Application for Consent to conduct
Marine Scientific Research

Date: 06.12.2018_____

1. General Information

1.1 Cruise name and/or number:
POS534

1.2 Sponsoring Institution(s):	
Name:	GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel
Address:	Wischhofstraße 1-3 24148 Kiel
Name of Director:	Prof. Dr. Peter M. Herzig

1.3 Scientist in charge of the Project:	
Name:	Dr. Mark Schmidt
Country:	Germany
Affiliation:	GEOMAR
Address:	Wischhofstr. 1-3 24148 Kiel
Telephone:	+49 431 600 2283
Fax:	+49 431 600-2928
Email:	mschmidt@geomar
Website (for CV and photo):	https://www.geomar.de/en/staff/fb2/mg/mschmidt/

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	Prof. Douglas Connelly
Affiliation:	NOC Southampton
Address:	Waterfront Campus, Southampton SO14 3HZ, UK
Telephone:	+44 23 8059 6546
Fax:	
Email:	douglas.connelly@noc.ac.uk
Website (for CV and photo):	https://noc.ac.uk/people/dpc

2. Description of Project

2.1 Nature and objectives of the project:
The proposed research cruise relates to the EU project: "Strategies for Environmental Monitoring of Marine Carbon Capture and Storage" STEMM-CCS. Contributions to the main aims of STEMM-CCS (i.e. WP 4, http://www.stemm-ccs.eu/work-packages): (1) Develop and test new sensitive and robust subsea monitoring technology, which is indicative for subsea CO2 leakage. New technology: lab-on-a-chip, optodes, membrane inlet mass spectrometry, (multibeam)echosounder quantification (2) Tests are conducted under a controlled CO2-release experiment at Goldeneye (https://www.youtube.com/watch?v=FteAvILEvzk). (3) Porewater geochemistry, benthic flux measurement, pelagic water column monitoring provide data for quantitative interpretation of CO2-induced biogeochemical changes by numerical modelling to improve best practice guides for CCS integrity monitoring. (4) Hydroacoustic water column imaging and atmospheric CH4 and CO2-measurements above abandoned wells in the North Sea provides statistical sound carbon flux estimates from "leaky wells" into the North Sea and atmosphere.

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:
STrategies for Environmental Monitoring of Marine Carbon Capture and Storage" (EU); www.stemm-ccs.eu Project coordinator: Douglas Connelly, NOC Southampton

2.3 Relevant previous or future research projects:
ECO2 - Sub-seabed CO2 Storage: Impact on Marine Ecosystems www.eco2-project.eu http://www.senseocean.eu/

2.4 Previous publications relating to the project:
e.g. Jerry Blackford, Yuri Artioli, James Clark, Lee de Mora - Monitoring of offshore geological carbon storage integrity: Implications of natural variability in the marine system and the assessment of anomaly detection criteria (2017) 10.1016/j.ijggc.2017.06.020 Vielstädte, L., Haeckel, M., Karstens, J., Linke, P., Schmidt, M., Steinle, L. and Wallmann, K. (2017) Shallow gas migration along hydrocarbon wells – An unconsidered, anthropogenic source of biogenic methane in the North Sea. Environmental Science & Technology, 51 (17). pp. 10262-10268. DOI 10.1021/acs.est.7b02732 Schmidt, M., Linke, P., Sommer, S., Esser, D. and Cherednichenko, S. (2015) Natural CO2 seeps offshore Panarea – A test site for subsea CO2 leak detection technology Marine Technology Society Journal, 49 (1). pp. 19-30. DOI 10.4031/MTSJ.49.1.3.

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.
In general the Scottish EEZ (Areas 4 and 5; Map 1), specifically around Goldeneye (Area 1; Map 2); coordinates of requested areas are listed in a separate excel spreadsheet (attached xlsx-file): Latitude Longitude Research Area 1 (Goldeneye) 57° 55.24' N 000° 31.98' W 58° 03.28' N 000° 32.63' W 58° 03.45' N 000° 12.86' W 57° 55.07' N 000° 12.53' W 57° 55.24' N 000° 31.98' W Research Area 2 (Norwegean EEZ) 57° 36.61' N 002° 08.53' E 56° 20.09' N 004° 02.57' E 56° 06.90' N 003° 15.77' E 56° 35.75' N 002° 38.85' E 57° 36.61' N 002° 08.53' E Research Area 3 (German EEZ) 55° 45.85' N 003° 28.28' E 55° 00.17' N 005° 03.20' E 53° 55.81' N 008° 06.45' E 54° 05.88' N 008° 07.77' E 55° 21.100' N 004° 44.75' E 55° 45.11' N 004° 13.10' E 55° 50.30' N 003° 45.42' E 55° 45.85' N 003° 28.28' E Research Area 4 (Scottish EEZ)

56° 45.89' N 002° 30.27' E 56° 45.16' N 001° 08.53' E 57° 03.88' N 000° 52.71' E 57° 38.02' N 000° 06.61' W 57° 54.19' N 000° 22.43' W 57° 54.19' N 002° 38.22' W 58° 03.28' N 002° 40.86' W 58° 06.76' N 000° 06.57' E 58° 27.55' N 000° 03.93' E 58° 26.17' N 000° 34.26' E 57° 53.49' N 001° 55.100' E 56° 45.89' N 002° 30.27' E Research Area 5 (Transit Aberdeen) 57° 53.49' N 000° 44.84' W 57° 24.57' N 001° 21.76' W 57° 21.73' N 001° 07.26' W 57° 53.49' N 000° 25.07' W 57° 53.49' N 000° 44.84' 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.
Maps showing research area 4 and 5, which are requested for hydroacoustic and multibeam measurements only, and area 1 (Goldeneye) requested for all listed methods are attached.

4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	**POSEIDON**
Type/Class:	RV
Nationality (Flag State):	German
Identification Number (IMO/Lloyds No.):	7427518
Owner:	Ministerium für Wissenschaft und Wirtschaft des Landes Schleswig-Holstein vertreten durch das GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel Wischhofstraße 1-3 24148 Kiel
Operator:	GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel Wischhofstraße 1-3 24148 Kiel
Overall length (meters):	60,80 m
Maximum draught:	04,90 m
Displacement/Gross Tonnage:	1105 BRZ
Propulsion:	Diesel Electric
Cruising & maximum speed:	9 kn, max.10 kn
Call sign:	DBKV
INMARSAT number and method and capability of communication (including emergency frequencies):	Vsat: +49 421 9440243011 Mobile GSM: 0049 1716070932
Name of Master:	Matthias Günther
Number of Crew:	15
Number of Scientists on board:	11

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 other craft in the project, including its use:
None

4.5 Particulars of methods, full description of scientific instruments to be used(for fishing gear specify type and dimension) and location			
Types of samples and Measurements:	Methods to be used:	Instruments to be used:	To be carried out within 12nm (yes or no):
Water column chemistry	Onboard laboratory methods; in situ sensor measurements; in situ video recording	Towed-mode/casts of Video-CTD/Niskin bottle rosette (Hydrobios; SBE9plus; 1x1x2 m); 12 x 10 L Niskin bottles; additional pH, pCO2, pCH4, O2 sensors attached	No; only in area 1
Seafloor images	HD Video camera recording	Towed Ocean Floor Observatory (OFOS; 2x1.5x1.5 m)	No; only in area 1
Near seafloor water chemistry	In situ sensor measurements	OFOS is equipped with Membrane Mass Spectrometer, pH,	No; only in area 1

	approx.. 2 m above seafloor	pCO2, pCH4, CTD sensors	
Sediment and porewater geochemistry	Onboard subsampling and analyses	Gravity Corer (GC; weight ~1.5 to; 0.5x0.5x6 m), 5 m penetration depth	No, only in area 1
Sediment and porewater geochemistry	Onboard subsampling and analyses	Multicorer (MUC; 1x1x1 m;), 0.5 m penetration depth	No, only in area 1
Oceanographic currents	ADCP, CTD	Upwards looking 300 kHz RDI ADCP plus SBE37 CTD mounted to trawl resistant Lander (Floatation Technologies; 1.5x1.5X0.5 m)	No, only in area 1
Benthic geochemistry	In situ sensors, onboard analyses	Sampling chamber mounted to benthic seafloor Lander (K.U.M; 1.5x1.5x2 m); sediment penetration depth of 0.2 m	No, only in area 1
Hydroacoustic monitoring	ADCP and Single beam echosounder	Kongsberg EK80/ADCP mounted in moonpool/pole of RV Poseidon	No, but for all requested areas
Hydroacoustic measurements	Single beam echosounder	Kongsberg EK80 WBAT echosounder mounted to OFOS	No; only in area 1
Bathymetry	Multibeam echosounder	Elac Nautic permanently installed on RV Poseidon	No, but for all requested areas

4.6 Indicate nature and quantity of substances to be released into the marine environment:
No substances will be released from RV Poseidon or scientific gears operated from onboard RV Poseidon.

4.7 Indicate whether drilling will be carried out. If yes, please specify:
No drilling but coring with Gravity Corer (5 m sediment penetration) and Multicorer (0.5 m sediment penetration) within area 1; exclusion zones of offshore platform and pipelines will be avoided

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):

Ship-mounted ADCP, Echosounder and Multibeam will be used between 1st of May and 28th of May in Scottish EEZ (area 1, 4, and 5 in Map 1); Multiple deployments and recoveries of Landers, Gravity Corer, Multicorer, OFOS, and Video-CTD between 1st of May and 28th of May (10x10 nms box, area 1; Map 2); exact locations have to be adapted relative to the exact location of the planned CO2-release experiment operated by RSS James Cook; maximum water depths are about 120 m

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 into Scottish EEZ at 1st of May 2019 Final departure at about 28th of May 2019
6.2 Indicate if multiple entries are expected:
Re-entry into working area after a crew exchange in Aberdeen

7. Port Calls

7.1 Dates and Names of intended ports of call:
Scientific crew is partly exchanged in Port of Aberdeen, in the period between 16th + 18th of May 2019 for 24 hours.

7.2 Any special logistical requirements at ports of call:
Scientific crew exchange only

7.3 Name/Address/Telephone of shipping agent (if available):
T. Ward Shipping via subagent
LV Shipping Ltd.
Unit 12 Wellheads Place Wellheads Industrial Estate Dyce, Aberdeen AB21 7GB UNITED KINGDOM
Tony.mcveigh@lvshipping.com
+44 122 472 5572 +44 771 406 6419 (mobile)
Mr. Tony McVeigh

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:
Representatives of the coastal state are participating in a joint 2-vessel operation. GEOMAR participants are mainly working onboard RV Poseidon and colleagues from NOCS, NERC, PML, Heriot Watt University are operating onboard RSS James Cook at the same location

8.2 Proposed dates and ports for embarkation/disembarkation:
Scientific crew exchange in Port of Aberdeen is planned for 17th of May 2019; date may be shifted for 1-2 days according to schedule of RSS James Cook campaign

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:
Cruise report will be submitted 6 months after the cruise

9.2 Anticipated dates of submission to the coastal State of the final report:
Final report and all data accesses will be submitted in early 2020

9.3 Proposed means for access by coastal State to data (including format) and samples:
Data will be published (PANGEA); reports will be published as open access (OceanRep); scientific results will be published in open access international journals

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:
STEMM-CCS coordination bureau at NOC Southampton provides access on request

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
Assistance will be provided by STEMM-CCS partners on request;

9.6 Proposed means of making results internationally available:
Data will be published (PANGEA); reports will be published as open access (OceanRep); scientific results will be published in open access international journals

10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or Pending):
Will ask for work permit in Norwegian waters for using ship-borne Echosounder/ADCP during transit

11. List of Supporting Documentation

11.1 List of attachments, such as additional forms required by the coastal State, etc.:
a. Map of planned hydroacoustic measurements in Scottish EEZ b. Map of planned measurements and sampling at Goldeneye c. Table of coordinates

Signature:

GEOMAR
Helmholtz-Zentrum
für Ozeanforschung Kiel
Forschungsschiffe
Wischhofstraße 1-3
24148 Kiel

Contact information of the focal point:
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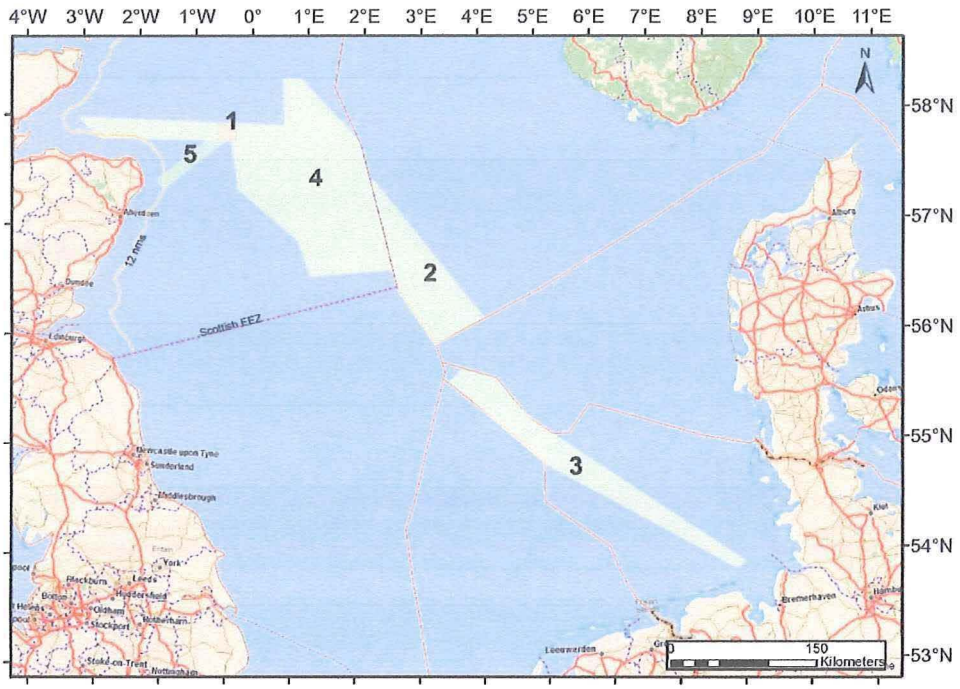
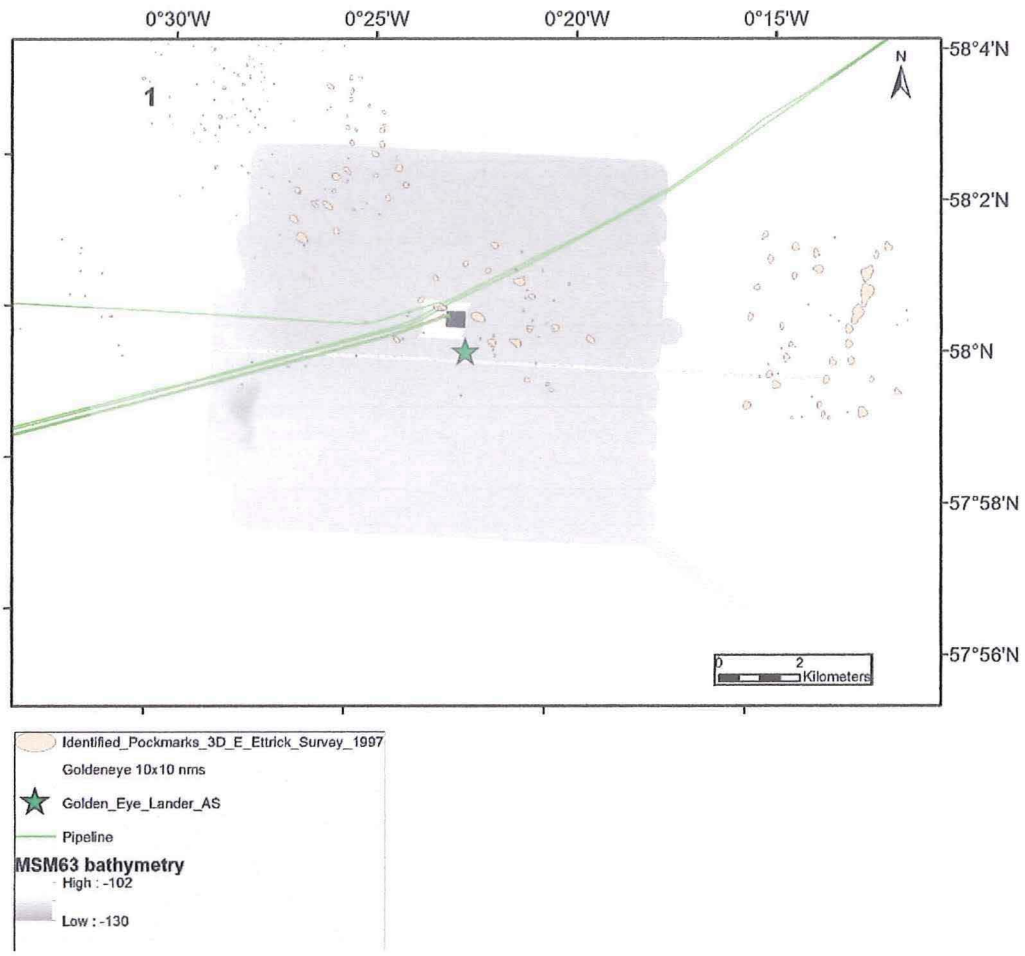
E-Mail: klackschewitz@geomar.de



Map 1: Proposed working areas for hydroacoustic measurements during transit to main working area 1 (Goldeneye). Working area 5 represents the transit to Aberdeen for crew exchange.



Map 2: Proposed working area for hydroacoustic, oceanographic and geological investigations around Goldeneye (area 1).