

UNITED KINGDOM RESEARCH AND INNOVATION

Application for Consent to conduct Marine Scientific Research Iceland

Date: 7th September 2021

1. General Information

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| 1.1 Cruise name and/or number: |
| HECLA Iceland (DY140) |

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| 1.2 Sponsoring Institution(s): | |
| Name: | National Oceanographic Centre |
| Address: | European Way Southampton SO14 3ZH |
| Name of Director: | Prof. Ed Hill |

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| 1.3 Principal Investigator in charge of the Project : | |
| Name: | Dr. Phil Bagley |
| Country: | United Kingdom |
| Affiliation: | National Oceanographic Centre |
| Address: | European Way Southampton SO14 3ZH |
| Telephone: | +44(0) 23 8059 6371 |
| Fax: | |
| Email: | phil.bagley@noc.ac.uk |
| Website (for CV and photo): | https://www.noc.ac.uk/people/philba |

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| 1.4 Entity(ies)/Participant(s) from Coastal State involved in the planning of the project: | |
| Name: | Andreas Macrander |
| Affiliation: | Hafrannsóknastofnun / Marine and Freshwater Research Institute |
| Address: | Fornubúðum 5, 220 Hafnarfjörður, Ísland |
| Telephone: | Sími/Tel: +354 575 2062 GSM: +354 865 98 49 |
| Fax: | |
| Email: | andreas.macrander@hafogvatn.is |
| Website (for CV and photo): | www.hafogvatn.is |

2. Description of Project

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| 2.1 Nature and objectives of the project: |
| HECLA is coordinated by the National Oceanography Centre (NOC) and this trial will use one submarine gliders to follow scientific sampling lines in Icelandic, Faroes and UK waters to collect CTD (Conductivity, Temperature, Depth) data. |
| The overall objective of the HECLA project is to demonstrate how near real time oceanographic data from submersible gliders can be used to feed into ocean forecasting models, and to advance near real time data gathering. |
| The scientific work will be undertaken in partnership with Dstl (Defence Science and Technology Laboratory), the UK Met Office, the British Oceanographic Data Centre (BODC), and the Royal Navy. |
| The submersible gliders will be deployed and recovered from the UK. |

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| 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: |
| N/A |

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2.3 Relevant previous or future research projects:

Following on from the successful MASSMO project where multiple Marine Autonomous Systems (MAS) demonstrated the effectiveness of MAS for offshore data collection, the HECLA project aims to build on this success to operationalise the flow of ocean data obtained from gliders into ocean forecasting models (AMM15).

This trial is a follow on from the previous HECLA glider mission (still operational at time of writing) and was not initially planned, but due to the success of this mission and the ability of the glider to navigate in these difficult waters this further glider mission is requested.

2.4 Previous publications relating to the project:

Suberg, L., **Wynn, R.B.**, van der Kooij, J., Fernand, L., Fielding, S., Guihen, D., Gillespie, D., Johnson, M., Gkikopoulou, K.C., Allan, I.J., Vrana, B., Miller, P.I., Smeed, D. and Jones, A.R. (2014) Assessing the potential of autonomous submarine gliders for ecosystem monitoring across multiple trophic levels (plankton to cetaceans) in shallow shelf seas. *Methods in Oceanography*, 10, 70-89.

<http://projects.noc.ac.uk/massmo/>

See also:

<http://www.bbc.co.uk/news/science-environment-29464273>

<http://www.bbc.co.uk/news/uk-scotland-highlands-islands-37822097>

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 glider will attempt to follow the waypoints shown below. As the previous glider mission has shown the glider is very slow moving and can navigate in these waters, but is affected by currents, tides and occasionally can be caught in Eddy currents. As with the previous HECLA submersible glider mission our aim is follow the mission path as described but the glider may be several nautical miles off course at times.

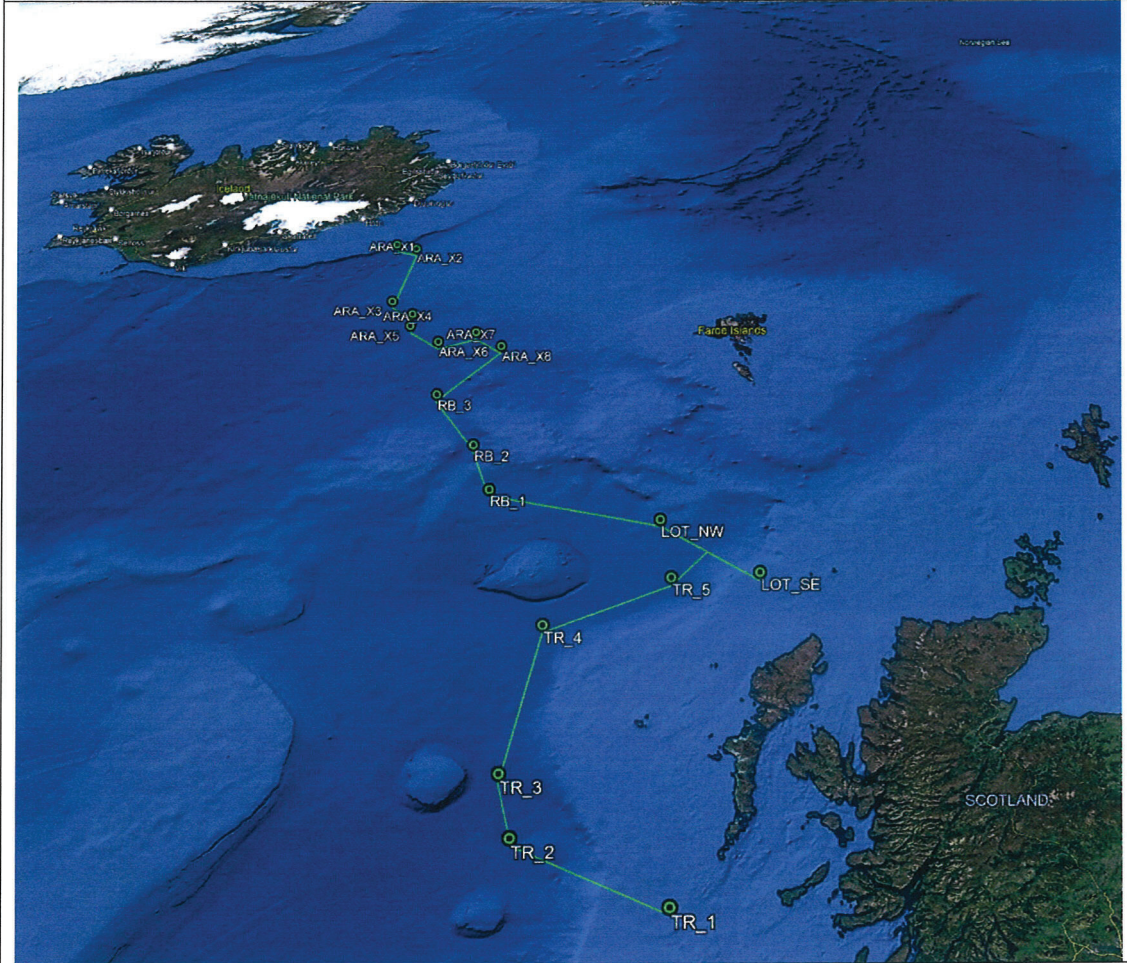
However, the glider will aim to follow the general mission path described by the following waypoints. Please note the aim of the mission is to start at TR_1 and work through the way points to ARA_X1, and then return by the same route for recovery in UK waters at TR_1:

| Waypoint | Latitude | Longitude |
|----------|--------------|--------------|
| TR_1 | 56° 23.620'N | 8° 13.211'W |
| TR_2 | 56° 53.943'N | 10° 3.712'W |
| TR_3 | 57° 22.654'N | 10° 16.614'W |
| TR_4 | 58° 37.190'N | 9° 55.134'W |
| TR_5 | 59° 2.469'N | 8° 9.056'W |
| LOT_SE | 59° 3.660'N | 6° 53.191'W |
| LOT_NW | 59° 38.430'N | 8° 18.373'W |
| RB_1 | 60° 1.256'N | 10° 59.164'W |
| RB_2 | 60° 33.376'N | 11° 23.157'W |
| RB_3 | 61° 13.105'N | 12° 13.359'W |
| ARA_X8 | 61° 53.256'N | 11° 15.785'W |
| ARA_X7 | 62° 6.318'N | 11° 48.386'W |
| ARA_X6 | 61° 58.516'N | 12° 28.860'W |
| ARA_X5 | 62° 13.621'N | 13° 6.638'W |
| ARA_X4 | 62° 24.769'N | 13° 8.985'W |
| ARA_X3 | 62° 37.674'N | 13° 38.912'W |
| ARA_X2 | 63° 33.384'N | 13° 35.894'W |
| ARA_X1 | 63° 38.604'N | 14° 4.214'W |

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**

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Sure 3.1 is complete)



4. Methods and means to be used

4.1 Particulars of vessel:

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| Name: | None Being Used. The intent is to launch and recover the marine autonomous platforms from Isle of Lewis and recover in the Shetland Islands |
| Type/Class: | |
| Nationality (Flag State): | |
| Identification Number (IMO/Lloyds No.): | |
| Owner: | |
| Operator: | |
| Overall length (meters): | |
| Maximum draft: | |
| Displacement/Gross Tonnage: | |
| Propulsion: | |
| Cruising & maximum speed: | |
| Call sign: | |
| INMARSAT number and method and capability of communication (including emergency frequencies): | |
| Name of Master: | |
| Number of Crew: | |
| Number of Scientists on board: | |

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| 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: | Underwater Glider |
| Manufacturer and make/model: | Teledyne Webb Slocum |
| Nationality (Flag State): | UK |
| Website for diagram & Specifications: | http://www.teledynemarine.com/slocum-glider/?BrandID=23 |
| Owner: | Royal Navy |
| Operator: | NOC |
| Overall length (meters): | 2.0 |
| Displacement/Gross tonnage: | 55kg |
| Cruising & Maximum speed: | 0.5 knots |
| Range/Endurance: | 6 months |
| Method and capability of communication (including emergency frequencies): | Iridium satellite comms, ARGOS Telesonar modem |
| Details of sensor packages: | Conductivity, temperature, depth, fluorescence (Chlorophyll, backscatter, CDOM) |
| Other relevant information: | Depth 0-1000 m, navigation by GPS, altimeter and dead reckoning. Contains lithium batteries |

| 4.4 Particulars of Unmanned Surface Vehicles (USV): | |
|---|-----|
| Name: | |
| Manufacturer and make/model: | N/A |
| 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: | |

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| 4.5 Particulars of Unmanned Air Vehicles (UAV) : | |
| Name: | |
| Make/Model: | N/A |
| 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: | |

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| 4.6 other craft in the project, including its use: |
| NONE |

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| 4.7 Particulars of methods and scientific instruments: | | |
| Types of samples and Measurements: | Methods to be used: | Instruments to be used: |
| Temperature, salinity, and fluorescence | Continuous measurement from sensors mounted on the surface and submarine gliders | Continuously recording conductivity, temperature depth probe (CTD) and fluorescence sensors |

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| 4.8 Indicate nature and quantity of substances to be released into the marine environment: |
| N/A |

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| 4.9 Indicate whether drilling will be carried out. If yes, please specify: |
| No |

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| 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: |
| No |

5. Installations and Equipment

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| 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

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| 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: 15 February 2022 Final Entry: 15 July 2022 |
| 6.2 Indicate if multiple entries are expected: |
| No |

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7. Port Calls

7.1 Dates and Names of intended ports of call:

N/A

7.2 Any special logistical requirements at ports of call:

N/A

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

N/A

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:

N/A

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:

30 Jan 2023

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**)

31 March 2023

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/>

All HECLA raw and calibrated data will be accessible from the British Oceanographic Data Centre (BODC).

9.4 Proposed means to provide Coastal State with assessment of data, samples and Research results:

In addition to data being held at BODC (see above), results will be published in scientific papers/reports and presented at national and international fora.

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

In addition to data being held at BODC (see above), results will be published in scientific papers/reports and presented at national and international fora

9.6 Proposed means of making results internationally available (to obtain cruise reports these Can be obtained via the BODC weblink see below:

In addition to data being held at BODC (see above), results will be published in scientific papers/reports and presented at national and international fora

10. Other permits Submitted

10.1 Indicate other types of Coastal State permits anticipated for this research (received or Pending):

N/A

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11. List of Supporting Documentation

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| 11.1 List of attachments, such as additional forms required by the Coastal State, etc.: |
| N/A |

Signature:



Contact information of the focal point: See Section 1.3 above

Name:

Country:

Affiliation:

Address:

Telephone:

Email:

UPLOAD YOUR FINAL CRUISE REPORT: https://www.bodc.ac.uk/resources/inventories/cruise_inventory/search/

SEND YOUR FINAL CRUISE REPORT: msrapplications@fco.gov.uk

