Application for Consent to conduct
Marine Scientific Research

Date: 02.11.2016

1. General Information

1.1 Cruise name and/or number: MSM63

1.2 Sponsoring Institution(s): *(The Sponsoring Institution is the name of the Institution(s) which initiates, finances and is responsible for the proposed scientific research)*	
Name:	GEOMAR Helmholtz Centre for Ocean Research Kiel
Address:	Wischhofstr 1-3, 24148 Kiel
Name of Director:	Prof. Dr. Peter Herzig

1.3 Scientist in charge of the Project:	
Name:	Prof. Dr. Christian Berndt
Country:	Germany
Affiliation:	
Address:	Wischhofstr 1-3, 24148 Kiel
Telephone	+494316002273
Fax:	
Email:	cberndt@geomar.de
Website (for CV and photo):	http://www.geomar.de/de/mitarbeiter/fb4/gdy/cberndt/

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	Prof. Dr. Jon Bull
Affiliation:	National Oceanography Centre Southampton
Address:	Empress Dock
Telephone:	+44 23 8059 3078
Fax:	
Email:	j.bull@noc.soton.ac.uk
Website (for CV and photo):	https://www.southampton.ac.uk/oes/research/staff/bull.page

2. Description of Project

2.1 Nature and objectives of the project:
Quantification of focused fluid migration through the sedimentary succession is fundamental for a large number of research themes ranging from the assessment of geological climate controls and slope stability to verify applied question such as where hydrocarbons accumulate and how safe CO2 storage is. Within the ECO2 project we have attempted to assess the integrity of the overburden, but the combination of field studies and numerical simulation has shown clearly that it is not possible to describe fluid migration in a sedimentary basin quantitatively without understanding the role of seismic chimney structures. The main scientific goals of the cruise are a) firstly to constrain the bulk permeability of an existing chimney structure, i.e. to assess the amount of aqueous and gassy fluids that may move through these structures over time. b) Secondly, we would like to constrain the temporal evolution of fluid migration through pipe structures over time, i.e. do they transport fluids continuously or episodically and if episodically is it likely that CO2 storage may initiate a new episode of migration. c) Thirdly, we would like to test the hypothesis that chimney structures in seismic data represent indeed fault networks created by hydro-fracturing and not bulk mobilization of sediments as a diaper or subsidence of sediments in the style of a breccia pipe.

Within the specialisation of marine geophysics we intend to apply equipment in the research disciplines of active source seismology, electromagnetics and seabed coring.

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:

STEMM-CCS (EU funding through Horizon2020)

2.3 Relevant previous or future research projects:

ECO2 (EU funding through Framework 7)

2.4 Previous publications relating to the project:

ECO_2 (2015) ECO_2 Final Publishable Summary Report. ECO_2 project number: 265847. *www.eco2-project.eu (08.09.2015)*

Karstens, J. (2015) Focused fluid conduits in the Southern Viking Graben and their implication for the Sleipner CO_2 storage project. Doctoral dissertation (unpublished). University Kiel.

Karstens, J. und **Berndt, C**. (2015) Seismic chimneys in the Southern Viking Graben – Implications for palaeo fluid migration and overpressure evolution Earth and Planetary Science Letters, 412 . pp. 88-100.

3. Geographical Areas

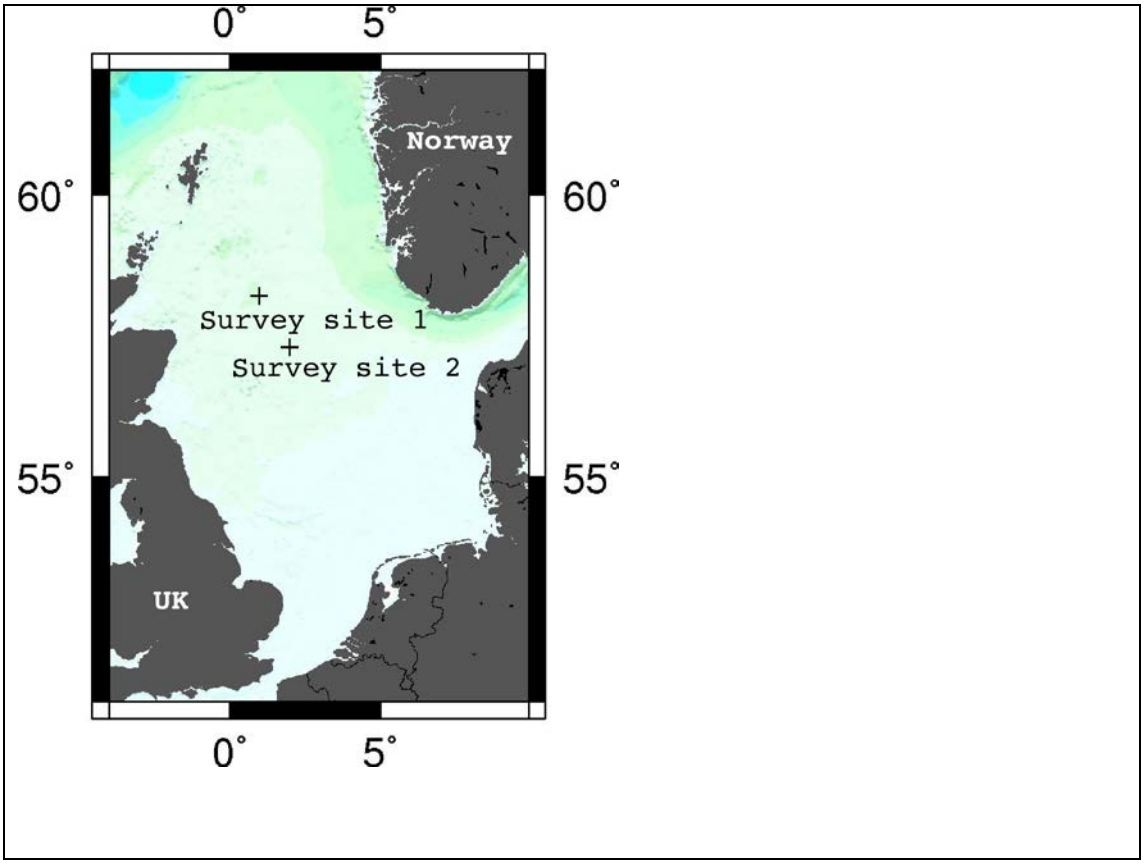
3.1 Indicate geographical areas in which the project is to be conducted (with reference in Latitude and longitude in decimal degrees, including coordinates of cruise/track/way points/sampling stations). Please provide coordinates in a separate excel spreadsheet.

We apply for a work permit for two 10 km-radius survey areas centred around the locations specified below:

Survey site 1 (pockmark): 58.28339° N, 0.97583° E
Survey site 2 (salt diapir): 57.37776° N, 1.98332° E

Work will only be conducted in one of the two areas with survey site 1 having higher priority.

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.



4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	MARIA S. MERIAN
Type/Class:	Reseach Vessel
Nationality (Flag State):	German
Identification Number (IMO/Lloyds No.):	IMO-Nr. 9274197
Owner:	Federal State of Mecklenburg-Vorpommern, Germany
Operator:	University of Hamburg, Institute of Oceanography Bundesstraße 53, 20146 Hamburg
Overall length (meters):	94,76 m.
Maximum draught:	6,5 m.
Displacement/Gross Tonnage:	Deadweight 4493t / Gross Tonnage 5573 BRZ
Propulsion:	Diesel Electric
Cruising & maximum speed:	Cruising speed: 12,5 kn Maximum speed: 15 kn
Call sign:	DBBT
INMARSAT number and method and capability of communication (including emergency frequencies):	SAT: 00870-764354964 SAT: 00870-764354967
Name of Master:	Björn Maa
Number of Crew:	Max. 24
Number of Scientists on board:	22

4.2 Particulars of Aircraft: not applicable	
Name:	
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): not applicable	
Name:	
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: not applicable

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):
Seismic data	P-Cable high-resolution 3D seismic system	2 GI guns (2x105 cub inch) Geometrics GeoEel Ocean bottom seismometers	no
CSEM data	Marine electromagnetic surveying	DASI OBIC CSEM system	no
Sediment cores	Drilling Gravity coring	RockDrill 2	no
Hydroacoustic data	Multi-beam echosounder Parametric echosounder	EM1002 Parasound EK60	no

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:
Two 55 m long sediment cores will be collected using the British Geological Survey's RockDrill2. The sites will be decided based on the 3D seismic data collected during the cruise. The sites will be placed within 5 km radius of the centre points of the survey specified in point 3.1.

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

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):
no

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:
1.5.-24.5.
6.2 Indicate if multiple entries are expected:

7. Port Calls

7.1 Dates and Names of intended ports of call:	
Southampton	4 days within the period of 24th of April to 03rd of May 2017 (planned so far from 27th of April to 30th of April 2017).
Aberdeen	1 day within the period of 12th May to 18th of May 2017 (intended so far 15th May 2017)
Southampton	3 days within the period of 22nd of May to 30th of May 2017 (planned so far from 25th of May to 27th of May 2017)

7.2 Any special logistical requirements at ports of call:
- Exchange of scientists - Loading/discharging of scientific equipment/containers

- - taking bunkers, provisions, ships spare-parts

7.3 Name/Address/Telephone of shipping agent (if available):
Inchcape Shipping Services Ltd. Postal Address: Unit 5 Imperial House Imperial Way Southampton Hants SO15 0RB

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:
The UK participants (Prof. Jon Bull and Prof. Tim Minshull) are partners in the STEMM-CCS project. Furthermore, the project is coordinated by a UK scientist (Prof. Doug Connelly of NOCS)

8.2 Proposed dates and ports for embarkation/disembarkation:
Embarkation: Southampton, 30.05.2017 Change of ca. 10 scientists, Aberdeen, 15.05.2017 Disembarkation: Southampton, 25.05.2017

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 three months after finishing the research cruise - Scientific publication within the following three years

9.2 Anticipated dates of submission to the coastal State of the final report:
31.5.2018

9.3 Proposed means for access by coastal State to data (including format) and samples:
All digital data (seismic, EM, and hydroacoustic) will be available through the GEOMAR data management system and the online data portal (www.pangaea.de). The sediment cores will be stored and accessible through the GEOMAR core repository.

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:
All cruise participants (including the UK partners) will have full access to all data already during the cruise.

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
See point 9.4.

9.6 Proposed means of making results internationally available:

The scientific results will be disseminated through scientific publications in high profile journals and presentation at scientific conferences.
The STEMM-CCS projects also runs a work package for dissemination of the results to industry stake holders.

10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or Pending):
A similar permit will be applied for for two further sites in Norwegian waters.

11. List of Supporting Documentation

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

Signature: 

Contact information of the focal point:	
Name:	Leitstelle Deutsche Forschungsschiffe
Country:	Germany
Affiliation:	University of Hamburg Institute for Oceanography
Address:	Bundesstr. 53 20146 Hamburg
Telephone:	+49 (40) 42838-3640
Fax:	+49 (40) 42838-4644
Email:	leitstelle@ifm.uni-hamburg.de