the ship. There were a number of crewmembers who took advantage of this opportunity and tried their hand fishing, but without any luck. Mr. Akeegok, who has an admirable sensitivity for the beauty and resources of the entire Arctic region, expressed his concern for the fishing as no member of the ship's crew had a license for fishing within the waters of Nunavut. I had allowed the fishing as an opportunity for members of my crew to have a diversion from the rigors of a four and a half month long deployment away from home and had not considered the need for a local fishing license.

Mr. Akeegok, through his enthusiastic talks about living in Nunavut and passionate concern for the Arctic environment, has helped me better understand the many challenges Nunavut faces trying to manage the resources of the region. For future science missions that bring HEALY back into the waters of Nunavut, I will certainly ensure we respect the resources of the region and obtain the proper licenses before allowing any members of the crew to fish.

Please accept my apology and distribute as you deem appropriate.

Sincerely,

  
D. K. OLIVER  
Commanding Officer  
USCGC HEALY (WAGB-20)

**APPENDIX 10**

**Application form for research projects in Greenland**

Send the completed form to:

**Danish Polar Center**  
**Strandgade 100 H**  
**DK-1401 Copenhagen K, Denmark**

Phone: +45 3288 0100  
Fax: +45 3288 0101  
E-mail: [dpc@dpc.dk](mailto:dpc@dpc.dk)

Please read the Cover Letter and the Planning Guide before you fill in the form

Reserved for the Danish Polar Center	
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**General information****Title of project**

Variability and Forcing of Fluxes through Nares Strait and Jones Sounds:  
A Freshwater Emphasis

**Number of participants**

20

**Name of project leader**

Dr. Kelly Falkner

**Address of project leader**

104 Ocean Admin Bldg.  
College of Oceanic & Atm. Sciences  
Corvallis OR 97331-5503 USA

**Citizenship**

USA

**Date of birth**

3-1-60

**Phone**

541-737-3625

**Fax**

541-737-2064

**E-mail**[kfalkner@coas.oregonstate.edu](mailto:kfalkner@coas.oregonstate.edu)

Have you applied for a permit before?

Yes

☒

No

☐

Will the project need access to the National Park?  
If yes, cf. Cover Letter and Firearm Licence Form

Yes

☐

No

☒

**Activity area in Greenland**

(Indicate local geographical longitude and latitude of boundaries and base camp locations. Enclose a map – preferably in scale 1 : 250.000 – with the information)

Base camp ~ 80° 27.5'N and 066° 44.38'W

Operations boundary

78° 17.8'N 072° 34.0'W

78° 54.3'N 075° 48.4'W

82° 15' N 061° 00' W

82° 00' N 060° 00' W

**Points of arrival and departure in the activity area**

78° 17.8'N 072° 34.0'W      81° 42.4'N 064° 47.9'W

78° 54.3'N 075° 48.4'W      80° 23-46'N and

79° 54.7'N 071° 21.4'W      067° 27'-068° 52'W

81° 18.4'N 061° 48.8'W

**Planned dates of arrival to and departure from Greenland**

About 6 weeks of work with April 10, 2005 early arrival and June 10, 2005 late departure

**Which radio equipment will be used in Greenland?**

VHF

☒

HF

☒

ELT/PLB

☐

none

☐

other

☒

If 'other' is checked, please specify below

Iridium phone

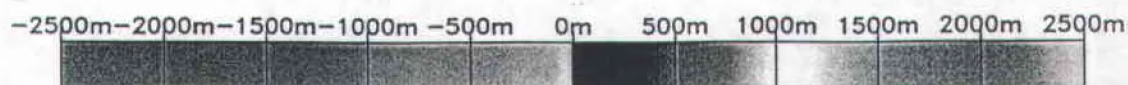
Please see the [Radio Licence Application Form](#)

**Description of project objectives in Greenland (max. 100 words in English)**

Our science goal is to determine how much seawater and ice flow south through Nares Strait and how that flow varies over a three-year period. We will use satellite information, models and ocean observations to do this. We emplaced 18 moorings across Kennedy channel and 5 shallow moorings distributed along Nares St. in August 03 from the USCGS Healy. Our objective in Spring 2005 is to retrieve these moorings through the ice, download data, refurbish them and redeploy them. We would like to do this by aircraft from a base camp near Lafayette Bay, Greenland.

More details regarding the project and findings are posted at the project web-site: <http://newark.cms.udel.edu/~cats/>

This work is supported by the US National Science Foundation, Simon Stephenson, Arctic Division of the Office of Polar Programs, Room 755, 4201 Wilson Boulevard, Arlington, VA 22230  
(703) 292-8030 (703) 292-9081 Fax



Mooring locations for Nares St. flux program. Red star marks targeted site for 2005 base camp for aircraft operations. Pressure sensing moorings in blue. Main array moorings in pink.



## Logistics

### Means of transportation to and from the activity area

Aircraft: fixed wing

### Means of transportation within the activity area

Aircraft: helicopter, twin-engine fixed wing  
Small all-terrain vehicle with wagon

Will you be bringing firearms?

Yes ☒ No ☐

If yes, you will need a firearm licence

Do you plan airdrops?

Yes ☒ No ☐

### If you plan airdrop(s), state locality / localities

Lafayette Bay 80° 24.5-27'N 066° 47'W

### Access to the below locations will be required (check appropriate)

Thule Air Base ☒ Station Nord ☐ Daneborg ☐ Mestersvig ☐

### Name and address of any local contact in Greenland

Axel Lund Olson, School Principal/Vice Mayor, Qaanaaq Kommune  
Postboks 96  
3971 Qaanaaq  
Grønland

Alex B. Jørgensen-Olzacki, Financial Manager, Qaanaap Kommunua  
Postboks 95  
3971 Qaanaaq  
Grønland

(Members of our science team, Scott McAuliffe and Mark Nielson, traveled to Qaanaaq June 1-7, 2004 to discuss our science project with members of the the community. While there, they gave presentations at the school and interacted with a wide range of community members aided by the fact that Mark speaks Danish. Unfortunately, the well-connected Hans Jensen was not in town during the visit. Scott and Mark attempted to determine whether our targeted camp site location and timing would pose any issues for the community. Alex B. Jørgensen-Olzacki told them that he would discuss the issue with local hunters during the next council meeting which are held about 6 times per year. An upcoming visit from the Danish Queen in June was of more pressing concern to the community at the time. We remain in contact with the above individuals via e-mail and phone. We intend to remain in contact with the community to inform them of our endeavors and findings and to determine whether any English speaking community members might be available to participate in our project.)

**Description of emergency, safety and general equipment to be used**

The field team will utilize Medical Advisory Services (MAS) to provide medical consultation in the event medical assistance is required. MAS will also provide the field team with a medical kit for field use.

The camp staff will develop safety procedures for traveling on the sea ice and in the region around the camp. They will be equipped with Iridium Satphones and VHF radios for communications. Bear and other animal deterrents will be employed.

The camp will consist of tents and "weatherport" structures for shelter.

**List of all participants name, address, date of birth, and citizenship**

Kelly K. Falkner, 616 NW 35th Corvallis OR USA 97330, 3-01-60, USA  
 David Huntley, PO Box 795, 251 Cowan Rd, Rising Sun, MD USA 21911, 2-10-69, USA  
 Andreas Muenchow, 909 Baylor Dr., Newark DE USA 19711, 11-09-61, GERMANY  
 Humfrey Melling, 240 Memorial Crescent, Victoria BC, CANADA, V8S 3J2, 17-07-49, CANADA  
 Ron Lindsay, 2900 Queenston St, Victoria BC, CANADA, V8R 4P5, 4-05-51  
 Victoria BC CANADA  
 Dave Riedel 3-06-68 Victoria BC CANADA  
 Technician (mechanical), TBD  
 Technician (oceanographic) TBD  
 Post-doctoral fellow, TBD  
 Helicopter pilot TBD  
 Helicopter mechanic TBD  
 Camp radio/cook TBD  
 Bear watch, Greenlander? TBD  
 Media person(s) TBD  
 Twin pilot TBD  
 Twin co-pilot TBD  
 Twin mechanic TBD  
 Danish or Greenland scientist(s) TBD

Provide separate list if needed. Report any change before departure for Greenland

**Scientific information****Responsible scientific institution(s)**

(reference, name, address, telephone, fax, e-mail)

College of Oceanic & Atmospheric Science  
 Oregon State University  
 104 Ocean Admin Bldg.  
 Corvallis, OR 97331 USA  
 541-737-3625 (tel) 541-737-2064 (fax) kfalkner@coas.oregonstate.edu

**Co-operation established with Danish or foreign scientific institution(s)**  
(reference, name, address, telephone, fax, e-mail)

Contacted Morten Rasch, Head of Logistics  
Danish Polar Center  
Strandgade 100H  
DK-1401 Copenhagen  
Denmark  
45 32880110 (tel)  
45 32880101 (fax)  
mr@dpc.dk

Humfrey Melling  
Fisheries and Oceans Canada  
Institute of Ocean Sciences  
9860 West Saanich Road  
P.O. Box 6000, Sidney, B.C.  
Canada, V8L 4B2  
250-363-6552 (tel)  
250-363-6746 (fax)  
mellingh@dfo-mpo.gc.ca

**Contact established to an institution or authority in Greenland**  
(reference, name, address, telephone, fax, e-mail)

Dr. Michael Kingsley (mcsk@natur.gl)  
Pinngortitaleriffik  
Grønlands Naturinstitut

**Collection of scientific material**

**Seawater samples**

Through Mørtén Rasch, we were contacted by:  
Dr. Peter Stougaard, Head of Discovery  
Bloneer  
Kogle Alle 2  
DK-2970 Hoersholm  
Denmark  
pst@bloneer.dk

Peter would like to send two Danish scientists to our camp to collect microorganisms from Greenland. Bloneer is a non-profit research and development institute based in Denmark, aimed at linking university and industrial interests. They claim to have performed their R&D on microorganisms in Greenland in accordance with the RIO convention and in close collaboration with the Home Rule of Greenland. We are in the process of determining how their needs can be accommodated at our camp.

**By my signature below I confirm**  
that all participants in the project will be made aware of the contents of  
'Information and stipulations' and further that the information submitted  
in this application form can be made public.

**Place and date**

Oregon State University, Corvallis,  
OR USA, 15 July 2004

**Signature of responsible leader**

**APPENDIX 11**

## RADIO LICENCE APPLICATION FORM

To be forwarded to  
**TELE Greenland, Radio Administration**  
**P.O. Box 504, DK-3920 Qaqortoq, Greenland**  
 Phone +299 64 31 22  
 Fax +299 64 31 23  
**rfv@tele.gl**

Please read Planning Guide and

Regulations for Use of Radio Equipment in Greenland

before you submit the form

**Danish Polar Center ref. no.**

### General information

Project / Expedition title:

Name and adress of responsible leader:

Phone:

Fax:

E-mail:

Geographical area(s) or route:

Period of stay - dates of starting and ending the project / expedition:

### Application for HF radio system

Make:

Type:

Radiated power:

Antenna(s)

**Modulation type:** Telephony SSB

Telephony FM

Telegraphy CW

Other

Specify other:

**Use of radio system:**

Base radio station

Internal communication



Available frequencies: 2784 kHz 3350 kHz 3815 kHz 4050 kHz

---

Communication with Greenland coastal radio systems

Available frequencies: : 2045 kHz 2090 kHz 2182 kHz

---

Maritime VHF channels:

---

### Application for VHF radio systems

Make: Type:

Radiated power: Antenna(s)

### Use of radio systems for internal communication

148.0 – 155.0 MHz State your frequency

445.0 – 445.975 MHz State your frequency

Other State your frequency

Air / ground communication 122.8 MHz

Citizen band radio Band

Approved by

Project / expedition participants possess valid radio certificate Copy enclosed

State other qualifications, if any, e.g. previous experience with radio systems

---

### Other radio systems – Emergency radio beacons

Make: Type:

Frequencies: If 406 MHz, state assigned identification code:

---

This is to certify that I have been informed of and accepted the contents of 'Regulations for use of radio equipment in Greenland'

Date

---

**APPENDIX 12**

**RESERVED FOR THE POLICE**

Application for

Modtaget dato:

Udstedt dato:

**FIREARM PERMIT**

Journalnr.: 55PM-50120-

This form must be returned to:

Gebyr indbetalt:

The Chief Constable of Greenland

P.O. Box 1006

DK-3900 Nuuk

**PLEASE USE CAPITAL LETTERS**

First / last name(s):			Date of birth:
Address:			
Postal code:	City:	Country:	Phone / fax:

*I hereby apply for a permit for the following firearm(s):*

<b>SHOTGUN</b>	<b>RIFLE</b>	<b>PISTOL / REVOLVER</b>
Semi / fully automatic (check) Yes _____ No _____	Semi /fully automatic (check) Yes _____ No _____	(Check) Pistol _____ Revolver _____
Make	Make	Make
Model	Model	Model
Manufacture number	Manufacture number	Manufacture number
Calibre	Calibre	Calibre

*The firearm(s) will be used for:*

(Check) _____ Hunting		
(Check) _____ Target practice or competition shooting	Club (enclose copy of membership card)	
(Check) _____ Self-defence against mammals during expedition / project	Name of expedition / project	DPC ref. no.
	Date of field period:	Stay in the National Park (check) Yes _____ No _____
(Check) _____ Other	Description	

By my signature I hereby consent to that the police can obtain information regarding my personal affairs, including any possible criminal cases

**Date** \_\_\_\_\_

**Signature** \_\_\_\_\_

**APPENDIX 13**



## INSURANCE STATEMENT

for a research project or a sport expedition in Greenland

### TO THE DANISH STATE:

**Title of project or expedition:**

**Name of project or expedition leader:**

**Period(s) of field activity in Greenland:**

**Activity area(s) in Greenland:**

It is hereby acknowledged that the Danish State – represented by Danish Polar Center – will be reimbursed by the undersigned insurance company for any expense paid by Danish authorities and derived from implementing Search and Rescue (SAR) operations for the amount of (check)

DKK 500.000,-

☐

DKK 1.000.000,-

☐

for the project or expedition as a whole, irrespective of any limitation in policy clauses.

Furthermore, the Danish State – represented by Danish Polar Center – will be reimbursed for any expense derived from evacuation (ambulance) transport for the amount of DKK 280.000,- for any individual participant of the project or the expedition, irrespective of any limitation in policy clauses.

<b>Name of insurance company:</b>	<i>Stamp of company</i>
<b>Address of insurance company:</b>	

<b>Phone number:</b>	
<b>Fax number:</b>	
<b>Date and signature of responsible insurance agent</b>	

Read about insurance conditions in 'Guide for Project and Expedition planners' available at DPC's homepage [www.dpc.dk/guide](http://www.dpc.dk/guide)

**Deadline:**

The completed and signed original Insurance Statement must be received by Danish Polar Center no later than 3 weeks prior to the start in Greenland of your project or expedition.

Danish Polar Center, Strandgade 100 H, DK-1401 Copenhagen K, Denmark  
Phone +45 3288 0100 Fax +45 3288 0101 [dpc@dpc.dk](mailto:dpc@dpc.dk)

**APPENDIX 14**

**Cover Letter  
applicable to  
Research Projects and Sport Expeditions  
in Greenland**

In preparation for your planned project/expedition in Greenland please read the following paragraphs and act according to the stated requirements. Please note that all pertinent documents must be received by the Danish Polar Center before a permit can be issued.

- 1.** The following documents are important for the issuing of a permit and you should therefore read and complete them carefully:
  - Application Form for a Research Project or a Sport Expedition
  - Application Form for Radio Licence
  - Application Form for Firearm Permit
  - Insurance Statement Form.
- 1.** The completed and signed application form (with required maps enclosed) must be submitted to the Danish Polar Center.
- 2.** Upon receiving the completed and signed application form the Danish Polar Center will forward a letter of receipt stating the special reference number assigned to your project or expedition. This reference number must be cited in all communication with public authorities and aircraft operators.
- 3.** Required maps and aerial photographs of Greenland can be purchased at the National Survey and Cadastre (address: Rentemestervej 8, DK-2400 Copenhagen NV, Denmark. Phone: +45 35875050, fax: +45 35875051).
- 4.** Projects and expeditions taking place in uninhabited areas (i.e. outside towns, hamlets, or stations) in North and East Greenland, anywhere on sea ice, or on the Inland Ice are required to bring an approved (certified) emergency radio beacon ('Personal Locator Beacon': PLB). The PLB must be capable of simultaneous transmission on 121.5 MHz / (243M Hz) and / or 406 MHz with a 121.5 MHz homing device and continuous transmission using an internal power supply for at least 24 hours at an ambient temperature down to -20° C.
- 5.** Carrying PLBs and radio equipment in Greenland requires a special licence. Complete the application form and send it to the issuing authority: TELE Greenland, P.O. Box 1002, DK-3900 Nuuk, Greenland. Phone: +299 323120, fax: +299 323130, no later than 3 months prior to the start of the activity. Upon issuing the licence, TELE Greenland will send a copy of the licence to the Danish Polar Center.
- 6.** Projects and expeditions to the Greenland National Park are required to bring a firearm as well as polar bear deterrents. A written firearm

permit must be obtained from the Chief Constable of Greenland, P.O. Box 1006, DK-3900 Nuuk, Greenland. Phone: +299 321448, fax: +299 324194. You must send a copy of the permit to the Danish Polar Center no later than 3 weeks prior to the departure for Greenland. The firearm(s) and the permit must be shown on request to any appropriate authority.

- 7.** A research project taking place on land in West Greenland is not required to take out a SAR (Search And Rescue) insurance nor an evacuation insurance.
- 8.** A research project or a sport expedition operating in uninhabited areas (i.e. outside towns, hamlets, or manned stations) in North or East Greenland, anywhere on sea ice, or anywhere on the Inland Ice must take out a SAR as well as an evacuation insurance covering all participants.
- 9.** A research project operating in areas mentioned in section 9 (above) and carried out under the auspices of a public Danish research institution (e.g. a university) normally does not need to take out a SAR and evacuation insurance as project members will be covered by the institution through the institution's self-insurance. However, the self-insurance generally covers employed staff only and other persons whose wages or funds are administered by the above-mentioned institution. The project leader must therefore forward to the Danish Polar Center, an official statement - with enclosed documentation - from the involved institution(s) clarifying the SAR and evacuation insurance conditions for all participants in the project. The statement must be submitted to the Danish Polar Center no later than 3 weeks prior to the departure for Greenland. Participants who are not covered by the self-insurance must take out insurances according to sections 11 -13 below. Send a copy signed by the insurance company to the Danish Polar Center.
- 10.** The SAR insurance must cover the amount of DKK 1,000,000 with the Danish State represented by Danish Polar Center as the sole beneficiary if the project or expedition takes place inside the Greenland National Park or on the Inland Ice.
- 11.** The SAR insurance must cover the amount of DKK 500,000 with the Danish State represented by Danish Polar Center as the sole beneficiary if the project or expedition takes place in uninhabited areas of North and East Greenland outside the Greenland National Park.
- 12.** A project or an expedition required to have a SAR insurance must also - for each member - take out an additional evacuation (ambulance) insurance covering the amount of DKK 280,000 with the Danish State as represented by Danish Polar Center as the sole beneficiary.
- 13.** When the insurance requirements listed under the above sections 10-13 apply to a project or an expedition the 'Insurance Statement' form must be completed, signed by the insurance company, and returned

to the Danish Polar Center no later than 3 weeks prior to the departure for Greenland.

- 14.** Should a project or an expedition involve the use of airfields or airports in Greenland the aircraft operator chartered by the project or expedition is required to apply for permission to land in accordance with the 'Aeronautic Information Publication (AIP) for Greenland and the Faroe Islands'.
- 15.** If you plan to ship or bring chocolate or alcoholic beverages to Greenland for use during the field period, please note that these goods are subject to a special import duty levied by the Greenland Provincial Treasury.
- 16.** The project or expedition and its members are required to comply with all current environmental protection rules in Greenland and to take all necessary precautions to protect and preserve the Arctic environment which is extremely vulnerable to the impact of human activities.
- 17.** Projects or expeditions taking place in uninhabited areas are encouraged to forward a report on logistics to the Danish Polar Center upon the return from Greenland. The report should cover the following items:
  - \* Transport by aircraft, vessels, etc.
  - \* Status for established depots of material, provisions, or fuel.
  - \* Any logistic problems or difficulties encountered.
  - \* Facts and conditions of general interest.
- 18.** Provided
  - a.** that all required material (i.e. radio licence, insurance statement, and firearm permit etc.) is submitted to the authorities within the stated deadlines, and
  - b.** that the planned project or expedition does not involve obvious hazards for the participants or third party, and
  - c.** that the planned or expedition project does not interfere with or counteract public interests in Greenland
 the Danish Polar Center will issue an official permit given on certain general conditions and in some cases subject to fulfilment of a number of additional specific requirements.

**It is stressed that the Danish Polar Center will need ALL required documents before a permit can be issued !**

**The Danish Polar Center does not send out reminders !**



**APPENDIX 15**

## COLLEGE OF OCEANIC &amp; ATMOSPHERIC SCIENCES



## OREGON STATE UNIVERSITY

Oceanography Administration Building 104 • Corvallis, Oregon • 97331-5503

Telephone 541-737-3625 • Fax 541-737-2064

**Projekt titel: Forandring og drift af havstrømme gennem Nares Stræde****Projekt beskrivelse:**

Vores videnskabelige mål er at fastslå hvor meget havvand og is, der strømmer mod syd gennem Nares Stræde og hvordan strømforholdene varierer over en 3 årig periode. For at kunne gøre det, vil vi bruge satellitinformation, modeller og havobservationer. Havstudierne fandt sted fra USCG isbryderne Healy og begyndte sidst i juli varende til midten af august 2003. Vi undersøgte vandets egenskaber, tog vandprøver og placerede instrumenter på havbunden i Baffin Bugt, Kane Bassin og Kennedy Kanal. Instrumenterne måler strømningsforhold, havdybde, temperatur og saltindhold. De er designet og placeres således at chancen for beskadigelse fra isbjerge er minimal. Vi regner med at kunne lokalisere og omplacere udstyret ved hjælp af helikopter og Twin Otter i april 2005. I april 2007 vil udstyret så blive endeligt fjernet. Arbejde udført ved hjælp af fly, vil ske med udgangspunkt fra midlertidige lejre, som vil være opstillet i ca. 6 uger. Lejrene vil blive placeret på land ved Lafayette bugten på den Grønlandske side af Kennedy Kanal.

Vi vil også studere tidligere strømningsforhold på to forskellige måder: Muslinger lægger deres skaller i præcise årlige lag og kan leve i 40 år. Vi antager, at kemien i lagene af muslingeskaller kan fortælle os hvordan strømningsforholdene har ændret sig gennem tiderne. Til denne brug har dykkere samlet 163 muslinge- og vandprøver fra 5 forskellige lokaliteter spredt på den canadiske og grønlandske side af Nares Stræde. For at studere tidligere ændringer af strømningsforholdene gennem hundrede og tusinder af år, har vi indsamlet 6 sedimentkerner fra havbunden i den nordlige del af Baffin bugten. Ved hjælp af skibets helt særlige kortudstyr, har vi desuden optegnet detaljerede kort over havbunden i de områder, hvor vi rejste, og disse vil blive offentligt tilgængelige. En Nunavut Observatør, Paloosie Akeeagok, fra Grise Fjord, deltog i turen i sommeren 2003. Vi håber, at vi kan lære noget af lokalbefolkningen og i fremtiden få lokal deltagelse i flere forskellige aspekter af vores projekt.

## COLLEGE OF OCEANIC &amp; ATMOSPHERIC SCIENCES



## OREGON STATE UNIVERSITY

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**Project Title : Variability and Forcing of Fluxes through Nares Strait****Project Description:**

Our science goal is to determine how much seawater and ice flow south through Nares Strait and how that flow varies over a three-year period. We use satellite information, models and ocean observations to do this. Ocean studies began from the USCG Icebreaker Healy from late-July to mid-August, 2003. We examined water properties, took water samples and placed instruments on the seafloor in Baffin Bay, Kane Basin and Kennedy Channel. The instruments measure currents, sea level, temperature and salt content and are designed and placed to avoid damage from deep iceberg keels. We intend to retrieve and redeploy the equipment using helicopter and Twin Otter in April 2005. We would then retrieve the equipment in April 2007 without redeployment. Aircraft based work would be conducted from camps lasting about 6 weeks and made of temporary structures. These camps will be located on land at Lafayette Bay on the Greenland side of Kennedy Channel.

We are also studying past flow conditions in two ways. Clams lay down their shells in distinct annual layers and can live to be 40 years old. We are testing the idea that the chemistry of clamshell layers can teach us about how the flow changed over past decades. For this purpose, divers collected 163 clams and water samples at 5 locations distributed along the Canadian and Greenland sides of Nares Strait. To study past flow changes over hundreds and thousands of years, we collected 6 sediment cores from the seafloor in Northern Baffin Bay. Through the ship's unique mapping system we collected detailed maps of the seafloor over the regions that we traveled and will make this data available. A Nunavut Observer, Paloosie Akeegok, from Grise Fjord, participated in the cruise during the summer, 2003. We hope learn from the local community and engage local participation in several future aspects of our project.