UNITED KINGDOM RESEARCH AND INNOVATION

Application for Consent to conduct
Marine Scientific Research

ICELAND
Science & Port Call

Date: _15 January 2024_____

1. General Information

1.1 Cruise name and/or number:DY182

1.2 Sponsoring Institution(s):	
Name:	Royal Netherlands Institute for Sea Research (NIOZ)
Address:	Landsdiep 4, 1797 SZ, 't Horntje (Texel), the Netherlands
Name of Director:	Han Dolman

1.3 Principal Investigator in charge of the Project :	
Name:	Marieke Femke de Jong
Country:	Netherlands
Affiliation:	Royal Netherlands Institute for Sea Research (NIOZ)
Address:	Landsdiep 4, 1797 SZ, 't Horntje (Texel), the Netherlands
Telephone:	+31 222369411
Fax:	
Email:	Femke.de.jong@nioz.nl
Website (for CV and photo):	https://www.nioz.nl/en/about/organisation/staff/femke-de-jong

1.4 Entity(ies)/Participant(s) from Coastal State involved in the planning of the project:	
Name:	N/A
Affiliation:	
Address:	
Telephone:	
Fax:	
Email:	
Website (for CV and photo):	

2. Description of Project

2.1 Nature and objectives of the project:
This research is part of the Overturning in the Subpolar North Atlantic Program (OSNAP), an effort to determine the strength of the meridional overturning circulation and associated heat and freshwater fluxes in the subpolar North Atlantic. It is a collaborative program with scientists from several nations, including the U.K., the Netherlands, Germany, France, Canada, and China. Shiptime is shared between partners. This specific cruise will host both the NIOZ and the University of Miami (UoM) teams. The specific objectives of this cruise are as follows: - To perform mooring operations along the OSNAP East line between the Iceland and Irminger basins, including servicing (recovery and redeployment) of 12 current meter moorings (5 NIOZ and 7 UoM). - To conduct standard CTD (Conductivity-Temperature-Depth) and Lowered ADCP (Acoustic Doppler Current Profiler) stations at approximately 42 sites along the same mooring line. - To acquire continuous underway data (vessel-mounted ADCP data, meteorological data, and surface temperature and salinity data) along the cruise track, and to perform selected additional CTD stations along the cruise track.

2.2 If designated as part of a larger scale project, then provide the name of the project and the Organisation responsible for coordinating the project:
Overturning in the Subpolar North Atlantic Program (OSNAP). Subsections of the array are coordinated by the individual institutes. For this cruise this is NIOZ.

2.3 Relevant previous or future research projects:
The subarray that will be serviced during this cruise was previously part of the EU project NACLIM.

2.4 Previous publications relating to the project:
Fu, Y., Lozier, M. S., Biló, T. C., Bower, A. S., Cunningham, S. A., Cyr, F., ... & Yashayaev, I. (2023). Seasonality of the Meridional Overturning Circulation in the Subpolar North Atlantic. Communications Earth & Environment, 4(1), 181. Fried, N., & Femke de Jong, M. (2022). The role of the Irminger Current in the Irminger Sea northward transport variability. Journal of Geophysical Research: Oceans, e2021JC018188. Li, F., M.S. Lozier, S. Bacon, A. Bower, S.A. Cunningham, M.F. de Jong, B. DeYoung, N. Fraser, N. Fried, G. Han, N.P. Holliday, J. Holte, L. Houpert, M.E. Inall, W.E. Johns, S. Jones, C. Johnson, J. Karstensen, I.A. LeBras, P. Lherminier, X. Lin, H. Mercier, M. Oltmanns, A. Pacini, T. Petit, R.S. Pickart, D. Rayner, F. Straneo, V. Thierry, M. Visbeck, I. Yashayaev, C. Zhou. 2021. Subpolar North Atlantic western boundary density anomalies and the Meridional Overturning Circulation. Nat Commun 12, 3002 (2021). de Jong M. F., L. de Steur, N. Fried, R. Bol, and S. Kritsotalakis, 2020. Year-Round Measurements of the Irminger Current: Variability of a Two-Core Current System Observed in 2014–2016. JGR Oceans Koman, G., Johns, W. E., & Houk, A. (2020). Transport and evolution of the East Reykjanes Ridge Current. Journal of Geophysical Research: Oceans, 125, e2020JC016377. Lozier, M.S., F. Li, S. Bacon, F. Bahr, A.S. Bower, S.A. Cunningham, M.F. de Jong, L. de Steur, B. deYoung, J. Fischer, S.F. Gary, B.J.W. Greenan, N.P. Holliday, A. Houk, L. Houpert, M.E. Inall, W.E. Johns, H.L. Johnson, C. Johnson, J. Karstensen, G. Koman, I.A. Le Bras, X. Lin, N. Mackay, D.P. Marshall, H. Mercier, M. Oltmanns, R.S. Pickart, A.L. Ramsey, D. Rayner, F. Straneo, V. Thierry, D.J. Torres, R.G. Williams, C. Wilson, J. Yang, I. Yashayaev, and J. Zhao, 2019. A sea change in our view of overturning in the subpolar North Atlantic. Science, 363, 516-521.

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 cruise will start and end in Reykjavik, Iceland. From Reykjavik, we will steam southward to the OSNAP line. During the steam we will gather measurements with the automated underway shipboard measurement system (meteorology, surface water properties, vessel mounted current measurements). A hydrography CTD test cast will also be done on the first day of steam, which is likely still in Icelandic waters. Once at the OSNAP line, we will recover and redeploy the NIOZ and UoM moorings (positions below), and survey CTD stations between the easternmost OuM mooring (~25°W) and westernmost NIOZ mooring (~35°). If time allows we will continue CTDs westward along the OSNAP line to the central Irminger Sea up to ~39°W. Water samples may be taken on CTD station for lab analysis of salinity and oxygen for calibration of the CTD sensors. Additional sampling along the OSNAP line may be water samples from the CTD rosette for environmental DNA and contaminant analysis and vertical plankton net hauls in the upper 10-50m for taxonomic observations.

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Port of call: Reykjavik
64° 10' N 21° 55' W

Cruise tracks for underway data independent of stations
Reykjavik to D5 "proforma stations"
63° 8.40' N 22° 32.59' W
62° 6.78' N 23° 10.19' W
61° 5.18' N 23° 47.78' W
60° 3.57' N 24° 25.37' W
59° 1.96' N 25° 2.97' W

Westernmost CTD to Reykjavik "proforma stations"
60° 31.84' N 36° 53.36' W
61° 15.47' N 33° 53.69' W
61° 59.11' N 30° 54.02' W
62° 42.74' N 27° 54.34' W
63° 26.37' N 24° 54.67' W

NIOZ Mooring positions in the eastern Irminger Basin:
IC0 59° 13.02' N 35° 07.51' W 2930
IC1 59° 06.26' N 33° 41.20' W 2494
IC2 59° 01.29' N 32° 43.56' W 1873
IC3 58° 57.40' N 31° 57.08' W 1633
IC4 58° 53.38' N 31° 17.90' W 1471

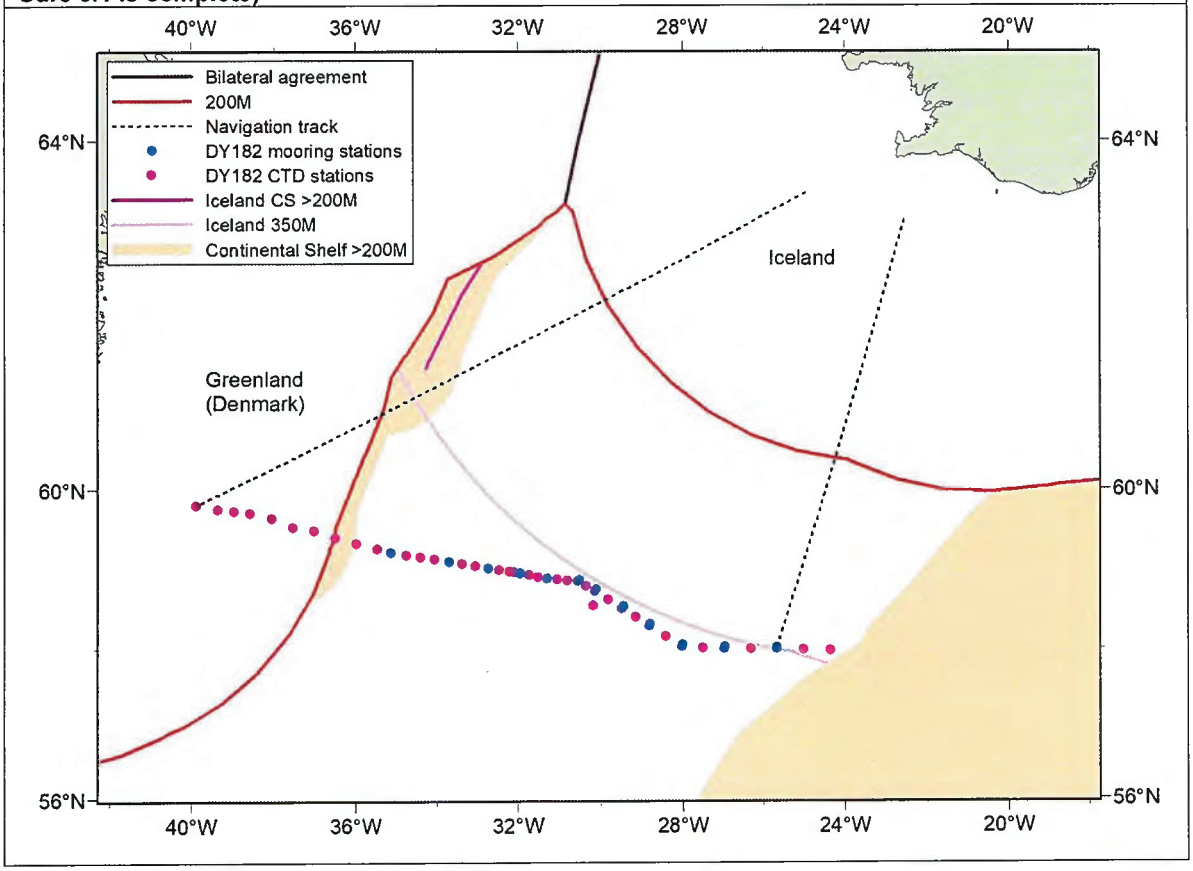
UoM Mooring positions in the Iceland Basin:
M1 58° 52.330' N 30° 31.765' W 1710
D1 58° 44.810' N 30° 07.040' W 1740
D2 58° 32.010' N 29° 27.580' W 2513
D3 58° 18.320' N 28° 49.060' W 2180
M2 58° 02.210' N 28° 01.130' W 2370
D4 58° 00.600' N 26° 58.120' W 2680
D5 58° 00.350' N 25° 40.560' W 2705

Preliminary CTD station positions [° ' N] [° ' W]

59 48.21	39 53.03
59 45.24	39 21.30
59 44.02	38 57.68
59 42.85	38 34.17
59 38.60	38 03.11
59 31.91	37 32.07
59 29.20	37 00.90
59 24.50	36 29.80
59 19.79	35 58.77
59 15.77	35 27.86
59 11.33	34 45.68
59 13.02	35 07.48
59 09.72	34 24.29
59 07.94	34 02.70
59 04.62	33 22.11
59 06.18	33 41.37
59 02.91	33 02.77
58 59.98	32 28.09
58 58.70	32 12.55
59 01.27	32 43.64
59 01.28	32 43.68
58 58.30	32 05.81
58 56.06	31 44.02
58 57.38	31 57.20
58 54.71	31 30.98
58 52.69	31 02.99
58 52.01	30 48.49
58 51.37	30 33.59
58 53.35	31 17.79

58 53.36	31 17.80
58 47.59	30 21.40
58 43.81	30 09.06
58 32.83	30 10.95
58 37.39	29 49.20
58 30.56	29 29.54
58 23.67	29 10.33
58 16.80	28 50.05
58 08.78	28 26.04
58 00.71	28 02.06
57 59.90	27 30.12
57 59.10	26 58.11
57 58.98	26 19.36
57 58.84	25 40.57
57 58.42	25 00.78
57 57.92	24 21.09

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. **(NB: make Sure 3.1 is complete)**



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4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	RRS Discovery
Type/Class:	Lloyds Register Lloyd's +100A1 Oceanographic Research Vessel, IWS, Ice Class 1D +LMC, UMS, DP(AM), Green Passport, Shipwright (SERS)
Nationality (Flag State):	British
Identification Number (IMO/Lloyds No.):	9588029
Owner:	United Kingdom Research & Innovation
Operator:	National Marine Facilities
Overall length (meters):	99.70 Metres
Maximum draft:	6.60 Metres
Displacement/Gross Tonnage:	Net Tonnage: 1785 Gross Tonnage: 5952
Propulsion:	Diesel Electric
Cruising & maximum speed:	12 Knots & 15 Knots Max Speed
Call sign:	2FGX5
INMARSAT number and method and capability of communication (including emergency frequencies):	773238856 – Voice 783255483 – Fax 423593533 – Sat C
Name of Master:	TBA
Number of Crew:	24
Number of Scientists on board:	30

4.2 Particulars of Aircraft:	
Name:	N/A
Make/Model:	
Nationality (flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall Length (meters):	
Propulsion:	
Cruising & Maximum speed:	
Registration No.:	
Call Sign:	
Method and capability of communication (including emergency frequencies):	
Name of Pilot:	
Number of crew:	
Number of scientists on board:	
Details of sensor packages:	
Other relevant information:	

4.3 Particulars of Autonomous Underwater Vehicle (AUV):	
Name:	N/A
Manufacturer and make/model:	
Nationality (Flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall length (meters):	
Displacement/Gross tonnage:	
Cruising & Maximum speed:	
Range/Endurance:	
Method and capability of communication	

(including emergency frequencies):	
Details of sensor packages:	
Other relevant information:	

4.4 Particulars of Unmanned Surface Vehicles (USV):	
Name:	N/A
Manufacturer and make/model:	
Nationality (Flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall length (meters):	
Displacement/Gross tonnage:	
Cruising & Maximum speed:	
Range/Endurance:	
Method and capability of communication (including emergency frequencies):	
Details of sensor packages:	
Other relevant information:	

4.5 Particulars of Unmanned Air Vehicles (UAV) :	
Name:	N/A
Make/Model:	
Nationality (flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall Length (meters):	
Propulsion:	
Cruising & Maximum speed:	
Registration No.:	
Call Sign:	
Method and capability of communication (including emergency frequencies):	
Name of Pilot:	
Number of crew:	
Number of scientists on board:	
Details of sensor packages:	
Other relevant information:	

4.6 other craft in the project, including its use:
N/A

4.7 Particulars of methods and scientific instruments:		
Types of samples and Measurements:	Methods to be used:	Instruments to be used:
Underway meteorology measurements	Automated measurements from sensors fitted on the meteorology mast of the vessel	Sensors measuring air temperature, humidity, wind speed and direction, air pressure, solar radiation
Underway current measurements	Automated measurement by an acoustic Doppler current profiler fitted underneath the vessel	75 kHz and 150 kHz ADCPs (acoustic Doppler current profiler)
CTD measurements	Hydrographic profile of the water column measured by a sensors lowered over the side of the vessel	CTD (conductivity, temperature, depth) sensor package. Water samples may be taken with Niskin bottles fitted on the CTD frame.
Underway sea surface measurements	Automated measurements on seawater intake	Sensors measuring temperature, salinity, fluorimeter, optical backscatter.

4.8 Indicate nature and quantity of substances to be released into the marine environment:
Not applicable

4.9 Indicate whether drilling will be carried out. If yes, please specify:
Not applicable

4.9.1 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:
Not applicable

5. Installations and Equipment

Details of installations and equipment (including dates of laying, servicing, method and Anticipated timeframe for recover, as far as possible exact locations and depth, and Measurements):
N/A

6. Dates

6.1 Expected dates of first entry into and final departure from the research area by the research vessel and/or other platforms:
First Entry: 02 – 11 Aug 2024 Last Entry: 18-27 Aug 2024
6.2 Indicate if multiple entries are expected:
Two entries, one at the start of the cruise and one at the end.

7. Port Calls

7.1 Dates and Names of intended ports of call:
Embarkation: 28th July - 02 August 2024, Reykjavik Iceland Disembarkation: 27th – 30th August 2024, Reykjavik Iceland

7.2 Any special logistical requirements at ports of call:
Loading and unloading of heavy equipment from containers onto the vessel.

7.3 Name/Address/Telephone of shipping agent (if available):
Nesskip HF Nesskip's House Austurstrond 1 172 Seltjarnarnes Reykjavik PC101 Tel: 00 354 5639900 Email: operations@nesskip.is

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:
N/A

8.2 Proposed dates and ports for embarkation/disembarkation:
Embarkation: 28th July - 02 August 2024, Reykjavik Iceland Disembarkation: 27th – 30th August 2024, Reykjavik Iceland

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:
The preliminary report will be available before end of February 2025

9.2 Anticipated dates of submission to the Coastal State of the final report **(This must be within 1 year of completion of the cruise)**
The final report will be available before end of August 2025

9.3 Proposed means for access by Coastal State to data (including formal) and samples as per BODC Weblink: **https://www.bodc.ac.uk/resources/inventories/cruiseinventory/search/**
Data will be available from the data centers of NIOZ and the University of Miami.

9.4 Proposed means to provide Coastal State with assessment of data, samples and Research results:
A first assessment of the data will be provided in the cruise report. Additional assessment is available on request.

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
Research is discussed in the International Council for the Exploration of the Sea (ICES) working group on ocean hydrography, of which our Icelandic colleagues are also part.

9.6 Proposed means of making results internationally available (to obtain cruise reports these Can be obtained via the BODC weblink see below:
All cruise reports related to the OSNAP project are available on the OSNAP project website at www.o-snap.org.