Application for Consent to conduct
Marine Scientific Research

Date: _3/3/2014__

1. General Information

1.1 Cruise name and/or number:
CV14007 “The collapse of the Irish Ice Sheet in the Celtic Sea sector and its marine habitat legacy”

1.2 Sponsoring Institution(s):	
Name:	Marine Institute
Address:	Rinville, Oranmore, Co. Galway
Name of Director:	Dr. Peter Heffernan

1.3 Scientist in charge of the Project:	
Name:	Dr Sara Benetti
Country:	UK
Affiliation:	University of Ulster
Address:	Cromore Road, Coleraine, BT52 1SA Northern Ireland
Telephone:	00442870123113
Fax:	
Email:	s.benetti@ulster.ac.uk
Website (for CV and photo):	http://www.science.ulster.ac.uk/esri/Dr-Sara-Benetti.html#page=background

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	Dr Katrien Van Landeghem/ Prof James Scourse
Affiliation:	Bangor University
Address:	School of Ocean Sciences, Bangor University, Menai Bridge, Anglesey, LL59 5AB, UK
Telephone:	0044 (0) 1248388161 (KVL) 0044 (0) 1248382876 (JS)
Fax:	
Email:	k.v.landeghem@bangor.ac.uk (KVL) oss011@bangor.ac.uk (JS)
Website (for CV and photo):	http://www.bangor.ac.uk/oceansciences/staff/php/stafflist1.php?jobgroup=Academic

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	Prof Colm Ó Cofaigh
Affiliation:	Durham University
Address:	Department of Geography, Durham University Science Site, South Road, Durham, DH1 3LE, UK
Telephone:	0044 (0) 1913341890
Fax:	
Email:	colm.ocofaigh@durham.ac.uk
Website (for CV and photo):	http://www.dur.ac.uk/geography/staff/geogstaffhidden/?id=1008

2. Description of Project

2.1 Nature and objectives of the project:

The overall scientific goal of this research cruise is to determine the role of glaciation on the past and present landscapes of the Celtic Sea focusing in particular on the relationship between glacial history and contemporary seafloor properties and ecosystems.

A ship time grant has been awarded to the University of Ulster by the Marine Institute of Ireland for 12 days on the Celtic Voyager, during which we will investigate a large area of the Celtic Sea, across Irish and UK waters, using geophysics and sediment sampling for 12 days. Specific objectives include:

- To determine the sub-seabed stratigraphy with unprecedented high resolution in the top 20m of the Celtic Sea substrate by acquisition of boomer and/or sparker data in order to investigate the nature of the large linear sand ridges on the floor of the Celtic Sea. These have been variously interpreted as a product of either subglacial melwater or tidal reworking (Praeg et al., 2010 and 2013 vs. Scourse et al., 2009b – refs in 2.4), but a fundamental impediment to resolving this has been the lack of detailed high-resolution data from these features. Our proposed research directly addresses this and additionally will provide data on the marine habitats they provide.

- To collect information on the contemporary seafloor morphology, sedimentary properties and associations of benthic fauna and bottom water properties in the region through the acquisition of multibeam data and seafloor samples (i.e. grabs). This area is of particular interest for example for Nephrops fisheries (Gerritsen & Lordan, 2011) and the data will improve the knowledge of general habitat potential in the survey area.

- To investigate the morpho-sedimentary legacy of ice extent and retreat on subsequent postglacial sediment deposition centres and associated ecosystems in order to assess the impact of past glaciation on ecosystem development. A direct deliverable of this objective will be the production of large scale base maps showing the relationship between present-day habitats and ice sheet dynamics.

- To conduct day-light marine mammal observations (as required during any seismic acquisition). These data will also increase the dataset of sightings in the area and will aid towards preparations of Strategic Environmental Assessments in the Celtic Sea (Hammond et al., 2008).

- To provide experience for undergraduate and postgraduate students aboard, increasing their knowledge of sea going operations and survey methods.

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:

The data acquired during this survey will contribute to the planning of the upcoming cruise in July-August 2014 on board the UK RV James Cook for the project BRITICE-CHRONO. This project is led by Prof Chris Clark at Sheffield University. All of the UK participants on this Celtic Voyager cruise are co-investigators of the BRITICE-CHRONO project and will also take part in the James Cook cruise in the summer.

2.3 Relevant previous or future research projects:

2013-ongoing *"Paleoenvironments and sediment distribution west of Ireland"* with Durham University, National University of Ireland Maynooth, and Marine Institute of Ireland funded partly by Irish National Development Plan through ship time.
2013-2018 NERC-funded Consortium "BRITICE-CHRONO: Constraining rates and style of marine-influenced ice sheet decay" led by University of Sheffield
2013-2017 FP7-funded Marie Curie Initial Training Network *"GLANAM (Glaciated North Atlantic Margins)"* with Universities of Bergen, Tromso, Svalbard, and Durham, Scottish Association for Marine Science, North Energy, Denmark and Greenland Geological Survey, STATOIL, Volcanic Basin Petroleum Research.
2011 "Gateways I" with National University of Ireland Maynooth, Trinity College Dublin, Geological Survey of Ireland, University College Cork, Osservatorio Geofisico Sperimentale (Italy) funded by Irish National Development Plan as ship time.

2.4 Previous publications relating to the project:

Clark, C. D., Hughes, A. L., Greenwood, S. L., Jordan, C., & Sejrup, H. P. (2012). Pattern and timing of retreat of the last British-Irish Ice Sheet. Quaternary Science Reviews. 44, 112-146.

Chiverrell, R.C., Thrasher, I.M., Thomas, G.S.P., Lang, A.,Scourse, J.D., Van Landeghem, K.J.J., McCarroll, D., Clark, C.D., Ó Cofaigh, C., Evans, D.J.A., and Ballantyne, C.K. (2013). Bayesian modelling the retreat of the Irish Sea Ice Stream. Journal of Quaternary Science, v. 28, p. 200-209.

Gerritsen, H, and Lordan, C. 2011. Integrating vessel monitoring systems (VMS) data with daily catch data from logbooks to explore the spatial distribution of catch and effort at high resolution. ICES Journal of Marine Science: Journal du Conseil 68 (1), 245-252

Haapaniemi, A.I., Scourse, J.D., Peck, V.L., Kennedy, D.P., Kennedy, H., Hemming, S.R., Furze, M.F.A., Pieńkowski-Furze, A.J., Walden, J., Wadsworth, E. & Hall, I.R. 2010. Source, timing, frequency and flux of ice-rafted detritus to the Northeast Atlantic margin, 30-12 ka: testing the Heinrich precursor hypothesis. Boreas 39, 576-591

Hammond, P.S., S.P. Northridge, D. Thompson, J.C.D. Gordon, A.J. Hall, S.N. Murphy & C.B. Embling (2008) Background information on marine mammals for Strategic Environmental Assessment 8. Document produced as part of the UK Department of Energy and Climate Change's. Crown Copyright. Offshore Energy Strategic Environmental Assessment programme

Hiemstra, J. F., Evans, D. J. A., Scourse, J. D., McCarroll, D., Furze, M. F. A. & Rhodses, E. 2006: New evidence for a grounded Irish Sea glaciation of the Isles of Scilly, UK. Quaternary Science Reviews 25, 299–309

McCarroll, D., Stone, J., Ballantyne, C.K., Scourse, J.D., Fifield, L.K., Evans, D.J.A. & Hiemstra, J.F. 2010. Exposure-age constraints on the extent, timing and rate of retreat of the last Irish Sea ice stream. Quaternary Science Reviews 29, 1844-1852.

Ó Cofaigh, C. & Evans, D.J.A. 2007. Radiocarbon constraints on the age of the maximum advance of the British-Irish Ice Sheet in the Celtic Sea. Quaternary Science Reviews 26: 1197-1203.

Praeg D., McCarron S., Goldsberry P., Stoker M. and GLAMAR RIDGES cruise participants (2010). GLAMRour RIDGES: exploring glacial landscapes in the Celtic Sea. Presentation at Geoscience 2010, 3-4 Nov. in Dublin Castle (Ireland).

Praeg, D., McCarrron, S., Dove, D., Accettella, D., Clarke, C., Cova, A., Romeo, R. Scott, G. (2013) Submarine glacial geomorphology of the Irish-UK Celtic Sea: results from the GLAMAR and GATEWAYS campaigns Geophysical Research Abstracts Vol. 15, EGU2013-10943, 2013. EGU General Assembly 2013

Rees, H. L., Pendle, M. A., Waldock, R., Limpenny, D. S., and Boyd, S. E. 1999. A comparison of benthic biodiversity in the North Sea, English Channel, and Celtic Seas. ICES Journal of Marine Science 56, 228–246

Reid J., Evans P.G.H. and Northridge,S. (Eds). 2003. An atlas of cetacean distribution on the northwest European continental shelf. Joint Nature Conservation Committee, Peterborough.

Roberts, D. H., Dackombe, R. V. & Thomas, G. S. P. 2007: Palaeoice streaming in the central sector of the British and Irish Ice Sheet during the Last Glacial Maximum: Evidence from the northern Irish Sea Basin. Boreas 36, 115–129

Scourse, J. D. and Furze, M. F. A. 2001. A critical review of the glaciomarine model for Irish Sea deglaciation: evidence from southern Britain, the Celtic shelf and adjacent continental shelf. Journal of Quaternary Science 16, 419–434

Scourse, J.D. 2013. Quaternary sea level and palaeotidal changes: a review of impacts on, and responses of, the marine biosphere. Oceanography and Marine Biology: An Annual Review 51, 1-70.

Scourse, J.D., Haapaniemi, A.I., Colmenero-Hidalgo, E., Peck, V.L., Hall, I.R., Austin, W.E.N., Knutz, P.C. & Zahn, R. 2009a. Growth, dynamics, and deglaciation of the last British-Irish Ice Sheet: the deep-sea ice-rafted detritus record. Quaternary Science Reviews 28, 3066-3084,

Scourse, J.D., Uehara, K. & Wainwright, A. 2009b. Celtic Sea linear tidal sand ridges, the Irish Sea Ice Stream and the Fleuve Manche: palaeotidal modelling of a transitional passive margin depositional system. Marine Geology 259, 102–111.

Stokes, C. R. & Clark, C. D. 2002: Are long subglacial bedforms indicative of fast ice flow? Boreas 31, 239–249.

3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in

Latitude and longitude in decimal degrees, including coordinates of cruise/track/way points/sampling stations). Please provide coordinates in a separate excel spreadsheet.

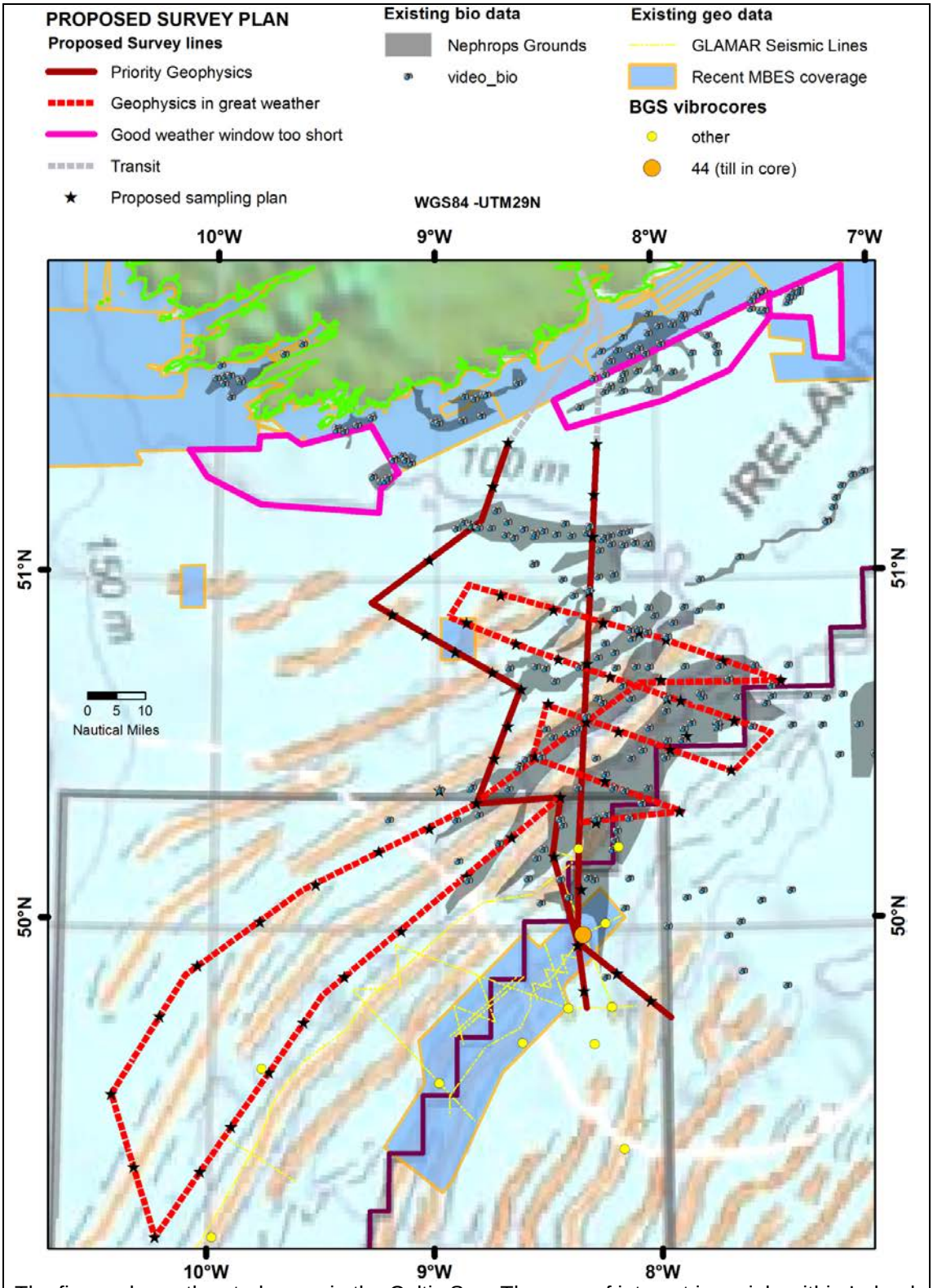
Celtic Sea in the box 51.3777ºN and 49.0852 ºN; 10.4272ºW and 7.4301ºW. Specific distribution of track lines in Sect. 3.2. Two possible plans are included.

(1) A priority plan (full dark red lines) to be undertaken if time is limited due to weather down time. This plan includes one entry in UK waters with two transects and 5 sediment samples.
(2) A fair weather plan (dashed red track lines), which would be added to the priority plan and allow better coverage of the area of interest. This plan includes two additional entries and 3 sediment samples in UK waters in order to cross several of the ridges under investigation.

Coordinates of proposed sediment sample locations are provided in a separate sheet.

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.



The figure shows the study area in the Celtic Sea. The area of interest in mainly within Ireland territorial waters with some of the tracklines (in red) extending in UK waters to achieve better and increased coverage of the ridges to be investigate.
Locations of expected seafloor samples for sediment grain size and benthic faunal studies and indicated by the stars and are located mostly between 100 and 150 m water depth.

NOTE: Step-like purple line is the boundary between UK and Irish waters.

4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	R.V. Celtic Voyager
Type/Class:	100 A1 Research Vessel, LMC
Nationality (Flag State):	Irish
Identification Number (IMO/Lloyds No.):	
Owner:	Marine Institute
Operator:	P&O Maritime Services
Overall length (meters):	31.4
Maximum draught:	4m
Displacement/Gross Tonnage:	340
Propulsion:	Wärtsilä UD25M5 (626 kW),
Cruising & maximum speed:	<= 10 knots
Call sign:	EIQN
INMARSAT number and method and capability of communication (including emergency frequencies):	GMDSS A class, E-mail. Mini M SAT C and GSM 00 353 91 423396/ 00870 763066755 00870-764687325 / 764687326
Name of Master:	Philip Baugh/Colin McBrearty
Number of Crew:	7
Number of Scientists on board:	8 max

4.2 Particulars of Aircraft:	
Name:	NA
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:	NA
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:
NA

4.5 Particulars of methods and full description of scientific instruments to be used(for fishing gear specify type and dimension)		
Types of samples and Measurements:	Methods to be used:	Instruments to be used:
Acoustic survey	Hull mounted acoustic survey equipment.	Multibeam sonar (EM2040) and Pinger (SES 5000)
Sediment samples (for grain size and benthic fauna analyses)	Grab samples	Day Grab, Shipek Grab
Water properties	Vessel sampling equipment	CTD and SVP
Seismic survey	Sparker and Chirp systems	Towed Geo-Source 200-400 Side-mounted SES-2000 medium

4.6 Indicate nature and quantity of substances to be released into the marine environment:
No substances will be released into the marine environment.

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

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 explosives will be used.

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):
NA

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:
Depending on weather conditions, the survey lines are expected to cross into UK waters several times during the duration of the cruise (5/5/2014 to 16/5/2014), as it can be seen in Sect. 3.2 – red dashed and filled lines)
6.2 Indicate if multiple entries are expected:
As above

7. Port Calls

7.1 Dates and Names of intended ports of call:
No port calls are expected during the cruise expect in case of bad weather conditions. In such case, the expected port will be Cork in the Republic of Ireland.

7.2 Any special logistical requirements at ports of call:
NA

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

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:
Chief scientist and most of the cruise participants are UK-based.

8.2 Proposed dates and ports for embarkation/disembarkation:
Embarkation: Cork 5/5/2014; Disembarkation: Cork 16/5/2014

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 end of May/June 2014. A specific MMO report can be produced on request of the coastal State.

9.2 Anticipated dates of submission to the coastal State of the final report:
The final report will be available in summer 2014.

9.3 Proposed means for access by coastal State to data (including format) and samples:
Chief scientist and other UK participants involved in the research will have immediate access to data and samples. Acoustic data and samples will be stored at University of Ulster and will be available upon request.

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:
The data collected as part of this scientific investigation will provide the basis for papers in peer-reviewed marine science journals. Data will also be made available to Government Agencies if requested.

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
Assistance in interpretation of geophysical and sedimentological data will be provided by research scientists at Universities of Ulster, Durham and Bangor (UK). Additional information on the marine mammal observation data can be provided by co-investigator Dr Simon Berrow from GMIT (Galway Mayo Institute of Technology – Republic of Ireland) and the National Park and Wildlife Service of Ireland

9.6 Proposed means of making results internationally available:
Intention to publish results in marine science journals.

10. Other permits Submitted

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

None

11. List of Supporting Documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:
None

Signature: 

Contact information of the focal point:
Name: Dr Sara Benetti
Country: UK
Affiliation: University of Ulster
Address: School of Environmental Sciences, Cromore Road, Coleraine, BT52 1SA
Telephone: 028 70123113
Fax:
Email: s.benetti@ulster.ac.uk