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 though 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:
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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 (= 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 anddepth):

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

Location	Station	Lat dec degree N	Long dec degree W	Depth m	Activity	Es t 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

Location	Station	Lat dec degree N	Long dec degree W	Depth m	Activity	Es t Begin Date/Time
	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
	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

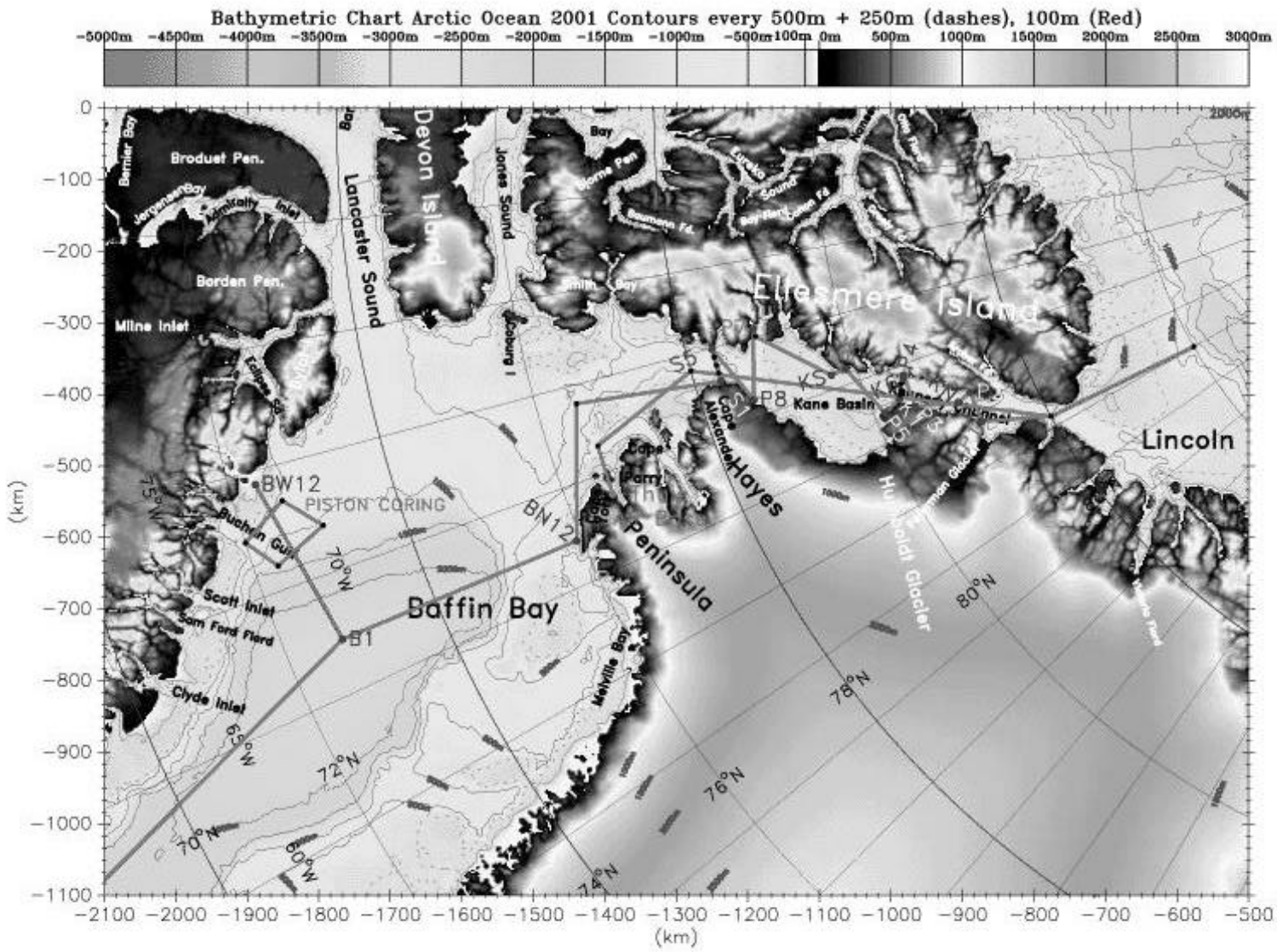
Details of installations and equipment (dates of laying, servicing, recovery; exact locations and depth):
See details in Geographical Areas spreadsheet. Exact positions of moorings will depend upon ice conditions encountered in this challenging strait.

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 21July and we expect to arrive at B1 on about 24July. 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.


Bathymetric Chart Arctic Ocean 2001 Contours every 500m + 250m (dashes), 100m (Red)
-5000m -4500m -4000m -3500m -3000m -2500m -2000m -1500m -1000m -500m -100m 0m 500m 1000m 1500m 2000m 2500m 3000m
Bernier Bay
Broduet Pen.
Jayne Bay
Admiralty Inlet
Borden Pen.
Milne Inlet
Lancaster Sound
Devon Island
Jones Sound
Bay
Norman Pen.
Smith Bay
Eureka Sound
Ellesmere Island
Kane Basin
Lincoln
Cape Alexander
Hayes
Cape Parry
Peninsula
Baffin Bay
Melville Bay
Humboldt Glacier
BW12
PISTON CORING
BN12
B1
Buchan Gulf
Scott Inlet
Sam Ford Fiord
Clyde Inlet
75°W
70°W
65°W
60°W
80°N
78°N
76°N
74°N
72°N
70°N
(km)
0 -100 -200 -300 -400 -500 -600 -700 -800 -900 -1000 -1100
-2100 -2000 -1900 -1800 -1700 -1600 -1500 -1400 -1300 -1200 -1100 -1000 -900 -800 -700 -600 -500
(km)

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.

9.4 Proposed means of making results internationally available:
The archival systems for the data are internationally accessible. The PI's will provide additional assistance upon request..

(Revised June 5, 2002)

KELLY KENISON FALKNER **ASSOCIATE PROFESSOR**

OREGON STATE UNVERSITY
College of Oceanic & Atmospheric Sciences

Citizenship: U.S.

Date & Place of Birth: March 1, 1960; Lancaster, NH

Family Status: Married, 2 children born 13 Sep 95 & 9 Nov 99

Address: Ocean. Admin. Bldg. 104
COAS, Oregon State University
Corvallis, OR 97331-5503
(541) 737-3625 office (541) 737-2064 (FAX)
kfalkner@coas.oregonstate.edu
http://chemoc.coas.oregonstate.edu/users/kfalkner

EDUCATION

B.A., Chemistry with, Russian minor, Reed College, 1983
Ph.D., Chemical Oceanography, M.I.T./W.H.O.I. Joint Program in Oceanography, 1989
Languages: French & Russian

ACADEMIC POSITIONS

Postdoctoral Researcher, M.I.T., 1989-1990
NATO Postdoctoral Research Fellow, Groupe de Recherche Géodésie Spatiale, Centre National D'Etudes Spatiales, Toulouse, France, 1990-1992
Assistant Professor, College of Oceanic & Atmospheric Sciences, 1992-1997
Associate Professor, College of Oceanic & Atmospheric Sciences, 1997-present

NON-ACADEMIC POSITIONS, EDITORSHIPS, etc…

Associate Editor, Geochimica et Cosmochimica Acta, 2002-

RESEARCH INTERESTS

Application of inorganic elemental and isotopic measurements to aqueous geochemical issues.

This entails sampling and analyses of waters and associated solids of diverse media including snow, ice, rivers, lakes, seas and the ocean and analytical technique development using state-of-the-art laboratory instrumentation, including ICPMS, TIMS & IRMS.

Topics studied include:

Recent history of lead pollution in the northern hemisphere as recorded in Greenland snow
Factors controlling the chemical composition of the large lakes (Baikal, Issyk-Kul)
Large-scale biochemical perturbations in the Black Sea
Measurement and cycling of osmium in the oceans

Current projects include:

Tracing origins and pathways of river waters and other contributions to the upper Arctic Ocean
Characterizing nature and causes of variability in Arctic circulation
Characterizing tributary and main stem river chemistry of the Salmon River, OR as part of a collaborative study of salmon life history as recorded in their otoliths
Deciphering sources of recent pronounced freshwater variability in the Gulf of Alaska

HONORS

National Science Foundation Arctic Service Award, 2000
COAS Student Mentoring Award, 2000
Office of Naval Research Young Investigator Award, 1993
NATO Postdoctoral Fellowship, 1990
Association for Women in Science Predoctoral Award, 1987
National Science Foundation Graduate Research Fellowship, 1984-87
Phi Beta Kappa, 1983

KELLY KENISON FALKNER **ASSOCIATE PROFESSOR**

PROFESSIONAL ACTIVITIES

National Committees

University National Oceanographic Laboratory System Arctic Icebreaker Coordinating Committee member 1996-2002

NSF Office of Polar Programs, Ocean-Atmosphere-Ice Interactions Steering Committee, 1997-2001

NSF Office of Polar Programs, Strategic Plan for Marine Science in the Arctic Committee, 1998-99

Review Panels

NSERC Site Review Panel for acquisition of ICPMS at UVic, Victoria, BC, January 1994

NSF Chemical Oceanography Panel, July 1993, May 1997 & November 1997

NSERC Earth and Environmental Sciences Grant Selection Committee, 1996-1997

Committee of Visitors to evaluate NSF Office of Polar Programs, July, 2000

Professional Organizations

American Geophysical Union

Association for Women in Science

Oceanography Society

Sigma Xi

American Chemical Society

American Society of Limnology & Oceanography

Field Work

Participant in 28 oceanographic, limnologic and riverine sampling expeditions: 1981-2003; Chief Scientist for 7 missions

RECENT PUBLICATIONS

Guay, C. K.. G. P. Klinkhammer, K. K. Falkner, R. Benner, P. G. Coble, T. E. Whitledge, B. Black, F. J. Bussell and T. A. Wagner (1999) High-resolution measurements of dissolved organic carbon in the Arctic Ocean by in situ fiber-optic spectrometry, Geophysical Research Letters 26:8: 1007-1110.

Moore, W. S. and K. Kenison Falkner (1999) Cycling of radium and barium in the Black Sea, J. Environmental Radioactivity 43:247-254.

Macdonald, R. W., E. C. Carmack, F. A. McLaughlin, K. Kenison Falkner and J. H. Swift (1999) Connections among ice, runoff and atmospheric forcing in the Beaufort Gyre, Geophysical Research Letters, 26:14:2223-2226.

Woodhouse, O. B., G. Ravizza, K. Kenison Falkner, P.J. Statham and B. Peucker-Ehrenbrink (1999) Osmium in seawater: concentration and isotopic composition vertical profiles in the eastern Pacific Ocean, Earth and Planetary Science Letters, 173:223-233.

Sherrell, R. M., Boyle E. A., Falkner K. K., and N.R. Harris (2000) Temporal variability of Cd, Pb, and Pb isotope deposition in central Greenland snow. Geochem. Geophys. Geosyst., vol. 1, Paper number 1999GC000007 [13,582 words, 6 figures, 2 tables]. May 30, 2000.

Guay, Christopher K. H.,. Kelly Kenison Falkner, Robin .D. Muench, Manfred Mensch, Markus Frank, and Reinhold Bayer (2001) Wind-driven transport pathways for Eurasian Arctic river discharge, Journal of Geophysical Research, 106:C6:11,469-11,480.

Alleau, Y., D. Colbert, P. Covert, B. Haley, X. Qiu, R. Collier, K. Falkner, B. Hales, L. Gordon and F. Prahl (2001) Th-234 applied to particle removal rates from the surface ocean: a mathematical treatment revisited, Geophysical Research Letters, 28:14:2855-2857.

Jones, E. P., J. H. Swift, L. G. Anderson, G. Civitarese, K. K. Falkner, G. Kattner, M. Lipizer, F. McLaughlin and J. Olafsson (2002) Tracing Pacific water in the North Atlantic Ocean, Journal of Geophysical Research, in press.

Vollmer, M. K., R. F. Weiss, R. T. Williams, K. K. Falkner, X. Qiu, E. A. Ralph and V. V. Romanovsky (2002) Physical and chemical properties of the waters of saline lakes and their importance for deep-water renewal: Lake Issky-Kul, , Geochimica Cosmochimica Acta, 66:24:4235-4246.

Morison, J. H., K. Aagaard, K. K. Falkner, K. Hatakeyama, R. Moritz, J. E. Overland, D. Perovich,K. Shimada, M. Steele, T. Takizawa and R. Woodgate (2002) The North Pole Environmental Observatory, EOS, Trans. Am. Geophys. Soc., 83:33:357-361.