

Application for Consent to conduct
Marine Scientific Research

Date: 12.03.2018

1. General Information

1.1 Cruise name and/or number: RV Maria S. Merian cruise MSM78
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1.2 Sponsoring Institution(s): GEOMAR	
Name:	GEOMAR Helmholtz Centre for Ocean Research, Kiel
Address:	Wischhofstr. 1-3, 24148 Kiel, Germany
Name of Director:	Prof. Dr. Peter Herzig

1.3 Scientist in charge of the Project:	
Name:	Prof. Dr. Christian Berndt
Country:	Germany
Affiliation:	GEOMAR Helmholtz Centre for Ocean Research
Address:	Wischhofstr. 1-3, 24148 Kiel, Germany
Telephone:	+49-431-600-2273
Fax:	+49-431-600-2922
Email:	cberndt@geomar.de
Website (for CV and photo):	https://www.geomar.de/en/staff/fb4/gdy/cberndt/

1.4 Entity(ies)/Participant(s) from coastal State involved in the planning of the project:	
Name:	Prof. Dr. Jon Bull and Prof. Dr. Tim Minshall
Affiliation:	National Oceanography Centre
Address:	Empress Dock, Southampton, SO14 3ZH
Telephone:	+44 (023) 8059 3078, +44 (023) 8059 6569
Fax:	
Email:	bull@noc.soton.ac.uk , tmin@noc.soton.ac.uk
Website (for CV and photo):	https://www.southampton.ac.uk/oes/research/staff/bull.page https://www.southampton.ac.uk/oes/research/staff/tmin.page

2. Description of Project

2.1 Nature and objectives of the project:
<p>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.</p> <p>The main scientific goals of the cruise are</p> <p>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.</p> <p>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.</p> <p>c) Thirdly, we would like to test the hypothesis that chimney structures in</p>

seismic data represent indeed fault networks created by hydro-fracturing and not bulk mobilization of sediments as a diapir 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 sediment echosounder, multi-beam bathymetry, water chemistry, seabed coring (RockDrill2, gravity 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:

Yes, this proposed research cruise is part of the STEMM-CCS project funded by European Union's Horizon 2020 research and innovation programme under grant agreement No. 654462.

STEMM-CCS Project Office

National Oceanography Centre
European Way
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SO14 3ZH
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STEMM-CCS Coordinator

[Douglas Connelly](#)
02380 596546

STEMM-CCS Project Manager

[Carla Sands](#)
02380 596263

2.3 Relevant previous or future research projects:

This is a follow-up cruise to RV Maria S. Merian cruise 63, where coring was not possible due to technical problems of the ship's propulsion system. In addition, there is a future research cruises with British vessel RRS James Cook in June 2019.

2.4 Previous publications relating to the project:

ECO₂ (2015) ECO₂ Final Publishable Summary Report. ECO₂ 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 CO₂ 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.

Overall area (WGS84, decimal degree):

Work permission for ship-borne hydro-acoustic devices (single beam echosounder and multibeam swath echosounder) is requested within these frame coordinates.

Latitude	Longitude
58.4259235863	1.4729509206
57.9318245384	1.9232696762
56.7653094093	2.5134797414
56.6899392680	1.1374574546
57.0162878575	0.9141442253
57.5599334529	-0.2313724956
57.9082998558	-1.3646372831
57.9036253732	-2.6780210477
57.9476690634	-3.4072921180
58.3619687870	-2.6247252519
59.2552107165	-0.7285445557
59.1654194307	1.6682288272
58.4259235863	1.4729509206

Coring targets (WGS84, decimal degree)

Survey site 1 (pockmark): 58.2816710761°N	0.9706349430°E
Survey site 2 (reference): 58.2903726193°N	1.0661170604°E

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.

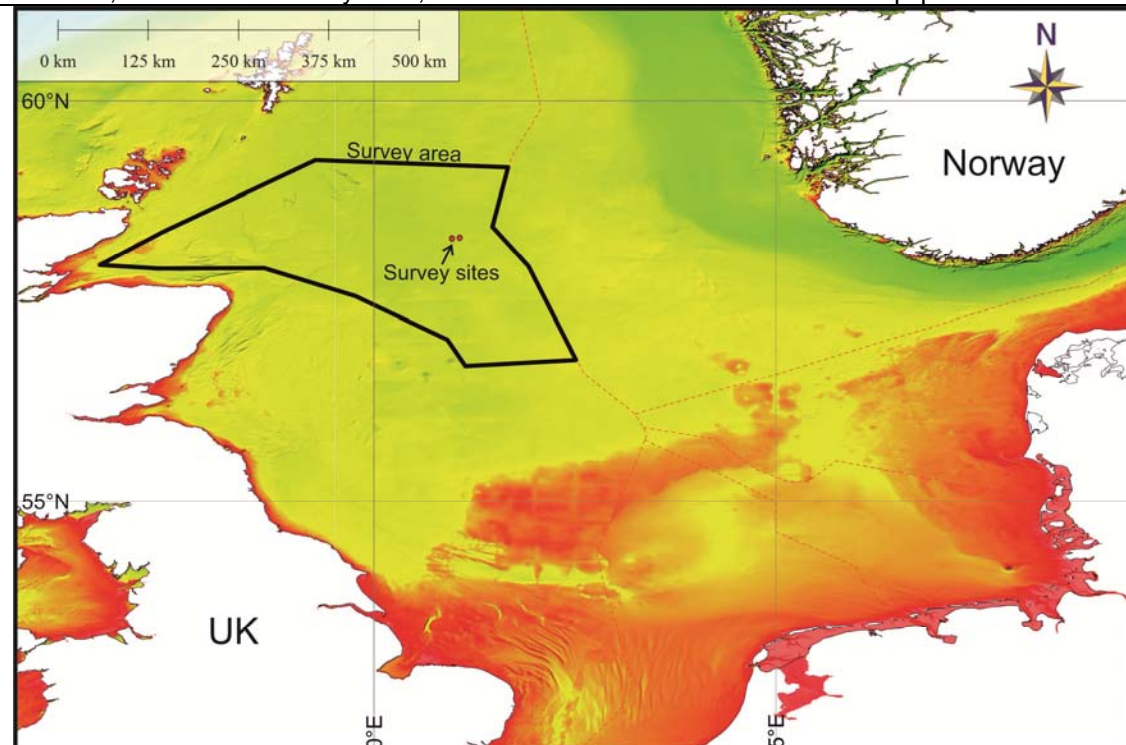
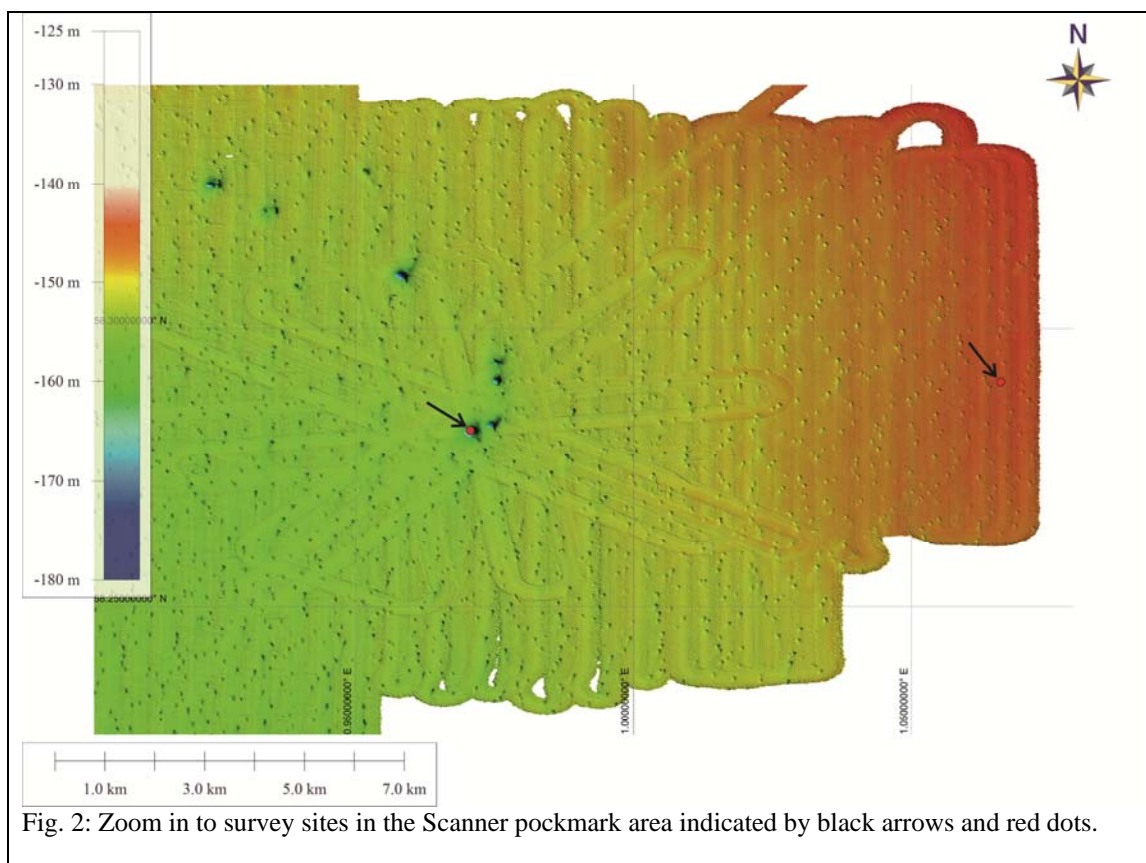


Fig.1: Map of the North Sea with indication of hydroacoustic survey area and survey sites 1 and 2 in the UK sector.



4. Methods and means to be used

4.1 Particulars of vessel:	
Name:	MARIA S. MERIAN
Type/Class:	Research 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 for Geology Bundesstraße 55, 20146 Hamburg
Overall length (meters):	94,76 m.
Maximum draught:	6,5 m.
Displacement/Gross Tonnage:	Deadweight 4493t / Gross Tonnage 5573 GT
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:	Ralf Schmidt
Number of Crew:	Max. 24
Number of Scientists on board:	Max. 23

4.2 Particulars of Aircraft:	
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):	
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:

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):
Seabed sampling	Sediment coring	British Geological Survey RockDrill2	No
Seabed sampling	Sediment coring	Gravity core	No
Bathymetry	Multi-beam bathymetry	Hull-mounted EM712	No
Sediment stratigraphy	Echo sounding	Hull-mounted Parasound P70	Yes
Water sampling	Geochemistry	Ship-based CTD	Yes
Thermosalinograph	Ozeanography		Yes
Meteorological sensors	Meteorology		Yes
Sun Photometer			

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

4.7 Indicate whether drilling will be carried out. If yes, please specify:
Yes, we will core 2 sites within the study area to a depth of 50 m below seafloor using the

British Geological Survey RockDrill2.

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.

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):
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No permanent installations.

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:
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From 15.10.2018	To 30.10.2018
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6.2 Indicate if multiple entries are expected:
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No, except for weather dependent conditions.
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7. Port Calls

7.1 Dates and Names of intended ports of call:
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Edinburgh	(13.-17.10.2018)
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Edinburgh	(26.-30.10.2018)
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7.2 Any special logistical requirements at ports of call:

Crew change, bunkering, container handling (mobile crane)

7.3 Name/Address/Telephone of shipping agent (if available):
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T.Ward Shipping LTd 3 Johns Place Leith Edinburgh EH6 7EL shipping@tward.co.uk +44 131 554 1231

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:

UK participants will join the cruise.

8.2 Proposed dates and ports for embarkation/disembarkation:
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Edinburgh	13.10.2018 / 17.10.2018
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Edinburgh	26.10.2018 / 30.10.2018
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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

9.2 Anticipated dates of submission to the coastal State of the final report:
Cruise Report three months after finishing the research cruise (30.01.2019)

9.3 Proposed means for access by coastal State to data (including format) and samples:
The acquired data will be shared by all partners. All digital data (hydroacoustic, core logs etc.) will be shared by all participants at the end of the cruise. The sediment cores will be stored at GEOMAR and samples will be available both to the U.K. and German partners.

9.4 Proposed means to provide coastal State with assessment of data, samples and Research results:
All data and results will be shared within the STEMM-CCS project which includes U.K. participants.

9.5 Proposed means to provide assistance in assessment or interpretation of data, samples And research results:
The STEMM-CCS project which is coordinated in the UK includes a work package that ensures dissemination of the results and will provide a best practice guide that will be open access.

9.6 Proposed means of making results internationally available:
The results will be published in the scientific literature, at conferences, and through outreach activities. Regular stake holder workshops are being organized by STEMM-CCS including with invitations to MPs and MEPs.

10. Other permits Submitted

10.1 Indicate other types of coastal state permits anticipated for this research (received or Pending):
No other coastal state permits anticipated for this research.

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
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