APPLICATION FOR CONSENT TO CONDUCT MARINE SCIENTIFIC RESEARCH

1. General Information

1.1 Cruise name and/or number:	F2024-042 - HLY2403- Water Isotopes

1.2 Sponsoring institution(s):		
Name	Address	Name Of Director
University of Alaska Anchorage	Ecosystem Biomedical Laboratory, Room 121 3151 Alumni Drive, Anchorage, AK, 99508	Jeffrey Welker

1.3 Scientist in charge of the project:	
Name:	Lauren Juranek
Country:	United States
Affiliation:	Oregon State University
Address:	United States
Telephone:	206-303-8746
Email:	laurie.juranek@oregonstate.edu

1.4 Entity(ies) /Participant(s) from coastal State involved in the planning of the project:	
Name:	See Section 6.2
Country:	
Affiliation:	
Address:	
Telephone:	
Fax:	
Email:	
Website (for CV and photo):	

1.5 Submitting officer:	
Name:	Brian Williams
Affiliation:	USCG PACAREA
Address:	United States
Telephone:	9075180763
Fax:	
Email:	brian.d.williams3@uscg.mil

2. Description of Project

2.1 Nature and objectives of the project:
Continuous, real-time isotope analysis; these measurements will enable freshwater source delineation (e.g., Greenland meltwater, Mackenzie River water) and water mass mixing relationships at an unprecedented scale for a single continuous set of measurements. These water isotope observations are already included in separate applications to Canada, Greenland (Denmark), and Norway, as part of larger research projects under "F2024-017-HLY2402 -ECR Chief Sci Training" and "F2024-016 - GO-SHIP ARC01".

2.2 Relevant previous or future research projects:
-Previous: NSF Arctic Research Opportunities, OPP-2133156. RAPID: Fingerprinting new water-carbon interactions in the Arctic: Isotopic measurements through the Northwest Passage and in Baffin Bay. J. M. Welker (Lead PI, UAA), D. Causey (Co-PI, UAA), E. S. Klein (Co-PI, UAA), B. G. Kopec (Co-PI, UAA). $200,000. -Future: NSF Arctic Observing Network: Monitoring the New Arctic Water Cycle with a Pan Arctic isotope forensics network. J. M. Welker (Lead PI, UAA), D. Causey (Co-PI, UAA), E. S. Klein (Co-PI, UAA), B. G. Kopec (PI, Michigan Technological University), R. J. Bochenek (Axiom Data Sciences). Data collected on this cruise segment would be used to support this proposal.

2.3 Previous publications relating to the project:
-Klein, E. S., Baltensperger, A. P., & Welker, J. M. (2024). Complexity of Arctic Ocean water isotope (δ18O, δ2H) spatial and temporal patterns revealed with machine learning. Elementa: Science of the Anthropocene, 12(1). https://doi.org/10.1525/elementa.2022.00127. -(preprint, attached) Kopec, B. G., Klein, E. S., Feldman, G. C., Pedron, S., Bailey, H., Causey, D. Hubbard, A. L., Marttila, H., & Welker, J. M. Arctic freshwater sources and ocean mixing relationships revealed with seawater isotopic tracing. In review at Journal of Geophysical Research: Oceans.

3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude, including coordinates of cruise track/ way points):
The ship anticipates entering Iceland's EEZ on 21AUG24 at position 65°07'00.0"N 29°52'00.0"W and exiting on 24AUG24 at position 68°46'00.0"N 8°31'00.0"W. Data will be collected continuously along the transect (see attached cruise track) from Nuuk, Greenland to Tromso, Norway. Weather avoidance and unanticipated schedule delays may impact precise dates and locations of EEZ transit.

3.2 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 location and depth of sampling stations, the tracks of survey lines, and the locations of installations and equipment.
Chart provided - see Section 10.1.

4. Methods and Means to be Used

4.1 Particulars of Vessel:	
Name:	HEALY (WAGB-20)
Type/Class:	Ship : USCGC
Nationality (Flag state):	United States
Identification Number/Lloyds #/MMSI #:	9083380
Owner:	United States Coast Guard
Operator:	United States Coast Guard
Overall length:	127.00 m
Maximum draught:	10.00 m
Displacement/Gross tonnage:	16,000.0
Propulsion:	Diesel electric
Cruising:	22.00 km/h
Maximum speed:	31.00 km/h
Call sign:	NEPP
INMARSAT number and method and capability of communication (including emergency frequencies):	Email- D13-DG-CGCHealy-XO@uscg.mil INMARSAT phone- 011-872-763-709-857 Iridium phone- (808) 684-2610 VHF 156.8 MHz, Pacarea Command center (510)437-3700
Name of master:	
Number of crew:	100
Number of scientists on board:	10

4.2 Other craft in the project, including its use:
N/A

4.3 Particulars of methods and scientific instruments:		
Types of samples and measurements	Methods to be used	Instruments to be used
Isotope analysis: oxygen (δ18O) and hydrogen (δ2H)	The water will be sampled and analyzed continuously in real-time. A small amount of water from the underway flowthrough seawater is sampled by a Picarro Continuous Water Sampler (CWS). The CWS converts that liquid water to vapor that is transmitted to a Picarro L2130-i isotope analyzer to measure the isotopic ratios (δ18O, δ2H) in real-time at 1 hz resolution.	Picarro CWS and L2130-i analyzer, vacuum pump, monitor, 2 jugs of standard water, and inlet/outlet lines.
Surface seawater characteristics	Underway surface seawater pump will draw water from approximately 5 m depth for continuous measurement of temperature, salinity, dissolved oxygen, fluorescence, turbidity, surface pCO2.	Mounted shipboard sensors: Sea Temperature: Seabird SBE3S intake temp. Thermosalinographs (sea temp, conductivity, salinity): Seabird SBE45. Transmissometer: C-STAR 25cm Fluorometer: Seabird ECO-Triplet Dissolved oxygen: Seabird SBE43, Seabird SBE63 Total dissolved gas pressure: Pro-Oceanus mini-TDGP Underway pCO2: General Oceanic 8050, NOAA LDEO Takahashi

4.4 Indicate nature and quantity of substances to be released into the marine environment:
No

4.5 Indicate whether drilling will be carried out. If yes, please specify:
No

4.6 Indicate whether explosives will be used. If yes, please specify type and trade name, chemical content, depth of trade class and stowage, size, depth of detonation, frequency of detonation, and position in latitude and longitude:
No

4.7 Indicate whether protected species be studied. If yes, please specify:
No

4.8 Indicate whether scientific acoustic equipment will be used.:
No

4.9 Indicate whether fishing/trawling will be used.:
No

5. Installations and Equipment

5.1 Details of installations and equipment (including dates of laying, servicing, method and anticipated timeframe for recovery, locations and depth, and measurements):
No

6. Dates

6.1 Estimated overall project start and end dates:
Project Start Date: 8/18/2024
Project End Date: 8/28/2024

6.2 Coastal State-specific details:	
Coastal Area	Iceland
Estimated Entry Date:	8/21/2024
Estimated Departure Date:	8/24/2024
Estimated Research Start Date:	8/21/2024
Estimated Research End Date:	8/24/2024
Explanation of multiple entries:	N/A
Research will be performed:	Between 12-200 nm, Beyond 200 nm
Extent to which Iceland will be enabled to participate or to be represented in the research project:	Space can be made available for an official observer or scientist from the coastal state if requested.
Name, affiliation and contact information for all participants from Iceland:	N/A

7. Port Calls

7.1 List of Port Calls
No Port Calls

8. Participation of the representative of the coastal State

8.1 Modalities of the participation of the representative of the coastal State in the research project:
See Section 6.2

8.2 Proposed dates and ports for embarkation/disembarkation:
See Section 6.2

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary report, which should include the expected dates of submission of the data and research results:
No more than 3 months from the end date of the research as provided in Section 6.1.

9.2 Anticipated dates of submission to the coastal State of the final report:
No more than 2 years from the end date of the research as provided in Section 6.1.

9.3 Proposed means for access by coastal State to data (including format) and samples:
Data will be provided through official channels at no cost to the coastal State(s). Samples will be provided upon request.

9.4 Proposed means to provide coastal State with assessment of data, samples and research results:
Assessment of data, samples and research results will be provided at no cost to the coastal State(s).

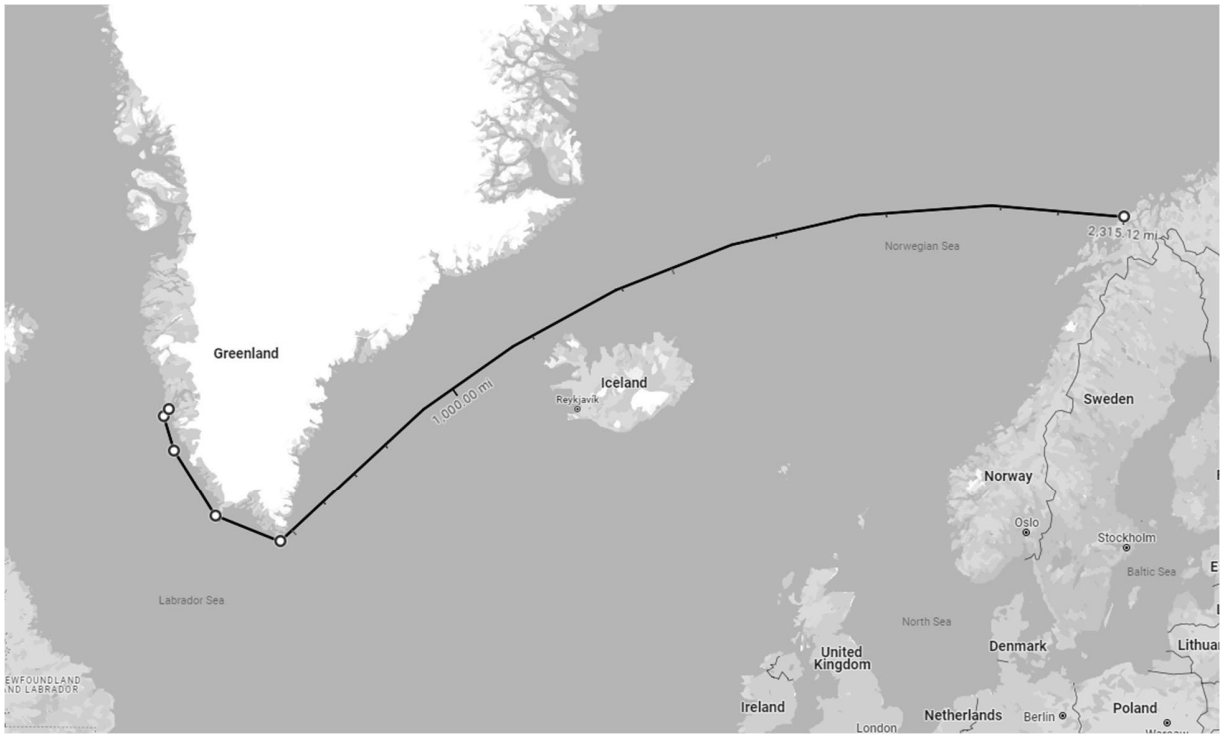
9.5 Proposed means to provide assistance in assessment or interpretation of data, samples and research results:
Assistance in further assessment or interpretation will be provided upon request.

9.6 Proposed means of making results internationally available:
All program data from past and new cruises are publicly available through links on http://usgoship.ucsd.edu. The link on that site to all program CTD and water sample data is to http://cchdo.ucsd.edu . Previous global hydrographic data are published in several atlases, including the WOCE Hydrographic Programme Atlas (http://woceatlas.ucsd.edu).

10. List of Supporting Documentation

10.1 List of attachments, such as additional forms required by the coastal State, etc.:			
Attachment Type	Description	Attachment	Submission Date
Proposed Cruise Track	Iceland	Iceland Cruise Track (1).docx	5/23/2024 12:42 PM

Executed: 6/3/2024 6:59:45 PM (Coordinated Universal Time)



Proposed Cruise Track

Nuuk, Greenland to Tromso, Norway: 18AUG24-28AUG24

Anticipated Entry into Iceland EEZ: 21AUG24 at position 65°07'00.0"N 29°52'00.0"W

Anticipated Exit from Iceland EEZ: 24AUG24 at position 68°46'00.0"N 8°31'00.0"W