



NIRB Application for Screening #125952 Early Career Training Cruise

Application Type: New

Project Type: Scientific Research

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Period of operation: from 2024-07-29 to 2024-08-13

Project Proponent: Lauren Juranek
Oregon State University
104 CEOAS Admin Building
Corvallis OR 97331
USA
Phone Number:: 1-206-303-8746, Fax Number::

DETAILS

Non-technical project proposal description

English: Northwest Passage Science and Early Career Training
Dr. Laurie Juranek and Dr. Emily Eidam, Oregon State University
This project involves marine research and early career scientist training on the USCGC Healy transit of the Northwest Passage from Kugluktuk, Canada to Nuuk, Greenland. We aim to instill best practices in managing objectives of interdisciplinary science teams and working effectively with the US Coast Guard, international partners, and Indigenous communities in planning and executing a cruise and communicating results broadly to local communities and the public.
Science research questions: (1) Can we fill gaps in data on Northwest Passage seafloor bathymetry and map navigational hazards? (2) How does transport of water through the Northwest Passage fit into the broader Arctic Ocean circulation? How do water parcels change chemically and physically? (3) How can we improve models of the growth and decay of sea ice based on meteorological, sea ice, and ocean surface condition data?
For (1), we propose to fill critical bathymetric gaps, help work toward complete seafloor mapping, and aid navigational hazard identification. We will work with Canadian Researchers from NRCAN and GSC to prioritize mapping locations. We also propose to collect seabed samples to improve an atlas of seabed sediments in development by Canadian researcher Dr. David Mosher. We will use samples to help train early career scientists in sampling methods and allow them to collect benthos, genomic data, and nutrient data.
For (2) we will monitor surface seawater while transiting using shipboard sensors, in order to understand how the chemical composition of seawater changes through the region with the flow of ocean currents. We will collect vertical profiles of water column properties as well as water samples to analyze properties including conductivity, temperature, nutrients, and other properties using a ship-based profiler at select sites and using small expendable sensors between stations. Water samples will be stored onboard and returned to individual laboratories for analysis.
For (3), we will collect meteorological and ocean surface measurements (drift rates, wind speeds, ocean surface temperature and salinity, light profiles) near sea ice and from an ice-based station. We also plan to collect ice samples if possible by drilling small holes with an auger.
We very much hope to build connections with regional hamlets and to reflect their knowledge and interests in our research and training efforts. We plan to visit Kugluktuk and Cambridge Bay this spring to connect with communities before the busy summer season. We also hope to organize a community event in Kugluktuk in late July to facilitate informal knowledge exchange among the community, our science party, and the USCG vessel officers prior to departure. We understand the importance of communicating our findings to local communities, and will plan an in-person follow-up trip in 2025. Data will be shared with the GSC and NRCAN and sent to Indigenous permitting authorities. Data collected in transit will be shared within 6 months of the survey. Data from discrete samples/measurements will be shared within 2 years of the survey (some require processing time).

French: Etude du Passage du Nord-Ouest et formation de jeunes chercheurs
Ce projet s'articule autour d'un projet de recherche et de formation de jeunes chercheurs sur le transit USCGC Healy allant du passage du Nord-Ouest, de Kugluktuk, au Canada, à Nuuk, au Groenland. Nous visons à inculquer les meilleures pratiques dans la gestion des objectifs d'équipes scientifiques interdisciplinaires et à travailler efficacement avec les Gardes Côtes américains, les partenaires internationaux, et les communautés autochtones, pour planifier et exécuter une campagne de recherche et communiquer les résultats aux communautés locales et au grand public.
Questions de recherche scientifique : (1) Pouvons-nous combler les lacunes dans les données de bathymétrie des fonds marins du passage du Nord-Ouest et cartographier les dangers pour la navigation ? (2) Comment le transport de l'eau à travers le passage du Nord-Ouest s'intègre-t-il dans la circulation plus large de l'océan Arctique ? Comment les parcelles d'eau changent-elles chimiquement et physiquement ? (3) Comment pouvons-nous améliorer les modèles de croissance et de dégradation de la glace de mer sur la base des données météorologiques, de la glace de mer et de l'océan de surface ?
Pour (1), nous proposons de combler les lacunes bathymétriques critiques, de contribuer à la cartographie complète des fonds marins et de faciliter l'identification des dangers pour la navigation. Nous travaillerons avec des chercheurs canadiens de RNCAN et de la CGC pour prioriser les emplacements à cartographier. Nous proposons également de collecter des échantillons de fonds marins pour améliorer un atlas des sédiments des fonds marins en cours d'élaboration par le chercheur canadien David Mosher. La collection des échantillons aidera à former des jeunes chercheurs aux méthodes d'échantillonnage et leur permettre de collecter des données sur le benthos,

Activities

Location	Activity Type	Land Status	Site history	Site archaeological or paleontological value	Proximity to the nearest communities and any protected areas
nominal cruise track (subject to ice conditions)	Scientific/International Polar Year Research	Marine	n/a	n/a	Science party plans to board via small boat transfer based out of Kugluktuk, all other activities are well offshore of communities
potential sampling location 1	Scientific/International Polar Year Research	Marine	n/a	n/a	All potential sampling locations are offshore and at a distance from communities

Community Involvement & Regional Benefits

Community	Name	Organization	Date Contacted
Cambridge Bay	email sent to Mia Otokiak re: potential participation as community rep on cruise	Nunavut Impact review board	2024-02-11
Kugluktuk	multiple phone calls to Grant at Kikiak Contracting re: help with Kugluktuk logistics	Kikiak contracting	2024-04-05
Cambridge Bay	Emails to David Hik at CHARS re: locating knowledge expert to sail on training cruise	Canadian High Arctic Research Station	2024-03-25
Kugluktuk	email sent to Larry Adjun	Kugluktuk Angoniatit Association - Hunters & Trappers Organization	2024-05-02

Authorizations

Indicate the areas in which the project is located:

Authorizations

Regulatory Authority	Authorization Description	Current Status	Date Issued / Applied	Expiry Date
Nunavut Research Institute	will be submitting NRI application for this project very soon	Not Yet Applied		

Project transportation types

Transportation Type	Proposed Use	Length of Use
Water	Transit and Research via US Coast Guard cutter Healy	

Project accommodation types

Community

Other,

Material Use

Equipment to be used (including drills, pumps, aircraft, vehicles, etc)

Equipment Type	Quantity	Size - Dimensions	Proposed Use
3.5 KHz echosounder	1	attached to ship	seabed imaging
USCGC Healy	1	128 m	Research vessel
multibeam echo sounder	1	attached to ship	bathymetric data collection
XCTD	30	0.3 m length	Collect temperature and salinity data while underway
Shipboard sensors for seawater properties	5	attached to vessel	Sensors measure temperature, salinity, dissolved oxygen, total dissolved gas pressure, and chlorophyll fluorescence
acoustic scattering	1	attached to vessel	echo sounder to detect biomass in water (fish finder) at 18KHz and 38 KHz
Acoustic doppler current profiler	2	attached to vessel	measure ocean current velocity
gravimeter	1	attached to vessel	measure Earth's gravity field
Smith McIntyre surface grab sampler	3	0.1 m ²	surface sediment sampling
gravity core	2	max 6m depth x 0.1 m diameter	surfical sediment sampling
Plankton ring net	2	1m ²	vertical tows for sampling and identification of plankton species composition
Multi corer	2	8 simultaneous cores, 1m x 0.1 m diameter	surface sediment and porewater sampling
CTD	10	6 x 10 L bottles per deployment	Collect seawater property data throughout water column, including water samples for shoreside analysis
kovacs ice coring device	2	up to 2 m depth by 0.1m diameter	Collect sea ice samples for analysis of physical, chemical properties (including micro plastics)
hydrophones	1	0.1 m	passive listening of ambient sound, including marine mammal detections, deployed over the side of the vessel or on a small free drifting buoy that is later recovered
small boat	1	6m x 3m	potential deployment to recover hydrophone buoy

Detail Fuel and Hazardous Material Use

Detail fuel material use:	Fuel Type	Number of containers	Container Capacity	Total Amount	Units	Proposed Use
Diesel	fuel	1	12202915	12202915	Gallons	vessel has diesel electric propulsion and carries all the fuel it needs
ethanol	hazardous	1	1	1	Liters	preservative for plant pigment samples
Mercuric Chloride	hazardous	1	1	1	Liters	Preservative for samples collected to measure seawater pH and alkalinity for ocean acidification studies.
Hydrochloric acid	hazardous	1	1	1	Liters	processing plant pigment and micro plastic samples
Sulfuric acid	hazardous	1	0.5	0.5	Liters	Analyzing oxygen samples
Sodium hydroxide (base)	hazardous	1	0.5	0.5	Liters	analyzing oxygen samples

Water Consumption

Daily amount (m3)	Proposed water retrieval methods	Proposed water retrieval location
0		

Waste

Waste Management

Project Activity	Type of Waste	Projected Amount Generated	Method of Disposal	Additional treatment procedures
Scientific/International Polar Year Research	Combustible wastes	0	All solid waste will be stored onboard for shoreside disposal in Nuuk, Greenland.	Healy garbage management plan attached in supplemental documents

Environmental Impacts:

no predicted environmental impacts associated with this activity.

Additional Information

SECTION A1: Project Info

SECTION A2: Allweather Road

SECTION A3: Winter Road

SECTION B1: Project Info

SECTION B2: Exploration Activity

SECTION B3: Geosciences

SECTION B4: Drilling

SECTION B5: Stripping

SECTION B6: Underground Activity

SECTION B7: Waste Rock

SECTION B8: Stockpiles

SECTION B9: Mine Development

SECTION B10: Geology

SECTION B11: Mine

SECTION B12: Mill

SECTION C1: Pits

SECTION D1: Facility

SECTION D2: Facility Construction

SECTION D3: Facility Operation

SECTION D4: Vessel Use

SECTION E1: Offshore Survey

SECTION E2: Nearshore Survey

SECTION E3: Vessel Use

SECTION F1: Site Cleanup

SECTION G1: Well Authorization

SECTION G2: Onland Exploration

SECTION G3: Offshore Exploration

SECTION G4: Rig

SECTION H1: Vessel Use

SECTION H2: Disposal At Sea

SECTION I1: Municipal Development

Description of Existing Environment: Physical Environment

Our activities will not impact the physical environment. We will collect small quantities of seabed for sediment analysis. We will collect small quantities of seawater for a suite of analyses designed to understand micro plastics, microscopic plants, and nutrients in seawater. Our ship-based sensor measurements will provide information on seafloor depth and potential navigational hazards in areas that are not well mapped.

Description of Existing Environment: Biological Environment

Our intended route has been planned to avoid protected critical habitat for marine mammals, including the Northwester polynya. We will avoid all areas with noted marine mammal presence. We are seeking to employ a local knowledge expert from Kugluktuk or other Nunavut community who will assist with marine mammal sightings to avoid impacts.

Description of Existing Environment: Socio-economic Environment

Miscellaneous Project Information

documents provided for Healy's garbage management, sewage management, and chemical and hazardous waste management plans

Identification of Impacts and Proposed Mitigation Measures

No anticipated environmental impacts. The vessel complies with all international waste management guidelines and is self-contained with respect to waste.

Cumulative Effects

Impacts

Identification of Environmental Impacts

	PHYSICAL	Designated environmental areas	Ground stability	Permafrost	Hydrology / Limnology	Water quality	Climate conditions	Eskers and other unique or fragile landscapes	Surface and bedrock geology	Sediment and soil quality	Tidal processes and bathymetry	Air quality	Noise levels	BIOLOGICAL	Vegetation	Wildlife, including habitat and migration patterns	Birds, including habitat and migration patterns	Aquatic species, incl. habitat and migration/spawning	Wildlife protected areas	SOCIO-ECONOMIC	Archaeological and cultural historic sites	Employment	Community wellness	Community infrastructure	Human health
Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Operation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

(P = Positive, N = Negative and non-mitigatable, M = Negative and mitigatable, U = Unknown)

Project Location



List of Project Geometries

1	polyline	nominal cruise track (subject to ice conditions)
2	point	potential sampling location 1
3	point	potential sampling location 2
4	point	potential sampling location 3
5	point	potential sampling location 4
6	point	potential sampling location 5
7	point	potential sampling location 6
8	point	potential sampling location 7
9	point	potential sampling location 8
10	point	potential sampling location 9

11	point	potential sampling location 10
12	point	potential sampling location 11
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61	point	potential sampling location 60
62	point	potential sampling location 61
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64	point	potential sampling location 62
65	point	potential sampling location TC12
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72	point	potential sampling location TC19
73	point	potential sampling location TC20
74	point	potential sampling location TC21
75	point	potential sampling location 63