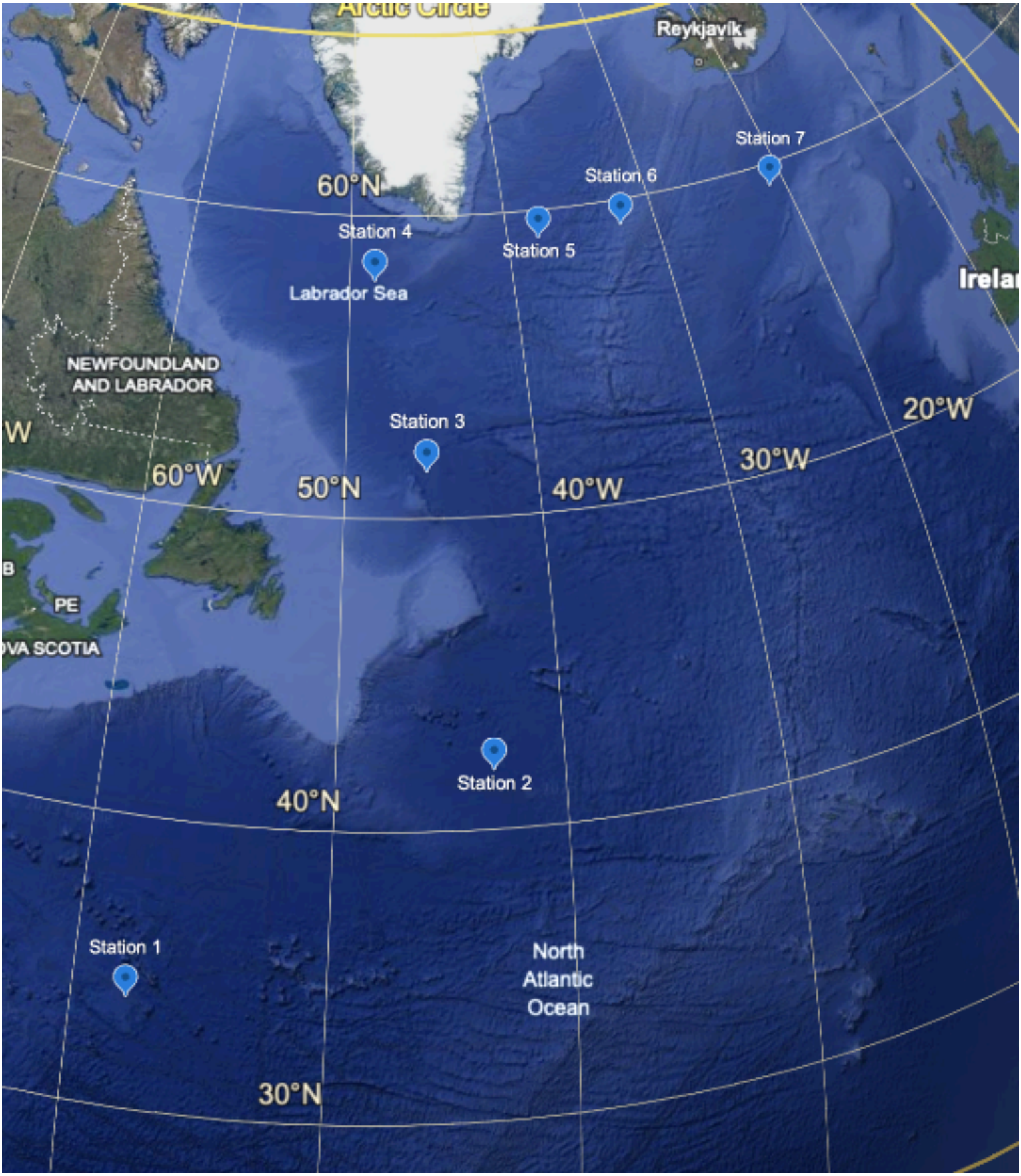

Arctic Circle
Reykjavik
Station 7
Station 6
60°N
Station 4
Station 5
Labrador Sea
Irela
NEWFOUNDLAND
AND LABRADOR
20°W
Station 3
30°W
60°W
50°N
40°W
PE
Station 2
40°N
Station 1
North
Atlantic
Ocean
30°N

NOTIFICATION OF PROPOSED RESEARCH CRUISE

PART A: GENERAL

1. NAME OF RESEARCH SHIP : R/V Marcus G. Langseth CRUISE NO.: MGL24-07

2. DATES OF CRUISE From: June 1, 2024 To: July 28,2024

3. OPERATING AUTHORITY: Lamont-Doherty Earth Observatory of Columbia University

   TELEPHONE: 1-845-365-8528 (CONTACT FOR SHIP: Sean Higgins)

   TELEFAX:

   TELEX:

4. OWNER (if different from no. 3): Trustees of Columbia University in the City of New York

5. PARTICULARS OF SHIP:

   Name:
   R/V Marcus G. Langseth
   Nationality:
   USA
   Overall length: (in metres)
   71m
   Maximum draught: (in metres)
   5.9m
   Net tonnage:
   3834 gross tons
   Propulsion e.g. diesel/steam:
   Geared Diesel
   Call sign:
   WDC6698
   Registration port and number
   (if registered fishing vessel)
   Oceanographic Research Vessel (Official # 1310186)

6. CREW

   Name of master: Mark Landow

   Number of crew: 20

7. SCIENTIFIC PERSONNEL

   Name and address of scientist in charge: Brian Haley

   Tel/telex/fax no.: +1 541-602-9025
   No. of scientists: ~20

8. GEOGRAPHICAL AREA IN WHICH SHIP WILL OPERATE (with reference to latitude and longitude)
   Central Labrador Sea 57.4°N, 48.5°W
   Irminger Sea 59.0°N, 37.5°W

9. BRIEF DESCRIPTION OF PURPOSE OF CRUISE
   The speeds and patterns of deep water currents, collectively known as thermohaline circulation, impact the global distribution of heat and chemicals including dissolved oxygen and carbon dioxide. Modern thermohaline circulation has been described as a "conveyor belt," wherein deep water is formed in the North Atlantic and near Antarctica, then moves throughout the rest of the global oceans. Changes in the location and strength of deep water

formation have dramatic impact on both the ocean and on Earth's climate. However, direct measurement of circulation from Earth's past is not possible and measuring modern ocean circulation is difficult, because of the inaccessibility of the deep ocean and the vast spatial scales involved, geoscientists must rely on geochemical tracers to understand deep circulation. These tracers allow geoscientists to understand changes in ocean circulation from both modern ocean water and ancient waters recorded in ocean sediments, and thus inform models that predict future change. Observations that the isotopic ratio of the dissolved trace metal neodymium (^{143}Nd and ^{144}Nd) appears to mimic modern deep ocean circulation has meant that this ratio is considered one such circulation tracer. Unfortunately, we do not yet understand why this ratio ostensibly mirrors deep ocean circulation, nor is the established view on the marine geochemical cycle of neodymium completely consistent with observations. To resolve these inconsistencies, we hypothesize that the sediments at the seafloor are a major source of neodymium to the ocean; a proposal in contrast to existing element budgets which consider the sediments to be primarily a sink removing neodymium from the ocean. To test this idea, we will sample sediments, the pore water they contain, and the overlying ocean water from several sites in the North Atlantic, measuring a suite of elements and isotopes in all these samples. This research will help us better understand the geochemistry of neodymium and its isotopes in the North Atlantic, one of the regions critical to understanding ocean circulation. Constraining the major controls on neodymium in the ocean is significant to our understanding of ocean-climate interactions as different mechanisms can lead to very different interpretations of the neodymium record of past and present deep water circulation. This improved understanding will result in more accurate interpretations of new and existing data with respect to changes in deep ocean circulation through time and its impact on climate.

10. DATES AND NAMES OF INTENDED PORTS OF CALL
July 25-28- -Port Call at end of project intended to be in Reykjavik, Iceland

11. ANY SPECIAL REQUIREMENTS AT PORTS OF CALL –
NONE

NOTIFICATION OF PROPOSED RESEARCH CRUISE

1. PART B: DETAILS

1. NAME OF RESEARCH SHIP: R/V Marcus G. Langseth CRUISE NO.: MGL24-07

2. DATES OF CRUISE From : June 1, 2024 To: July 28, 2024

3. a) PURPOSE OF RESEARCH

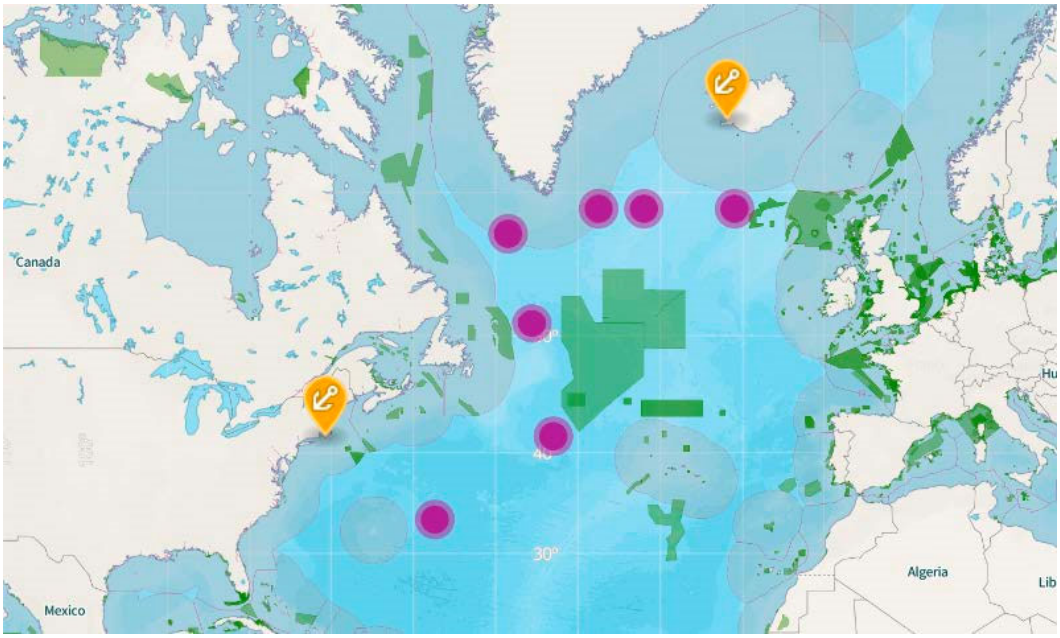
Neodymium (Nd) is one of 14 rare earth elements (REEs) frequently used to investigate environmental processes. In additional to its use as part of the REE series, the isotope ratio of neodymium ($^{143}Nd/^{144}Nd$; eNd) is arguably the most promising tracer of past ocean circulation, and is also heavily invested in the GEOTRACES project for the modern ocean. Unfortunately, many observational and theoretical studies indicate that our mechanistic understanding of both of these tracers has considerable problems, leading to potentially erroneous interpretations. Our research has focused on our understanding of the oceans' neodymium cycle resulting in our suggestion that a benthic source of REEs to the oceans exerts a primary control over the distribution of REEs and eNd in deep waters. To date this work has been conducted in the Pacific Ocean, but for this project we propose to test this hypothesis in the North Atlantic, a region critical for thermohaline circulation. This proposal argues that fundamental aspects of the geochemical cycle of marine REEs and Nd isotopes are in need of significant revision. Thus, this work has transformative implications on our understanding and application of the REEs and Nd isotope data in both the modern and ancient oceans. We make the specific and (perhaps) counterintuitive prediction that benthic fluxes of the REEs will be greater in the North Atlantic than those we have measured in the Pacific. If proven correct, these results will transform our interpretations of a large suite of existing data and provide a more accurate mechanistic understanding of what information these elements provide about modern and past ocean circulation. Even if proven incorrect, our proposed measurements will provide an important contrast to those we have made in the Pacific and will offer insight into the global geochemical cycling of these elements and their isotopes. Beyond the use and interpretation of neodymium, our work will further our understanding of the importance of the benthic environment on marine trace metal cycling in a general sense (e.g., for iron, copper, zinc, chromium, etc.)

b) GENERAL OPERATIONAL METHODS (including full description of any fish gear, trawl type, mesh size, etc.)

Water column water sampling using 20L Niskin Bottles
Sea floor sediment sampling using Multi-corers (1m long)
Use of MISO video equipment on Multi-coring device

4. ATTACH CHART showing (on an appropriate scale) the geographical area of intended work, positions of intended stations, tracks of survey lines, positions of moored/seabed equipment, areas to be fished

See Below for Chart and 7 proposed station locations with coordinates



Station 1: 33.5°N, 57.4°W, Bermuda Rise. Approx. 4530m sea floor depth.
Station 2: 41.5°N, 43.0°W, Newfoundland Basin. Approx. 4775m sea floor depth.
Station 3: 51.0°N, 45.6°W, S. Labrador Sea. 4125m sea floor depth.
Station 4: 57.4°N, 48.5°W, Labrador Sea. Approx. 3460m sea floor depth.
Station 5: 59.0°N, 37.5°W, Irminger Basin. Approx. 3100m sea floor depth.
Station 6: 59.0°N, 32.0°W, Reykjanes Ridge. Approx. 1990m sea floor depth.
Station 7: 59.0°N, 21.0°W, Iceland Basin. Approx. 2100m sea floor depth.

NO FISHING or Moored Seabed equipment

a) TYPES OF SAMPLES REQUIRED (e.g., geological/water/plankton/fish/radionuclide)

5. **Water from the water column**
Sediment from the sea floor
Pore water extracted from the sediment

b) METHODS OF OBTAINING SAMPLES (e.g., dredging/coring/drilling/fishing, etc. When using fishing gear, indicate fish stocks being worked, quantity of each species required, and quantity of fish to be retained on board).
Niskin Bottles for water
Multi-corer for sediment

6. DETAILS OF MOORED EQUIPMENT : **NONE**

Dates Laying	Recovery	Description	Depth	Latitude	Longitude

7. ANY HAZARDOUS MATERIALS (chemicals/explosives/gases/radioactives, etc.)
(Use separate sheet if necessary)

a) Type and trade name
1. Hydrochloric Acid (acid)
2. Nitric Acid (acid)
3. Ethanol (organic solvent)
4. Mercuric Chloride (poison)

b) Chemical content (and formula)

1. Hydorochloric Acid (HCl); ultra pure grade
2. Nitric Acid (HNO3); ultra pure grade
3. Ethanol (EtOH)
4. Mercuric Chloride (HgCl2)

c) IMO IMDG code (reference and UN no.)

1. UN 1789
2. UN 2031
3. UN 1170
4. UN 1624

d) Quantity and method of storage on board

1. 2 L; stored in chemical cabinet
2. 2L; stored in chemical cabinet
3. 2L; stored in chemical cabinet
4. 100 mL; stored in chemcial cabinet

e) If explosives give dates of detonation: NONE

- Method of detonation
- Position of detonation
- Position of detonation
- Frequency of detonation
- Depth of detonation
- Size of explosive charge in kg.

8. DETAIL AND REFERENCE OF

a) Any relevant previous/future cruises

Our prior support for this work is centered on two proposals. The first was effectively a pilot study that allowed us to demonstrate the efficacy of our approach to obtaining sediment pore fluids for ε_{Nd} analysis: "*Behavior of Nd isotopes at the Ocean-Sediment Boundary: Addressing the 'Nd Paradox'"* (NSF OCE 1147407; Sailed on R/V Oceanus for sampling off Oregon, USA). The second proposal focused on pore fluid profiles of the abyssal central Pacific *"Collaborative Research: How and Why* ε_{Nd} *Tracks Ocean Circulation"* (NSF OCE 1850765; Sailed on the R/V Kilo Moana in the Central Pacific).

b) Any previously published research data relating to the proposed cruise

(1) Abbott, A.N., B.A. Haley, J. McManus, C.E. Reimers (2015) The sedimentary flux of dissolved rare earth elements to the ocean, *GCA*, 154, 186-200[97]. (2) Abbott, A.N., B.A. Haley, J. McManus (2015) Bottoms up: Sedimentary control on the deep ocean's ε_{Nd} signature, *Geology*[98]. (3) Abbott, A.N., B.A. Haley and J. McManus (2016) The impact of sedimentary coatings on the diagenetic Nd flux: *EPSL*, 449, 217-227[78]. (4) Haley, B.A., Du, J., Abbott, A.N. and McManus, J. (2017) The impact of benthic processes on rare earth element and neodymium isotope distributions in the oceans, Front. Mar. Sci., 4:426, doi: 10.3389/fmars.2017.00426[101]. (5) In addition to these manuscripts there have been five abstracts presented at the Goldschmidt meeting (Abbott et al., 2013, 2015; Haley et al., 2021) and the fall AGU meeting (Abbott et al., 2014, 2015). (6) April Abbott's Ph.D. thesis was also supported by our first NSF award; Abbott, A.N. (2015) Ph.D. thesis, Oregon State University. All published data are available through the publications listed or online at Pangaea (DOI numbers PANGAEA.877377; .877842; .877376; .877840; .877356; .877818; .877821; .877371; .877374; .877370).

9. NAMES AND ADDRESSES OF SCIENTISTS OF THE COASTAL STATE(S) IN WHOSE WATERS THE PROPOSED CRUISE TAKES PLACE WITH WHOM PREVIOUS CONTACT HAS BEEN MADE

None

10. STATE

Iceland – Port call at end of project

a) Whether visits to the ship in port by scientists of the coastal state concerned will be acceptable (**Yes**/No)

YES

b) Participation of an observer from the coastal state for any part of the cruise together with the dates and the ports for embarkation and disembarkation

Project departs from US port (Woods Hole, Massachusetts) on June 1 and ends in Reykjavik on ~July 25.

c) When research data from the intended cruise are likely to be made available to the coastal state and by what means:

Through publications and conferences/presentations. (2) Uploading to PANGEA database (https://www.pangaea.de/). (3) uploading to BCO-DMO database (https://www.bco-dmo.org/). The latter two where more appropriate.

PART C. SCIENTIFIC EQUIPMENT

Complete the following table using a separate page for <u>each</u> coastal state

<u>Coastal state : Greenland/Denmark</u>

<u>Port of call: None</u>

<u>Dates: June 1 to July 25</u>

Indicate "YES" or "NO"

				DISTANCE FROM COAST		
<u>List scientific work by function</u> e.g.	Water column including sediment sampling of the seabed	Fisheries research within fishing limits	Research concerning the natural resources of the conti-nental shelf or its physical characteris-tics	Within 3 nm	Between 3-12 nm	Between 12-200 nm
Magnetometry	No	NONE FOR ANY OF THESE	NONE FOR ANY OF THESE			For All Yes in Column 1, Distance would be between 12-200nm
Gravity	YES					
Diving	No					
Seismics	No					
Seabed sampling	YES					
Bathymetry	YES					
Trawling	No					
Echo sounding	YES					
Water sampling	YES					
U/W TV	No					
Moored instr.	No					
Towed instr.	No					

___Sean Higgins _____ Dated___12/15/2023_____
(On behalf of the Principal Scientist)

NB IF ANY DETAILS ARE MATERIALLY CHANGED REGARDING DATES/AREA OF OPERATION AFTER THIS FORM HAS BEEN SUBMITTED, THE COASTAL STATE AUTHORITIES MUST BE NOTIFIED IMMEDIATELY

PART C. SCIENTIFIC EQUIPMENT

Complete the following table using a separate page for each coastal state

Coastal state : Iceland

Port of call: Reykjavik

Dates: ~July 25-28, 2024

Indicate "YES" or "NO"

				DISTANCE FROM COAST		
List scientific work by function e.g.	Water column including sediment sampling of the seabed	Fisheries research within fishing limits	Research concerning the natural resources of the conti-nental shelf or its physical characteris-tics	Within 3 nm	Between 3-12 nm	Between 12-200 nm
Magnetometry	No	NONE FOR ANY OF THESE	NONE FOR ANY OF THESE			For All Yes in Column 1, Distance would be between 12-200nm
Gravity	YES					
Diving	No					
Seismics	No					
Seabed sampling	YES					
Bathymetry	YES					
Trawling	No					
Echo sounding	YES					
Water sampling	YES					
U/W TV	No					
Moored instr.	No					
Towed instr.	No					

___Sean Higgins _____ Dated___12/15/2023_____
(On behalf of the Principal Scientist)

NB IF ANY DETAILS ARE MATERIALLY CHANGED REGARDING DATES/AREA OF OPERATION AFTER THIS FORM HAS BEEN SUBMITTED, THE COASTAL STATE AUTHORITIES MUST BE NOTIFIED IMMEDIATELY

APPLICATION FOR CONSENT TO CONDUCT MARINE SCIENTIFIC RESEARCH

1. General Information

1.1 Cruise name and/or number:	F2023-094-North Atlantic Porewater

1.2 Sponsoring institution(s):		
Name	Address	Name Of Director
Oregon State University	CEOAS Oregon State University 104 CEOAS Admin. Bldg. Corvallis, OR 97331-5503 +1 541-737-3504 tuba.ozkan-haller@oregonstate.edu	Dr. Tuba Ozkan-Haller

1.3 Scientist in charge of the project:	
Name:	Brian Haley
Country:	United States
Affiliation:	Oregon State University
Address:	104 CEOAS Admin. Bldg, OSU Corvallis, OR 97331-5503 United States
Telephone:	541-602-9025
Email:	brian.haley@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:	Sean Higgins
Affiliation:	Lamont-Doherty Earth Observatory of Columbia University , Office of Marine Operations
Address:	61 Rt. 9W Admin Bldg. Rm.102-104 Palisades, New York 10964 US
Telephone:	845-365- 8528
Fax:	845-365-8424
Email:	sean@ldeo.columbia.edu

2. Description of Project

2.1 Nature and objectives of the project:

Neodymium (Nd) is one of 14 rare earth elements (REEs) frequently used to investigate environmental processes. In additional to its use as part of the REE series, the isotope ratio of neodymium (143Nd/144Nd; eNd) is arguably the most promising tracer of past ocean circulation, and is also heavily invested in the GEOTRACES project for the modern ocean. Unfortunately, many observational and theoretical studies indicate that our mechanistic understanding of both of these tracers has considerable problems, leading to potentially erroneous interpretations. In essence, the established view on the marine geochemical cycle of neodymium is not entirely consistent with observations. To resolve these inconsistencies, we hypothesize that the sediments at the seafloor are a major source of neodymium to the ocean; a proposal in contrast to existing element budgets which consider the sediments to be primarily a sink removing neodymium from the ocean. To test this idea, we will sample sediments, the pore water they contain, and the overlying ocean water from several sites in the North Atlantic, measuring a suite of elements and isotopes in all these samples. This research will help us better understand the geochemistry of neodymium and its isotopes in the North Atlantic, one of the regions critical to understanding ocean circulation.

2.2 Relevant previous or future research projects:

Our prior support for this work is centered on two projects. The first was effectively a pilot study that allowed us to demonstrate the efficacy of our approach to obtaining sediment pore fluids for eNd analysis ("Behavior of Nd isotopes at the Ocean-Sediment Boundary: Addressing the 'Nd Paradox'", funded by NSF OCE 1147407). The second proposal focused on pore fluid profiles of the abyssal central Pacific ("Collaborative Research: How and Why eNd Tracks Ocean Circulation", funded by NSF OCE 1850765 & 1850789). The current proposal represents the third step in our research that has been changing our understanding of the role of sea floor diagenetic processes on the marine geochemical cycle of the REEs and eNd and, quite likely, other minor and trace elements.

2.3 Previous publications relating to the project:

1) Abbott, A.N., B.A. Haley, J. McManus, C.E. Reimers (2015) The sedimentary flux of dissolved rare earth elements to the ocean, GCA, 154, 186-20097. (2) Abbott, A.N., B.A. Haley, J. McManus (2015) Bottoms up: Sedimentary control on the deep ocean's εNd signature, Geology. (3) Abbott, A.N., B.A. Haley and J. McManus (2016) The impact of sedimentary coatings on the diagenetic Nd flux: EPSL, 449, 217-22778. (4) Haley, B.A., Du, J., Abbott, A.N. and McManus, J. (2017) The impact of benthic processes on rare earth element and neodymium isotope distributions in the oceans, Front. Mar. Sci., 4:426, doi: 10.3389/fmars.2017.00426101. (5) In addition to these manuscripts there have been five abstracts presented at the Goldschmidt meeting (Abbott et al., 2013, 2015; Haley et al., 2021) and the fall AGU meeting (Abbott et al., 2014, 2015). (6) April Abbott's Ph.D. thesis was also supported by our first NSF award; Abbott, A.N. (2015) Ph.D. thesis, Oregon State University. All published data are available through the publications listed or online at Pangaea (DOI numbers PANGAEA.877377; .877842; .877376; .877840; .877356; .877818; .877821; .877371; .877374; .877370).

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):

Station 1: 33.5°N, 57.4°W, Bermuda Rise. Approx. 4530m sea floor depth.
Station 2: 41.5°N, 43.0°W, Newfoundland Basin. Approx. 4775m sea floor depth.
Station 3: 51.0°N, 45.6°W, S. Labrador Sea. 4125m sea floor depth.
Station 4: 57.4°N, 48.5°W, Labrador Sea. Approx. 3460m sea floor depth.
Station 5: 59.0°N, 37.5°W, Irminger Basin. Approx. 3100m sea floor depth.
Station 6: 59.0°N, 32.0°W, Reykjanes Ridge. Approx. 1990m sea floor depth.
Station 7: 59.0°N, 21.0°W, Iceland Basin. Approx. 2100m sea floor depth.

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:	MARCUS G. LANGSETH
Type/Class:	Ship : R/V
Nationality (Flag state):	United States
Identification Number/Lloyds #/MMSI #:	6203283
Owner:	Columbia University
Operator:	Mark Landow/Lamont-Doherty Earth Observatory
Overall length:	72.00 m
Maximum draught:	6.00 m
Displacement/Gross tonnage:	3,834.0
Propulsion:	2 x Bergen BRG-6 2650kw /3550 hp (each); 1 x Tunnel 590 kw/ 800 hp bow thruster
Cruising:	10.00 km/h

Maximum speed:	11.00 km/h
Call sign:	WDC6698
INMARSAT number and method and capability of communication (including emergency frequencies):	INMARSAT 150-0231
Name of master:	Capt Mark Landow of Lamont-Doherty Earth Observatory (LDEO)
Number of crew:	20
Number of scientists on board:	20

4.2 Other craft in the project, including its use:
No

4.3 Particulars of methods and scientific instruments:		
Types of samples and measurements	Methods to be used	Instruments to be used
(1) Sea floor sediment. (2) Sediment pore water. (3) Water column water. Data collected will include major, minor and trace element analyses, isotopic analyses of stable radiogenic isotopes, nutrient analyses, sediment mineralogy, water carbonate chemistry.	(1) collected with multi-corer and MISO cameras. (2) Centrifugation, filtration. (3) Collected with Niskin Bottles, filtration. Solid samples (sediment) will be frozen for return to the lab. Liquid samples will be filtered and acidified (trace elements) or preserved by freezing (nutrients). Some liquid samples may be poisoned (azide) for carbonate chemistry.	Multicorer, MISO system. Centrifuge. Analyses done with quadrupole Inductivley Coupled Plasma Mass Spectrometer (ICP-MS), multi-collector ICP-MS, chromatography, nutrient analyzer, X-ray Diffraction, optical emission spectrometer.

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

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: 6/1/2024
Project End Date: 7/25/2024

6.2 Coastal State-specific details:	
Coastal Area	Iceland
Estimated Entry Date:	6/1/2024
Estimated Departure Date:	7/25/2024
Estimated Research Start Date:	6/1/2024
Estimated Research End Date:	7/25/2024
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:	TBD
Name, affiliation and contact information for all participants from Iceland:	N/A
Coastal Area	Greenland
Estimated Entry Date:	6/1/2024
Estimated Departure Date:	7/25/2024
Estimated Research Start Date:	6/1/2024
Estimated Research End Date:	7/25/2024
Explanation of multiple entries:	N/A
Research will be performed:	Between 12-200 nm
Extent to which Greenland will be enabled to participate or to be represented in the research project:	TBD
Name, affiliation and contact information for all participants from Greenland:	N/A

7. Port Calls

7.1 List of Port Calls				
Port	Arrival Date	End Date	Special Logistical Requirements	Shipping Agent
Reykjavik	7/21/2024	7/24/2024	None	TBD

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:
(1) Through publications and conferences/presentations. (2) Uploading to PANGEA database (https://www.pangaea.de/). (3) uploading to BCO-DMO database (https://www.bco-dmo.org/). The latter two where more appropriate.

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	Proposed Cruise Track	ProposedCruiseTrack.pdf	11/27/2023 5:32 PM
Additional Permit	Denmark- Required NOTIFICATION OF PROPOSED RESEARCH CRUISE Document	Notification-of-Proposed-Research-Cruise-mandatory-to-submit_BH_SH.docx	12/15/2023 6:36 PM

Executed: 12/18/2023 8:05:51 PM (Coordinated Universal Time)