

NATURAL ENVIRONMENT RESEARCH COUNCIL

ANNEX A

Application for Consent to conduct Marine Scientific Research

ICELAND

Date: __25 November 2015_____

1. General Information

1.1 Cruise name and/or number:
DY054

1.2 Sponsoring Institution(s):	
Name:	National Oceanography Centre
Address:	European Way, Southampton, SO14 3ZH
Name of Director:	Ed Hill

1.3 Scientist in charge of the Project:	
Name:	Dr N. Penny Holliday
Country:	UK
Affiliation:	National Oceanography Centre
Address:	European Way, Southampton, SO14 3ZH
Telephone:	+44-23-8059-6206
Fax:	
Email:	penny.holliday@noc.ac.uk
Website (for CV and photo):	noc.ac.uk/people/nph

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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:
<p>This cruise is to service (recover and re-deploy) OSNAP moorings in the Irminger Sea and to complete a CTD section across the basin. There are 5 NOC moorings in the western basin, and 6 NIOZ moorings in the centre and east (NIOZ = Royal Netherlands Institute for Sea Research). All moorings were previously deployed in 2014 and 2015, and will be eventually recovered in 2018.</p> <p>The moorings and the CTD profiles will be used to measure the mean and variability of the surface-to-seafloor currents, and to compute the volume, heat and freshwater transport within the currents. They are part of a large international programme, OSNAP (Overturning in the Subpolar North Atlantic Programme) which has other moorings in the Labrador Sea, Iceland Basin and Rockall Trough. The other OSNAP moorings will be serviced on separate cruises in 2016 on UK (DY053) and US ships.</p> <p>The moorings and CTDs are outside of Icelandic Waters, but we will collect underway measurements of the surface water and meteorology en route from the port of Reykjavic to the westernmost CTD station in the Irminger Sea working site.</p>

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 (OSNAP), international coordination by Susan Lozier, Duke University, USA, and UK coordination by Penny Holliday,

2.3 Relevant previous or future research projects:
N/A

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2.4 Previous publications relating to the project:

Williams, R.G., V. Roussenov, M.S. Lozier, D. Smith (2015). Mechanisms of heat content and thermocline change in the subtropical and subpolar North Atlantic. *J. Climate*, 10.1175/JCLI-D-15-0097.1

Holliday, N. P., S. A. Cunningham, C. Johnson, S. Gary, C. Griffiths, J. F. Read, and T. Sherwin (2015), Multi-decadal variability of potential temperature, salinity and transport in the eastern subpolar North Atlantic, *J. Geophys. Res. - Oceans*, 10.1002/2015JC010762.

Sherwin, T. J., Aleynik, D. L., Inall, M. E. & Dumont, E. (2015) Deep drivers of mesoscale circulation in the central Rockall Trough. *Ocean Science*, doi:10.5194/os-11-343-2015

Cunningham, S. A., C. D. Roberts, E. Frajka-Williams, W. E. Johns, W. Hobbs, M. Palmer, D. Rayner, D. A. Smeed, and G. McCarthy (2013), Atlantic Meridional Overturning Circulation slowdown causes widespread cooling in the Atlantic, *Geophys. Res. Letters*, 40, 6202-6207, doi:10.1002/2013GL058464.

Johnson, C., M. Inall, and S. Häkkinen (2013), Declining nutrient concentrations in the northeast Atlantic as a result of a weakening Subpolar Gyre, *Deep Sea Research I*, 82, 95-107.

Marzocchi, A., J. Hirschi, J.-M. N. P. Holliday, S. A. Cunningham, A. T. Blaker, and A. C. Coward (2015), The North Atlantic subpolar circulation in an eddy-resolving global ocean model, *Journal of Marine Systems*, 142, 126-143, doi:10.1016/j.jmarsys.2014.10.007.

Williams et al, 2014. Decadal evolution of ocean thermal anomalies in the North Atlantic: the effects of Ekman, overturning, and horizontal transport. *Journal of Climate*, 27, 2, 698-719.

3. Geographical Areas

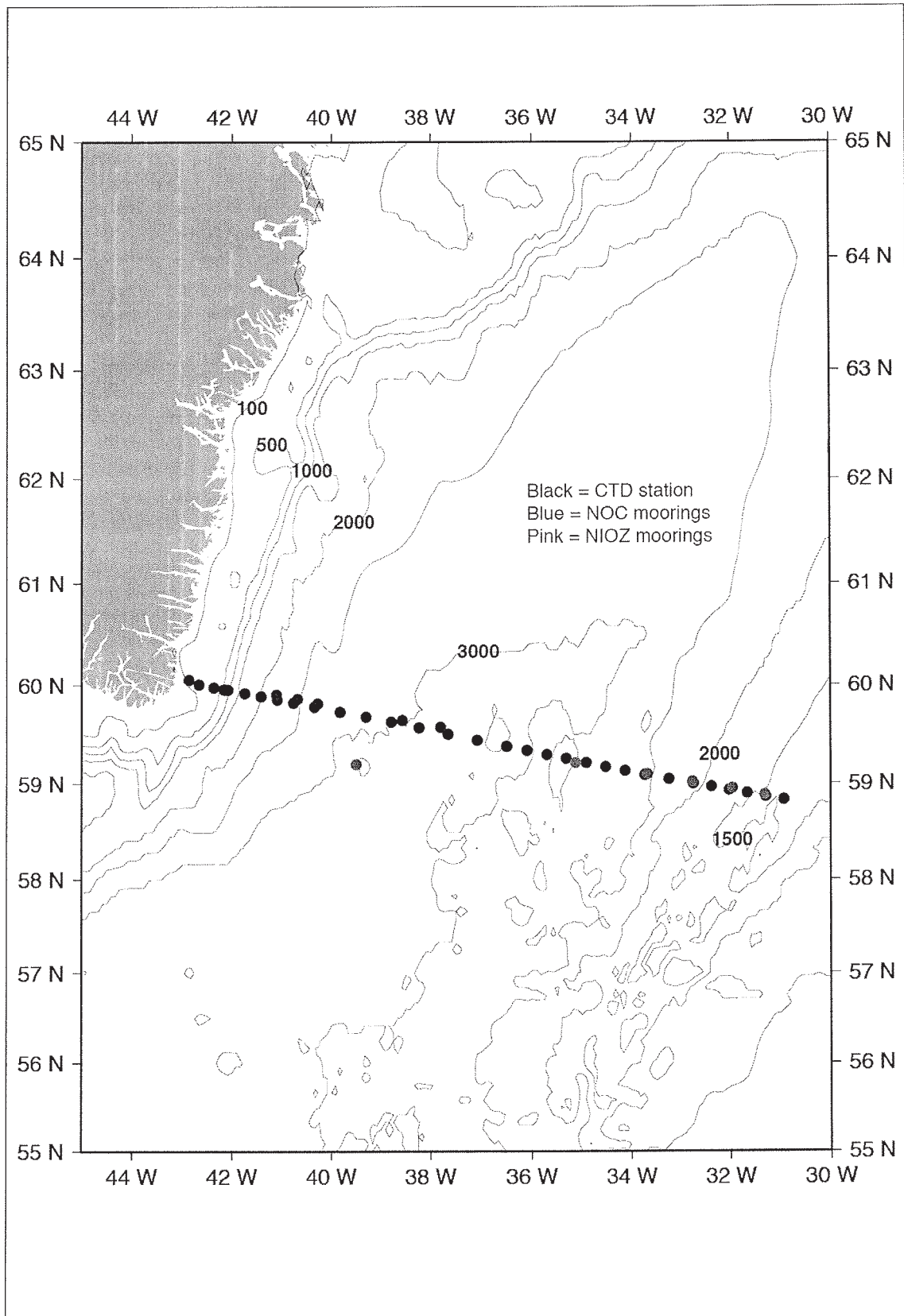
3.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude, including coordinates of cruise track/way points).

Underway data will be collected from

The CTD and mooring working area is the Irminger Sea, along the OSNAP line from 62.5 N 30.5W (on the East Greenland Shelf), to 58.8N 30.95W (over the Reykjanes Ridge).

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.

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4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	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:	Natural Environmental Research Council
Operator:	National Marine Facilities Sea Systems
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):	00870773238856 (Voice) 00870783255483 (Fax) 0580 42359533 (Sat C)
Name of Master:	TBA
Number of Crew:	24
Number of Scientists on board:	28

4.2 Particulars of Aircraft:	
Name:	N/A
Make/Model:	
Nationality (flag State):	
Website for diagram & Specifications:	
Owner:	
Operator:	
Overall Length (meters):	

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

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4.5 Particulars of methods and scientific instruments:		
Types of samples and measurements:	Methods to be used:	Instruments to be used:
Water properties including temperature, salinity, velocity	CTD profiling package, moorings	SeaBird CTD and water rosette system plus RDI LADCP system. On moorings: microcats (CTDs) current meters and ADCPs
Underway sampling	Acoustic, atmospheric and sea surface water sampling	ADCPs, echo sounders, thermosalinograph, Met package.

4.6 Indicate nature and quantity of substances to be released into the marine environment:
None

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

4.8 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

5. Installations and Equipment

5.1 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):												
<p>The NOC and NIOZ moorings were laid in August 2015 from the RV Pelagia (NIOZ). On this cruise they will be recovered and re-deployed for two years: all will be recovered in summer 2018. The moorings have fixed depth microcats (CTDs), current meters and ADCPs. All have their uppermost buoyancy at least 50m below the surface.</p> <p>The NOC moorings are at the following locations:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">M1</td> <td style="width: 20%;">59.9030</td> <td style="width: 20%;">-41.1118</td> </tr> <tr> <td>M2</td> <td>59.8591</td> <td>-40.6889</td> </tr> <tr> <td>M3</td> <td>59.8148</td> <td>-40.2765</td> </tr> <tr> <td>M4</td> <td>59.6466</td> <td>-38.5657</td> </tr> </table>	M1	59.9030	-41.1118	M2	59.8591	-40.6889	M3	59.8148	-40.2765	M4	59.6466	-38.5657
M1	59.9030	-41.1118										
M2	59.8591	-40.6889										
M3	59.8148	-40.2765										
M4	59.6466	-38.5657										

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M5	59.5772	-37.7992
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The NIOZ moorings are at the following locations:

IC0	59.2165	-35.1258
IC1	59.0988	-33.6822
IC2	59.0205	-32.7675
IC3	58.9555	-31.9590
IC4	58.8853	-31.3030
LOCO	59.2008	-39.5040

More details are at <http://www.o-snap.org/observations/instrumentation/>

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: 25th July 2016

Final Entry: 20th August 2016

6.2 Indicate if multiple entries are expected:

N/A

7. Port calls

7.1 Dates and Names of intended ports of call:

Reykjavik, Iceland 23rd – 27th July 2016

7.2 Any special logistical requirements at ports of call:

N/A

7.3 Name/Address/Telephone of shipping agent (if available):

Nesskip H.F
Nesskip's House
Austurstrond 1
172 Seltjarnarnes
REYKJAVIK
PC101

Tel: 00354 5639900 Fax: 00354 5639919 Contact: Gisli Thrastarson operations@nesskip.is

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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:

Embark: Reykjavic, Iceland 23rd - 27th July 2016

Disembark: Southampton, UK 17th 21st August 2016

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:

One month after the end of the cruise

9.2 Anticipated dates of submission to the coastal State of the final report:

Six months after the end of the cruise

9.3 Proposed means for access by coastal State to data (including format) and samples:

Data will be available through the British Oceanographic Data Centre (www.bodc.ac.uk)

9.4 Proposed means to provide coastal State with assessment of data, samples and research results:

Final data will be available through BODC.
Scientific results will be published in refereed journals

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples and research results:

N/A

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9.6 Proposed means of making results internationally available:

Final data will be available through BODC.
Scientific results will be published in refereed journals

10. Other permits submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or pending):

N/A

11. List of supporting documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:

N/A

Signature:

Contact information of the focal point:

Name: Penny Holliday

Country: UK

Affiliation: NOC

Address: European Way, Empress Dock, Southampton, SO14 3ZH

Telephone: 02380 596206

Email: penny.holliday@noc.ac.uk