CENTER FOR GEOMICROBIOLOGY
DEPARTMENT OF BIOLOGICAL SCIENCES
AARHUS UNIVERSITY

Eilif Sund
MSR Office
Fiskeridirektoratet
info@fiskeridir.no

CC: jtfhav@um.dk

Center for Geomicrobiology, Department of Biological Sciences

Hans Røy

Assistant Professor

Date:Feb 19th 2015

Direct Tel.: +45 87155985
E-mail:
hans.roy@biology.au.dk

Web:
au.dk/en/hans.roy@biology

Togt rapport for RV Aurora ”30.5.14 15.8-15.9 2014, jnr 14/7725”

http://www.fiskeridir.no/Yrkesfiske/Tema/Utenlandske-forskningstokt/Soekere-2014/0514/Cruise-Information-Aurora-140530

Vi undskylder den forsinkede indsendelse af rapport fra RV Auroras operation i Norsk farvand i august-september 2014.

Denne togtrapport består af to dele dækkende to togtben med fokus på hhv. ”Deepwater biological communities” og ” Geochemical Cycles”. Disse to dele til svarer den togt rapport som er blevet indsendt til Dansk Center for Havforskning, der finansierede sejladserne.

Med venlig hilsen,

Hans Røy.

Center for Geomicrobiology
Aarhus University
Ny Munkegade 114
DK-8000 Aarhus C
Denmark

Tel.: +45 89423280
Fax: +45 89422722
E-mail: toftdal@biology.au.dk

DCH REPORTING FORM

(The final reporting has two parts: 1) a description of key results and recommendations for future use, and 2) financial reporting form (separate Excel file).

DeepFuncEcol

Peter Grønkjær

1 General section

1.1 Grant holder,

Name, title, position, Institute, Address, telephone, e-mail.

Peter Grønkjær, PhD, Asc. Prof., Aarhus University, Department of Bioscience, Ole Worms Allé 1, 8000 Aarhus C, Phone 2338 2177, peter.groenkjaer@biology.au.dk

1.2 Project name

Functional diversity and ecology of Norwegian Trench communities (DeepFuncEcol)

1.3 Project number

2014-02

1.4 Funding period

August 2014

1.5 Significant deviations between budget and costs

None

2 Qualitative report

2.1 Description of cruise and results

Mobilisation for the cruise took place on August 8-9th. Aurora departed from Aarhus on the 10th and arrived on the 11th. Due to weather conditions (winds ranging between 14-22 m/s) the research activities were not initiated until the 13th. The research activities ended on the 16th again due to poor weather conditions. Demobilisation was finished on the 17th. Due to death and sickness in the close family the science crew was reduced to four VIP's. This gave room for 2 M.Sc. and 1 B.Sc. student who are going to base their theses on the sampled material from the cruise.

The CTD/Watersampler system onboard Aurora failed during the final tests in Hirtshals and it was not possible to carry out sampling based on this. Instead, CTD profiles to 500 m were obtained using the CTD mounted on Auroras Multinet sampler. This also meant that analyses of water samples (nutrients, chlorophyll) were impossible.

The two deep stations described in the application (SKA 3 – ca 610 m, 58°02.3N, 09°07.4E; SKA 2 – ca 350 m, 58°05.9N, 09°50.3E) were sampled using multinet (depth resolved zooplankton, 8 deployments), IKMT (shrimp and mesopelagic fish, 4 deployments), Agassiz trawl & Waren Sledge (benthic fish and fauna, 6 deployments) and boxcorer (infauna 9 deployments). In addition sediment traps were deployed at SKA 3. Each station was

sampled for 30 hrs to obtain samples of vertically migrating zooplankton at noon and midnight.

The shallow station (SKA 1 – ca 30 m, 57°38.6N, 09°53.9E) was sampled using Agassiz trawl during day.

The sampling was designed and executed to address the three research objectives below.

1) *A description of the oceanographic conditions along depth gradients in the Skagerrak area based on oceanographic data collected during the cruise period.*

   This was the least successful objective due to the failing CTD system. Hence, the sampling was limited to CTD data on station, but these are of sufficient quality to describe the general hydrography at the stations. The lack of water sampling is not critical to the analysis and overall cruise objective.

2) *Identification of possible pathways and sources of nutrients and organic matter to the seafloor across depth gradients by using stable isotopes.*

   The sampling to meet this objective was successful although few mesopelagic fishes were caught. Instead large numbers and several species of pelagic shrimp and krill were caught in the IKMT. A B.Sc. and a M.Sc. student are currently identifying and performing stable isotope analyses on the fauna to reconstruct the pelagic food web and identify trophic niches of – primarily – the crustacean fauna at the deep (SKA3) and slope station (SKA2). This work will lead two at least two publications in addition to the two theses.

3) *A description of the functional diversity of macrozoobenthos at selected sites representing different depths in the Skagerrak area. Identification of trophic positions will be based on stable isotope analyses of benthic organisms and potential food items from different sediment layers.*

   This sampling was also successful. The boxcorer and Agassiz trawl proved very efficient at sampling the benthic fauna as well as providing samples for the characterisation of the surface sediment layers. On board a large number of species were collected and preserved for later identification and stable isotope analyses. One M.Sc. student is currently working on this material. The differences in abundance and composition of the fauna between stations were very large, and so far support the notion of a distinct change in the benthic communities and the food webs around depths of 400-500 meters. This work will lead to 1-2 primary publications and one M.Sc. thesis.

All the fishes caught during the cruise were identified to species, and the 21 records of 17 species represent a valuable contribution to the ongoing Atlas of Marine fishes in Danish waters. Some of

the species (*Callionymus reticulatus*, *Etmopterus spinax* and *Pomatoschistus pictus*) are rarely caught and are of particular value for the project. High-quality photos of most of the species were produced onboard, for use in the Atlas-book and for public out-reach in general.

Analyses of all the obtained samples will be supported by a dedicated grant from Elisabeth and Knud Pedersens Fond as well as funding from the PI's and supervisors.

It is clear that the Norwegian trench offer easy reachable and scientifically very interesting opportunities to study the ecology of deep water communities and the factors that shape them. This cruise has documented the feasibility of performing deep water research in the Norwegian trench, has so far documented that significant differences in community structure occur over a limited depth and spatial range which suggest that these global phenomena may be studied on locations just 3 hrs sailing from Danish ports.

Deep water ecology is an area that appeals also to the general public and as a direct outcome of this cruise we organised an open ship and public lecture about the cruise and the ecology of deep water communities within the frame of Folkeuniversitetet. The event took place at Kattegat Centeret in Grenå.

2.2 Evaluation of ship used

The vessel is very well suited for this type of research. All equipment could be handled safely and efficiently in up to ca. 2.5 m waves. There was ample space for the handling of the samples. The breakdown of the CTD-system was not related to faults in the ship but due to a faulty connection in the CTD housing.

Short dissemination to be published

Dybhavet er verdens største habitat, - men også det mindst tilgængelige. I dybhavet er dyrene afhængige af føde der bliver produceret nær overfladen og transporteret ned til bunden. Denne transport kan enten foregå som en langsom nedsynkning af dødt organisk materiale, eller via en hurtig genvej i form af organismer såsom pelagiske fisk og krebsdyr, der på en daglig basis migrerer mellem overfladen og dybet. Kvantiteten og kvaliteten af den føde der er tilgængelig for dybhavsdyrene er derfor primært bestemt af dybden og adfærden af den pelagiske fauna. Ved større dybder bliver høj kvalitets føde en sjældenhed der kan begrænse faunaens biomasse, og påvirke dens sammensætning og de funktionelle træk som faunaen udviser. Den Norske Rende i Skagerrak er en dyb undervands kløft. Den repræsenterer på mange måder det klassiske dybhav og er i modsætning til de fleste andre dybhavshabitater let tilgængelig hvilket giver optimal mulighed for at studere processerne, der bestemmer udbredelse og levevilkår for dybhavsfaunaen.

Formålet med DeepFuncEcol togtet med RV Aurora var at undersøge fødekilder og de funktionelle diversitets mønstre – dvs. de træk (størrelse, fødesøgningstype, alder osv.) som udvises af dybhavsfaunaen – over en dybdegradient fra lavvand til de dybeste områder af Norske rende. Vores overordnede hypotese var at kvantiteten og kvaliteten af det organiske materiale, som når havbunden er en vigtig faktor, der bestemmer den funktionelle diversitet hos de bundlevende dyr. Vi udvalgte tre stationer på 640, 400 og 30 meters dybde i Skagerrak. Ved hjælp af en lang række pelagisk og bentisk indsamlingsudstyr var vi i stand til at undersøge hvordan pelagiske organismer påvirker den vertikale transport af organisk materiale og næringsstoffer, og, specifikt, hvorvidt det organiske materiale, der findes på stor dybde langsomt er drysset derned eller er resultatet af aktiv biologisk transport med vertikal migrerende dyr. På de dybe stationer udførte vi pelagisk prøvetagning i forskellige dybder ved middag og midnat for at følge den vertikale migration af zooplankton, småfisk og krebsdyr når de om natten stiger op for at æde planteplankton og igen når solen står op og de søger sikkerheden i dybet.

Kernen i vores laboratorieanalyser vil være analyser af stabile kulstof og kvælstof isotoper som kan bruges til af kortlægge transporten af energi fra primærproducenterne, igennem den pelagiske fauna og helt ned til dybhavets fauna.

Indtil videre har vores indsamling afsløret store forskelle i biomassen, sammensætningen og diversiteten i den bundlevende fauna. Den store forskel ses mellem 400 og 600 meters dybde på trods af at disse stationer ligger meget tæt på hinanden. Disse forskelle vil nu blive relateret til vandets fysiske forhold, kvantiteten, kvaliteten og isotop signaturen af det organiske materiale der når havbunden på de to stationer.

I alt 17 forskelige fiskearter blev indsamlet og identificeret under togtet. Alle registreringer indgår i det nationale projekt ”Atlas over danske Saltvandsfisk”. Flere af arterne (fx kortfinnet fløjfisk,

sorthaj og spættet kutling) registreres relativt sjældent i danske farvande og de nye fangster er således af stor værdi for projektet. Den kortfinnede fløjfisk blev først registreret danske farvande i 2012 og de små eksemplarer (ca. 3 cm) fra RV Aurora indikerer at arten nu gyder hos os. Under togtet blev der taget fotos af de fleste arter, til brug i den kommende atlasbog, undervisning og formidling.

Resultaterne fra DeepFuncEcol toget vil være et væsentligt bidrag til at forstå verdens største økosystemer – dybhavene – og de organismer der lever der.

Cruise report – "*Geomicrobiology of the Kattegat – Skagerrak seabed*", Aurora SKA, August 26 to September 2, 2014

Dawn (Aurora) in Aarhus Bay (Photo Bente Aa. Lomstein)

Bente Aa. Lomstein
Curator

Hans Røy
Chief Scientist

CONTENT

PARTICIPANTS:

Ship based participants:

Name:	Position	Institution	Function
Hans Røy	Scientist	CfG-AU	Chief scientist, Coring
Bente Aa. Lomstein	Professor	CfG-AU	Curator, Biogeochemistry
Kasper U. Kjeldsen	Scientist	CfG-AU	Molecular Microbiology
Clemens Glombitza	Post doc	CfG-AU	Biogeochemistry
Marion Jaussi	PhD student	CfG-AU	Biogeochemistry
Julie Rotschi	PhD student	CfG-AU	Biogeochemistry
Erik Kristensen	Associate Professor	Bio-SDU	Fauna, bioirrigation
Thomas Valdemarsen	Post doc	Bio-SDU	Fauna, bioirrigation
Gail Lee Arnold	Assistant Professor	Uni-Texas	Incubation experiments, Stable isotope geochemistry
Laura Merit Pepgras	PhD student	ETH Zürich	Molecular Microbiology

Shore based participants:

Name:	Position	Institution	Function
Bo B. Jørgensen	Professor	CfG-AU	Principal Investigator
Marit-Solveig Seidenkrantz	Professor	Geo-AU	Stratigraphy and paleoceanography
Mark Lever	Professor	ETH-Zürich	Molecular Microbiology
Brandi Reese	Associate Professor	Uni- Calif	Microbial culturing
Antje Gittel	Post doc	CfG-AU	DNA and live sediment
Lars Peter Nielsen	Professor	Micro-AU	Bioelectricity
Andreas Schramm	Professor	Micro-AU	Evolution

INSTITUTIONS:

CfG-AU
Center for Geomicrobiology, Department of Bioscience, Aarhus University

Bio-SDU
Department of Biological Sciences, University of Southern Denmark

Uni-Texas
University of Texas at El Paso, USA

Geo-AU
Department of Geoscience, Aarhus University

ETH-Zürich
ETH-Zürich, Switzerland

Uni-Calif
University of Southern California, USA

Micro-AU
Section for Microbiology, Department of Bioscience, Aarhus University

CRUISE OBJECTIVES AND SCIENTIFIC PROJECT

The project aims to obtain a continuous record from the sediment surface to up to 9 msbf of the following:

a) the microbial community size and diversity
b) the rate of organic matter mineralization
c) the physical environment and geochemical zonation
d) the sediment mixing and porewater transport by benthic fauna
e) the organic matter quality
f) the sedimentation history and age structure of the seabed
g) the past hydrography and climate

Surface cores and deep cores were combined in a high-resolution sub-sampling for:

a) Direct cell counting, fluorescence in situ hybridization, quantitative PCR, and high-throughput metagenomic sequencing of extractable DNA
b) Rate measurements of microbial energy metabolism using sensitive radiotracer experiments, incubation in "Wurgler bags" and jars, and reaction-transport modeling of chemical gradients in pore water and sediment
c) Analysis of pore water and solid phase chemistry, core scanning and determination of physical properties of the sediment
d) Identification and quantification of benthic fauna and determination of sediment mixing rates and bioirrigation using incubation experiments and natural radioisotope distributions
e) Application of amino acid and amino sugar based diagenetic indicators
f) Core description and core scanning, ^{14}C dating of shells
g) Micropaleontology and climate proxies for the reconstruction of Holocene oceanography.

The primary goal of the project is to understand how decreasing energy availability at depth in the seabed affects the community composition of predominant microorganisms (e.g. bacteria vs archaea) as well as the level of mean cell-specific energy turnover. The underlying hypotheses are that (1) decreasing energy availability with depths selects for microorganisms with lower energy requirements, and (2) with increasing sediment depth, cell-specific energy turnover eventually approaches a minimum rate, a so called "basal power requirement", that is the basic property of life. Only few data sets exists so far to address these questions and the hypotheses remain vague.
A gass seep sediment site was visited as a small site project to the main project. Specifically the gas seep site samples will allow testing the applicability of PCR-based assays for quantitative analyses of the marker genes as survey tools to detect diffuse seepage from marine oil and gas formations. In addition, by comparison to sediments not impacted by gas seepage obtained results would further our understanding of the dynamics and the microbiology of C_2-C_4 gas cycling in marine surficial sediments.

CORING STATIONS

We have carefully selected a number of coring sites in the Skagerrak, Kattegat and Little Belt (Fig. 1)

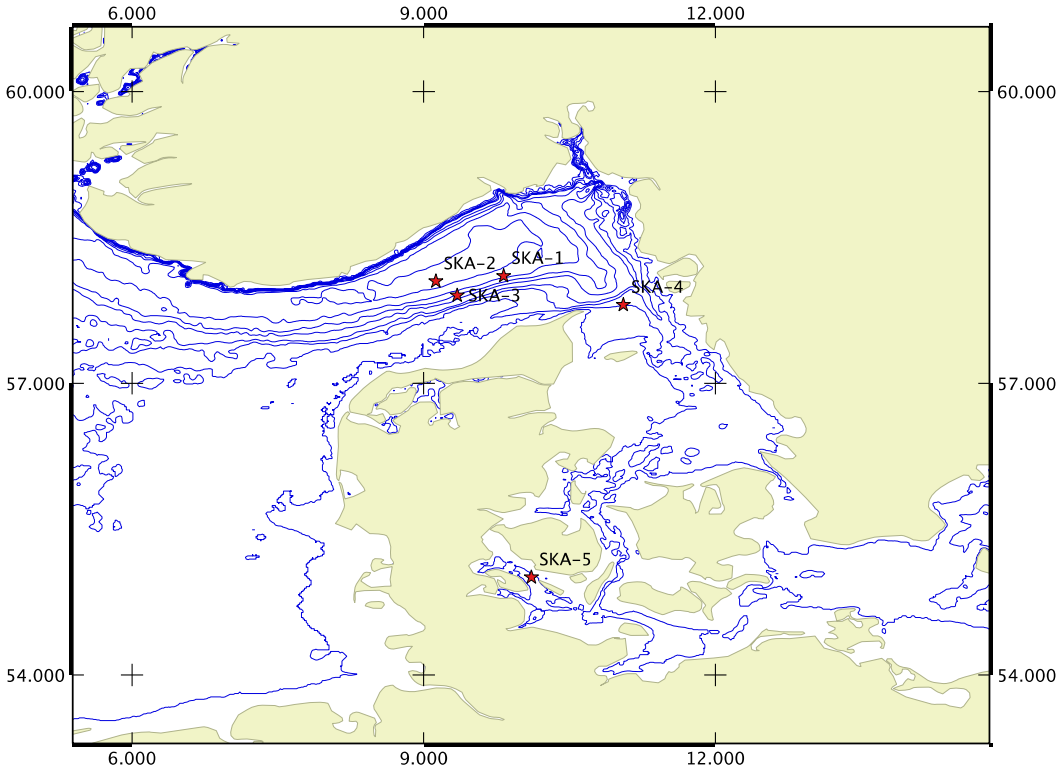

Figure 1. Sampling sites

Table 1: Sampling sites

Station	Area	Water depth (m)	Characteristics
SKA-1	Skagerrak	318	High iron reduction
SKA-2	Skagerrak	586	High manganese reduction
SKA-3	Skagerrak	183	Gas seep
SKA-4	Kattegat	43	High sulfate reduction/bioturbation
SKA-5	Southern Little Belt	..38	IODP Leg 347 site 59. High methanogenesis

GENERAL SAMPLING

The general sampling of cores, the coring type and the distribution of cores and water samples between projects are described in Table 2.

NARRATIVE OF THE AURORA SKA-LEG "*Geomicrobiology of the Kattegat – Skagerrak seabed"*

The Aurora was prepared for the cruise in port of Esbjerg on August 25th by mobilization of radiotracer container and gravity corer. The scientific crew boarded in Hirtshals at noon on August 24. During the afternoon August 26, 10 scientists and PhD students working in three different countries, prepared their equipment and install themselves in the laboratories. In the evening there was a meeting arranged by the Captain of Aurora giving information about general rules of conduct on board and later on in the evening there was an emergency drill.

August 27, R/V Aurora left Hirtshals at 4:00 under favorable wind conditions (8 m/s from NW) heading for the first station, Station SKA-1. We arrived SKA-1 (water depth 318 m) at 7:00 and performed a one hour survey with sub-bottom profiler to identify a suitable coring location. Coring operation started at 9:00, where the 6-m long Gravity Corer was deployed. The resultant 4.5 m sediment core was immediately sectioned into 1-m sections that were brought to the wet-lab for geomicrobiological subsampling. The gravity core was subsampled for methane, porewater and solid phase at 10 cm resolution in upper 1 m, below which the sampling resolution was increased to 25 cm. Methane, alkalinity, oxygen and pH were measured on board (see Figs 2 - 4), whereas all remaining samples were preserved for later analysis in our home laboratories. During geomicrobiological sampling, care was taken to sample only one side of the core allowing the other side to be used for reconstruction of the sedimentary past upon return to the Department of Geoscience, Aarhus University. The chronology will be based on AMS ^{14}C dating of bivalve shells or foraminifera at the AMS ^{14}C Laboratory, Aarhus University. During the day and early evening a total of 21 instruments were deployed (5 Haps cores, 5 water bottles, 6 Box-cores and 4 Rumohr cores; see Table 2). The purposes of these deployments were to compliment the sampling of the gravity core towards the sediment-water interface, to quantify and identify benthic macrofauna, to study bioirrigation by the benthic fauna, to measure sediment-water solute exchange rates, and to quantify sediment mixing and measure carbon mineralization rates in surface sediment.
Deployment of instruments ended at 21:00. The deck of R/V Aurora proved to be perfectly designed for safe handling and deployment of the heavy instruments.
A final transect with the soft bottom profiler was initiated at 22:30 at 58°06,206'N/9°49, 394'E (water depth 318 m), at 23:00 the position was 58°06,65'N/9°48,78'E (water depth 345 m) and transect ended at 23:20 at position 58°08,041'N/9°47, 29'E after which transit to Station SKA-2 took place.

Sampling at Station SKA-2 (water depth 586 m) was initiated August 28 at 8:00 under very good weather conditions (3.4 m/s). The first gravity core was back on deck at 9:19 and was subsampled as described previously. During the day and early evening a total of 20 instruments were deployed (1 Gravity corer, 12 Box cores, 5 Water bottles and 2 Rumohr cores) of which 17 were successful. The purposes of the deployments were as described for sampling at Station SKA-1.

A transect with the soft bottom profiler was started at 22:33 at the cored position 58°04,857'N/9°9´04,713'E (water depth 613 m). The transect ended at mid night.

Arrival at SKA-3 was timed to coincide with the watch shift at 06:00 on August 29. A Multi-beam survey of the gas seep was performed until 10:45 (see the recordings of the multi-beam for details). The survey functioned well, but suffered from lack of penetration trough heavy outgassing at the site center (57°54,201'N/9°20,664'E; water depth 183 m). The epicenter was sampled with Rumohr coring from 10:50 untill 14:45. The purpose of the sampling was to obtain sediment impacted by diffuse seepage of hydrocarbon gasses from underlying formations of oil and gas. Sediment samples were collected for measurements of pore water concentrations of C_2-C_4 hydrocarbon gasses and for molecular biology analyses of marker genes diagnostic of microorganisms involved in the anaerobic degradation of these gasses.

After completion of sampling, we were heading for SKA-4 with an ETA at 6:00 (30.08.14). However, a strong gale was building up after mid night with winds up to 19 m/s. Upon arrival at station the wind speed was 18 m/s and the wave height up to 2.5 m. It was therefore decided to abandon the station and transit towards Station SKA-5 in the Southern part of the Little Belt. However, at 8 o'clock the wind ceased, waves reduced and the weather forecast looked promising for operation at Station SKA-4 until late afternoon. Once again we were heading for Station SKA-4 with an ETA at 10:30. The Gravity Corer was deployed immediately after arrival at station. Due to the shallow water column (46 m) the full sampling program, as described for Stations SKA-1 and SKA-2, was efficiently carried out and the last Haps corer was on board at 15:00. At that time a new gale was developing with wind speeds of >13 m/s and it was decided to transit to the western side of Læsø to seek protection from the SE wind. During operation a total of 26 deployments of instruments were performed: 1 Gravity Corer, 7 Water bottle casts, 4 Rumohr cores, 2 Box cores and 12 Haps cores (with only 2 failed deployments). Subsampling of cores and incubations took place during the evening. Acoustic surveys were not possible because the sea state caused excessive amounts of air in the water.
The wind ceased during the night and we passed Hjelm in the morning of August 31 in calm water. The day was used to finish incubations and prepare for sampling at Station SKA-5 in the Southern Little Belt, September 1 in the morning. R/V Aurora arrived Assens at 17:30 in time to reach Daglig Brugsen to fetch new food supplies and buy ice cream for the evening presentation of "Martha".

Journalist Jes Petersen (Primeview ApS) and his photographer Morten Andersen embarked right before departure from Assens at 6:00, September 1. The purpose of their presence was to follow up on the IODP Leg 347 Baltic Sea Drilling expedition, finish a documentary of R/V Aurora and interview scientist on board. We reached Station SKA-5 (55°00,261'N/10°06,484'E; water depth 38 m) at 9:20 in good weather conditions (8.3 m/s from N/E). A multibeam survey was performed before sampling to ensure that we did not sample in the bore-holes made during IODP Leg 347 in 2013. Surprisingly, the bore-holes were still visible (Fig. 5) and it was decided to place Station SKA-5 50 meters away from the IODP Leg 347 sampling site. After the multibeam survey we immediately started deploying Box cores, Gravity cores, Water

bottles etc. In total 7 Box cores, 2 Gravity cores, 6 Water bottles and 11 Rumohr cores were deployed of which 22 were successful. At 15:35 the full sampling program was completed, after which we were heading for Assens again (arrival 18:50). In Assens, Jes Petersen, Morten Andersen, Erik Kristensen and Thomas Valdemarsen disembarked and we were heading for Station M5 in Aarhus Bay, which we arrived at 05:20, September 2. Two Rumohr cores were successfully sampled. We arrived pier 302 in Aarhus harbor at 06:45 to demobilize the radiotracer container. The ship was then moved to its regular pier to complete demobilization and to end a very successful cruise.

Cruise statistics
Ten scientists and PhD students working in three different countries participated in the cruise "Geomicrobiology of the Kattegat – Skagerrak seabed" from August 26 to September 2, 2014. During the cruise, 5 stations were sampled by deployment of 5 Gravity cores, 26 Box cores, 29 Rumorh cores, 23 Water bottles, and 18 Haps cores. The total gear operation time was 35 h. The remaining hours was spend in the laboratories incubating samples and subsampling cores for later analysis in our home laboratories.

ACKNOWLEDGEMENTS

The scientific party onboard R/V Aurora gratefully acknowledges the friendly co-operation and efficient assistance of Captain Torben Vang, first mate Ole Pedersen and the crew on deck Lars Renvald and Jesper B. Voetmann, which all together contributed significantly to the success of the cruise.

Thanks are also due to the Danish Center for Marine Research who funded the cruise.

Table 2: SKA-Aurora-14 Station summary

Station	Instrument code	Activity nr	Date	Latitude bottom	Longitude bottom	Water depth, m	End time	Status	Purpose
SKA-1	GC01	1	270814	58°06,212'N	9°49,340'E	318	9:04	Success	Geomicro PW & Solid phase
SKA-1	H01	2	270814	58°06,210'N	9°49,340'E	320	10:44	Success	SDU, Flux,Fauna
SKA-1	H02	3	270814	58°06,210'N	9°49,340'E	319	11:19	Failed	SDU, Flux,Fauna
SKA-1	H03	4	270814	58°06,210'N	9°49,342'E	319	11:39	Success	SDU, Flux,Fauna
SKA-1	H04	5	270814	58°06,212'N	9°49,346'E	319	12:01	Success	SDU, Flux,Fauna
SKA-1	H05	6	270814	58°06,200'N	9°49,354'E	319	13:05	Success	SDU, Flux,Fauna
SKA-1	W01	7	270814	58°06,196'N	9°49,345'E	319	13:50	Success	SDU, Flux,Fauna
SKA-1	W02	8	270814	58°06,197'N	9°49,493'E	319	14:02	Success	SDU, Flux,Fauna
SKA-1	W03	9	270814	58°06,194'N	9°49,341'E	318	14:13	Success	SDU, Flux,Fauna
SKA-1	W04	10	270814	58°06,190'N	9°49,336'E	318	14:30	Success	SDU, Flux,Fauna
SKA-1	W05	11	270814	58°06,190'N	9°49,336'E	318/S104 m	14:40	Success	SDU, Flux,Fauna
SKA-1	B01	12	270814	58°06,198'N	9°49,359'E	318	15:22	Success	SDU, Flux,Fauna
SKA-1	B02	13	270814	58°06,192'N	9°49,373'E	318	15:55	Success	SDU, Flux,Fauna
SKA-1	B03	14	270814	58°06,186'N	9°49,357'E	318	16:26	Success	SDU, Flux,Fauna
SKA-1	B04	15	270814	58°06,186'N	9°49,356'E	318	17:01	Failed	SDU, Flux,Fauna
SKA-1	B05	16	270814	58°06,195'N	9°49,360'E	319	17:35	Success	SDU, Flux,Fauna
SKA-1	R01	17	270814	58°06,211'N	9°49,403'E	318	19:24	Failed	Lara,
SKA-1	R02	18	270814	58°06,201'N	9°49,371'E	319	19:42	Success	Geomicro, PW
SKA-1	R03	19	270814	58°06,208'N	9°49,385'E	319	19:56	Success	Geomicro, Solid phase
SKA-1	R04	20	270814	58°06,188'N	9°49,371'E	318	20:10	Success	Geomicro, Pb-210
SKA-1	B06	21	270814	58°06,206'N	9°49,394'E	318	20:31	Success	Geomicro, oxygen profiles
SKA-2	GC02	22	280814	58°02,964'N	9°07,515'E	586	9:19	Success	Geomicro, PW & Solid phase
SKA-2	B07	23	280814	58°02,971'N	9°07,515'E	586	10:41	Success	Geomicro PW, High res SSR
SKA-2	B08	24	280814	58°02,913'N	9°07,499'E	586	11:32	Success	SDU, Flux,Fauna
SKA-2	B09	25	280814	58°02,965'N	9°07,516E	586	12:52	Success	SDU, Flux,Fauna
SKA-2	B10	26	280814	58°02,961'N	9°07,531'E	585	13:28	Failed	
SKA-2	B11	27	280814	58°02,959'N	9°07,460'E	586	14:00	Success	SDU, Flux,Fauna
SKA-2	B12	28	280814	58°02,987'N	9°07,497'E	586	14:36	Success	Geomicro, Solid phase
SKA-2	B13	29	280814	58°02,982'N	9°07,503'E	586	15:16	Success	SDU, Flux,Fauna, 3x oxygen, Pb-210
SKA-2	W06	30	280814	58°02,989'N	9°07,502'E	586/S100 m	16:09	Success	SDU, Flux,Fauna
SKA-2	W07	31	280814	58°02,958'N	9°07,506'E	586/S100 m	16:22	Success	SDU, Flux,Fauna
SKA-2	W08	32	280814	58°02,962'N	9°07,436'E	586/S100 m	16:45	Success	SDU, Flux,Fauna
SKA-2	W09	33	280814	58°02,989'N	9°07,491'E	586/S100 m	16:58	Success	SDU, Flux,Fauna
SKA-2	W10	34	280814	58°02,990'N	9°07,433'E	586/S100 m	17:11	Success	SDU, Flux,Fauna
SKA-2	W11	35	280814	58°02,953'N	9°07,958'E	586/S100 m	17:23	Success	SDU, Flux,Fauna
SKA-2	R05	36	280814	58°02,975'N	9°07,455'E	586	17:50	Failed	
SKA-2	R06	37	280814	58°02,998'N	9°07,535'E	586	18:51	Success	Laura, MBIO
SKA-2	B14	38	280814	58°02,991'N	9°07,494'E	586	19:23	Success	SDU, Flux,Fauna
SKA-2	B15	39	280814	58°02,974'N	9°07,504'E	586	20:00	Success	Gail Würgler
SKA-2	B16	40	280814	58°02,972'N	9°07,505'E	586	20:54	Failed	
SKA-2	B17	41	280814	58°02,973'N	9°07,503'E	586	21:30	Success	Gail/Ben long incub
SKA-3	R07	42	290814	57°54,201'N	9°20,664'E	183	10:50	Failed	
SKA-3	R08	43	290814	57°54,189'N	9°20,642'E	182	11:12	Success	Disposed - not influenced by gas
SKA-3	R09	44	290814	57°54,193'N	9°20,652'E	184	11:29	Success	Disposed - not influenced by gas
SKA-3	R10	45	290814	57°54,193'N	9°20,653'E	183	13:45	Failed	
SKA-3	R11	46	290814	57°54,178'N	9°20,619'E	182	14:07	Failed	
SKA-3	R12	47	290814	57°54,202'N	9°20,617'E	196	14:24	Failed	
SKA-3	R13	48	290814	57°54,200'N	9°20,617'E	189	14:35	Success	Antje Gittel - Gas project
SKA-4	G03	49	300814	57°48,396'N	11°03,194'E	46	10:54	Success	Geomicro PW & Solid phase
SKA-4	W12	50	300814	57°48,396'N	11°03,188'E	47	11:23	Success	SDU, Flux,Fauna
SKA-4	W13	51	300814	57°48,394'N	11°03,189'E	46	11:26	Success	SDU, Flux,Fauna
SKA-4	W14	52	300814	57°48,395'N	11°03,188'E	47	11:28	Success	SDU, Flux,Fauna
SKA-4	W15	53	300814	57°48,395'N	11°03,185'E	47	11:32	Success	SDU, Flux,Fauna
SKA-4	W16	54	300814	57°48,395'N	11°03,184'E	47	11:34	Success	SDU, Flux,Fauna
SKA-4	W17	55	300814	57°48,396'N	11°03,187'E	47	11:37	Success	SDU, Flux,Fauna
SKA-4	W18	56	300814	57°48,395'N	11°03,186'E	47	11:39	Success	SDU, Flux,Fauna
SKA-4	R14	57	300814	57°48,398'N	11°03,160'E	43	12:12	Success	Laura, MBIO
SKA-4	R15	58	300814	57°48,397'N	11°03,167'E	43	12:19	Success	Geomicro, PW

SKA-4	R16	59	300814	57°48,395'N	11°03,175'E	43	12:24	Failed	
SKA-4	R17	60	300814	57°48,390'N	11°03,179'E	43	12:28	Success	Geomicro, Solid phase
SKA-4	B18	61	300814	57°48,396'N	11°03,213'E	43	13:15	Success	SDU, Flux,Fauna
SKA-4	B19	62	300814	57°48,397'N	11°03,213'E	43	13:25	Success	SDU, Flux,Fauna
SKA-4	H07	63	300814	57°48,392'N	11°03,205'E	43	13:47	Success	SDU, Flux,Fauna
SKA-4	H08	64	300814	57°48,392'N	11°03,209'E	43	13:59	Success	SDU, Flux,Fauna
SKA-4	H09	65	300814	57°48,393'N	11°03,209'E	43	14:07	Success	SDU, Flux,Fauna
SKA-4	H10	66	300814	57°48,393'N	11°03,208'E	43	14:15	Success	SDU, Flux,Fauna
SKA-4	H11	67	300814	57°48,399'N	11°03,204'E	43	14:22	Success	Gail/Ben long incub
SKA-4	H12	68	300814	57°48,395'N	11°03,210'E	43	14:28	Success	Gail/Ben long incub
SKA-4	H13	69	300814	57°48,396'N	11°03,209'E	43	14:34	Success	Gail/Ben long incub
SKA-4	H14	70	300814	57°48,399'N	11°03,216'E	43	14:40	Success	Gail/Ben long incub
SKA-4	H15	71	300814	57°48,396'N	11°03,212'E	43	14:46	Success	Gail/Ben long incub
SKA-4	H16	72	300814	57°48,395'N	11°03,210'E	43	14:52	Failed	
SKA-4	H17	73	300814	57°48,396'N	11°03,211'E	43	14:58	Success	Gail/Ben long incub
SKA-4	H18	74	300814	57°48,398'N	11°03,218'E	43	15:03	Success	Geomicro PW, High res SSR
SKA-5	B20	75	10914	55°00,262'N	10°06,484'E	38	9:30	Success	SDU, Flux,Fauna
SKA-5	B21	76	10914	55°00,261'N	10°06,484'E	38	9:35	Success	SDU, Flux,Fauna
SKA-5	G04	77	10914	55°00,263'N	10°06,483'E	37	10:35	Success	Geomicro PW & Solid phase
SKA-5	W19	78	10914	55°00,260'N	10°06,483'E	38	11:04	Success	SDU, Flux,Fauna
SKA-5	W20	79	10914	55°00,260'N	10°06,483'E	38	11:07	Success	SDU, Flux,Fauna
SKA-5	W21	80	10914	55°00,264'N	10°06,485'E	38	11:09	Success	SDU, Flux,Fauna
SKA-5	W22	81	10914	55°00,264'N	10°06,483'E	38	11:12	Success	SDU, Flux,Fauna
SKA-5	W23	82	10914	55°00,261'N	10°06,486'E	37	11:14	Success	SDU, Flux,Fauna
SKA-5	R18	83	10914	55°00,263'N	10°06,486'E	37	11:42	Failed	
SKA-5	R19	84	10914	55°00,263'N	10°06,483'E	37	11:44	Failed	
SKA-5	R20	85	10914	55°00,264'N	10°06,484'E	37	11:48	Success	Laura, MBIO
SKA-5	R21	86	10914	55°00,268'N	10°06,511'E	37	11:49	Success	Geomicro, PW
SKA-5	R22	87	10914	55°00,259'N	10°06,513'E	37	12:08	Success	Brandi Reese/Gail Arnold
SKA-5	R23	88	10914	55°00,260'N	10°06,515'E	37	12:11	Failed	
SKA-5	R24	89	10914	55°00,262'N	10°06,513'E	37	12:15	Success	Gail Arnold
SKA-5	R25	90	10914	55°00,263'N	10°06,312'E	37	12:20	Success	Geomicro - SRR, Methanogenesis, MBIO, Cells
SKA-5	R26	91	10914	55°00,260'N	10°06,514'E	37	12:25	Success	Pb-210
SKA-5	R27	92	10914	55°00,263'N	10°06,512'E	37	12:31	Success	Bioelectricity
SKA-5	B22	93	10914	55°00,261'N	10°06,505'E	37	13:14	Success	SDU, Flux,Fauna
SKA-5	B23	94	10914	55°00,269'N	10°06,504'E	37	13:23	Failed	
SKA-5	B24	95	10914	55°00,258'N	10°06,522'E	37	13:31	Failed	
SKA-5	B25	96	10914	55°00,258'N	10°06,519'E	37	13:42	Success	SDU, Flux,Fauna
SKA-5	B26	97	10914	55°00,255'N	10°06,520'E	37	13:58	Success	SDU, Flux,Fauna
SKA-5	R28	98	10914	55°00,260'N	10°06,525'E	37	14:29	Success	Geomicro, Solid phase
SKA-5	G05	99	10914	55°00,254'N	10°06,516'E	38	15.18	Success	Ben Brunner, Brandi Reese, Axel Loy
M5	R28	100	20914	55°06,190'N	10°27,456'E	28	5:27	Success	Andreas Schramm
M5	R29	101	20914	55°06,190'N	10°27,457'E	38	5:29	Success	Andreas Schramm

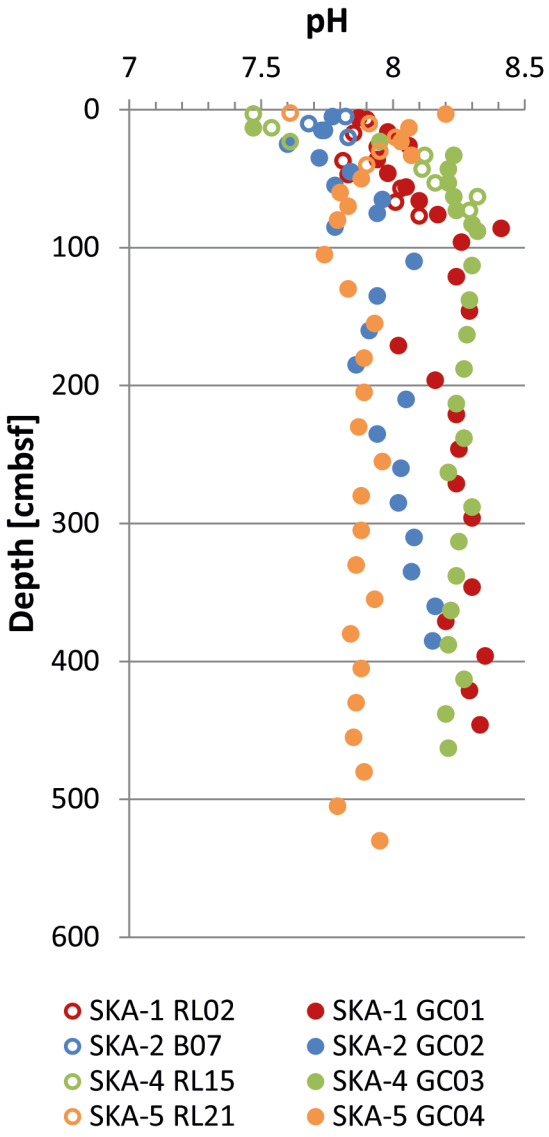

Figure 2: pH measured in porewater, sampled by Rhizones from Rumohr lot cores (circles) and Gravity cores (dots) retrieved at Stations SKA-1 (red), SKA-2 (blue), SKA-4 (green) and SKA-5 (organge).

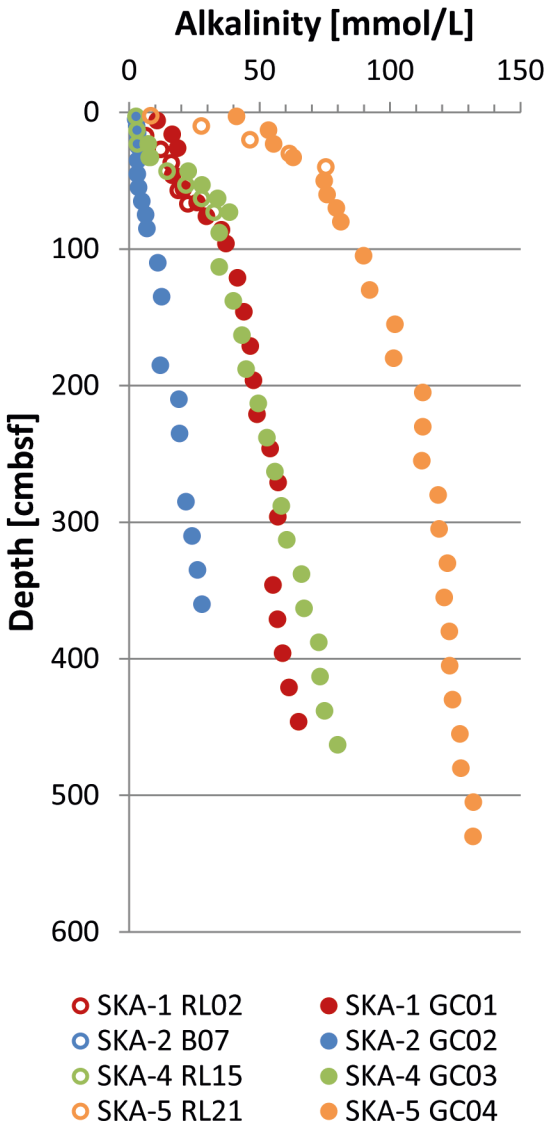

Figure 3. Total alkalinity (TA) of the porewater, sampled by Rhizones form Rumohr lot cores (circles) and gravity cores (dots) retrieved at Stations SKA-1 (red), SKA-2 (blue), SKA-4 (green) and SKA-5 (orange). Alkalinity was calculated from porewater pH and pH measurements after HCl titration to pH 3.5 – 3.9 according to TA = $(H^+_{added} - H^+_{excess} + H^+_{porewater})/V_0$. V_0 is the initial sample volume, H^+ concentrations were corrected by the activity coefficent of H^+ in seawater of 0.79.

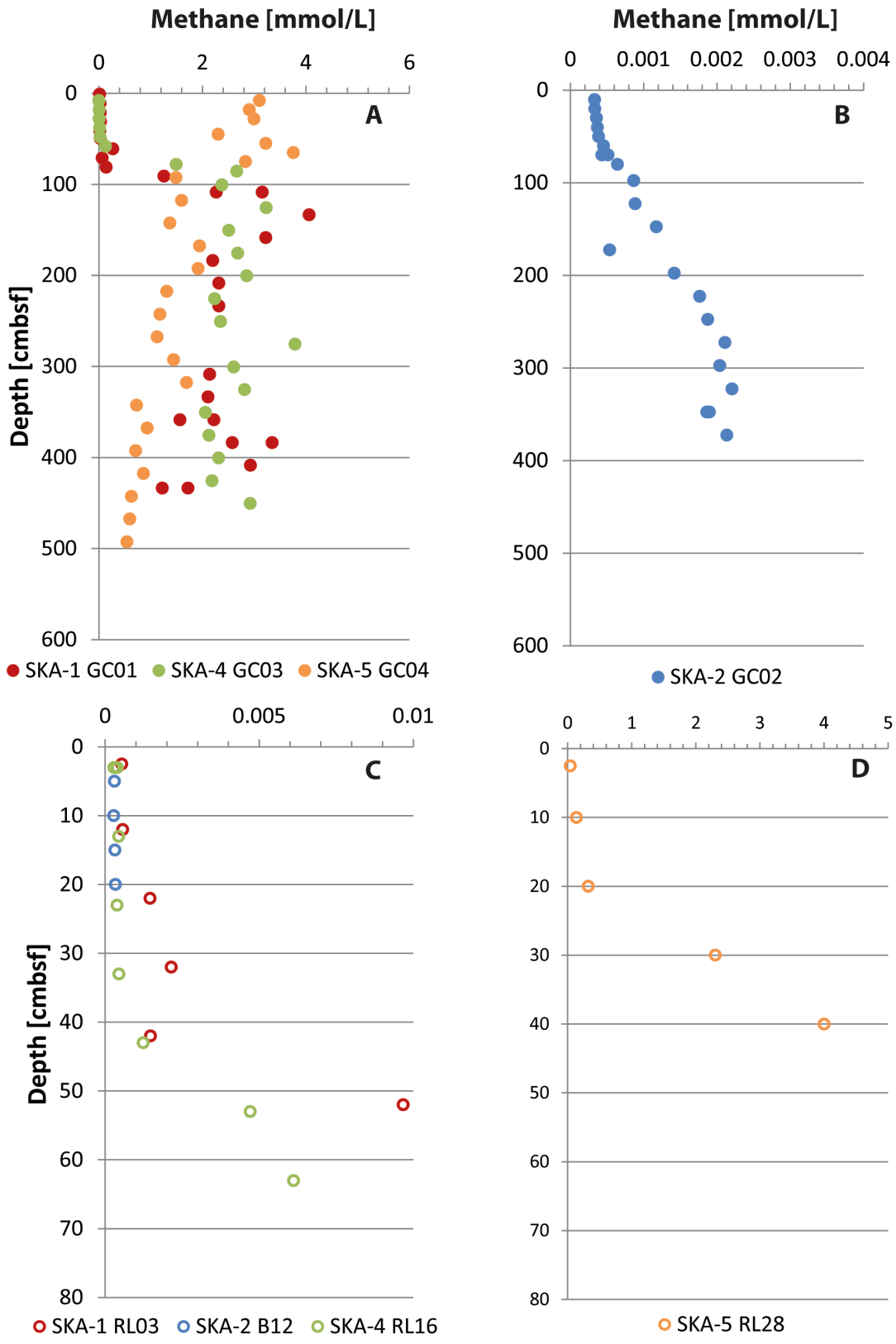

Figure 4. Methane concentrations measured by headspace gas chromatogrphy in samples from Rumohr lot cores (A, B) and Gravity cores (C, D) retrieved at Stations SKA-1 (red), SKA-2 (blue), SKA-4 (green) and SKA-5 (orange).

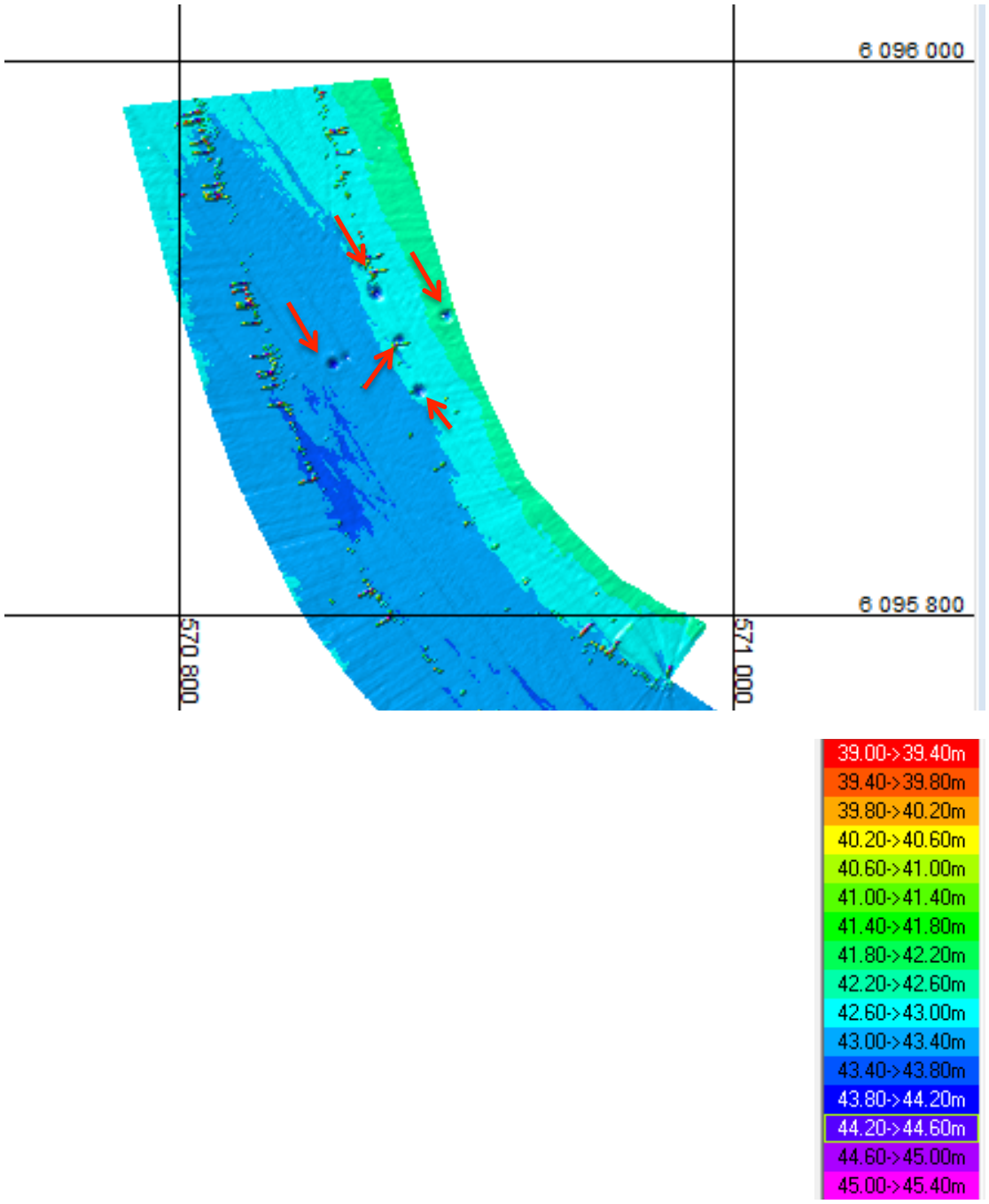

Figure 5. Unprocessed multibeam survey data at the IODP Leg 347 site. Arrows indicate impacts from the drilling expedition.

Station: SKA-1; GC01

Appendix 1

Date: 270814; 09:04 am	Water depth: 318 m

Position: 58°06,149'N/9°49,344'E	Type of sampling: porewater solutes (alkalinity, DIC, sulfate, sulfide, Fe, VFA, ammonium etc) and solid phase (MBIO, AA's, Sulfate reduction, Density and Cells)
Length of core: 451 cm	Bottom temp:
	Bottome salinity:

Sample ID	Depth, cmbsf	Section number	CH4 bubbles	Sediment texture	Other
1	446	1	-	Black dry	
2	421	1	+	Black dry	
3	396	1	+	Black dry	
4	371	1	+	Black dry	
5	346	2	++	Black fine dense	
6	321	2	+++	Black fine dense	Cells only 1 mL
7	296	2	+++	Black fine dense	
8	271	2	++	Black fine dense	
9	246	3	+	Black fine dense	
10	221	3	+	Fine dense mud	
11	196	3	+	Fine dense mud	
12	171	3	+	Fine dense mud	
13	146	4	+	Fine dense mud	
14	121	4	+	Fine dense mud	
15	96	4	-	Fine dense mud	
16	86	4	-	Fine dense mud	Temp 13.7°C at 2.35 pm
17	76	4	-	Fine more dense mud	
18	66	4	-	Fine more dense mud	
19	56	4	-	Fine more dense mud	
20	46	5	-	Fine soft mud	
21	36	5	-	Fine soft mud	
22	26	5	-	Fine soft mud	
23	16	5	-	Fine soft mud	
24	6	5	-	Fine soft mud	

Temperature at the bottom of sections at time the cores were sectioned:

Section 1: 8.1°C; Section 2: 8.4°C; Section 3: 8.3°C; Section 4: 8.9°C; Section 5: 9.0°C

Methane sampling depths

Sample ID	Depth, cmbsf	Section number			
1	433.5	1			
2	408.5	1			
3	383.5	1			
4	358.5	1			
5	333.5	2			
6	308.5	2			
7	383.5	2			
8	358.5	2			
9	233.5	3			
10	208.5	3			
11	183.5	3			
12	158.5	3			
13	133.5	4			
14	108.5	4			
15	91	4			
16	81	4			
17	71	4			
18	61	4			
19	49.5	4			
20	41	5			
21	31	5			
22	21	5			
23	11	5			
24	1	5			

Station: SKA-1

Appendix 2

RL02

Date: 270814	Water depth: 319 m

Position: 58°06,201'N/9°49,371'E	Type of sampling: Geomicro PW
Length of core: 82 cm	Bottom temp:

ID	Depth, cmbsf	Specific comments
32	7	
31	17	
30	27	
29	37	
28	47	Took until morning Aug 28
27	57	Took until morning Aug 28
26	67	Took until morning Aug 28
25	77	Took until morning Aug 28

Station: SKA-1

RL03

Date: 270814	Water depth: 319 m

Position: 58°06,208'N/9°49,385'E	Type of sampling: Geomicro - Solid Phase & Methane
Length of core: 77 cm	Bottom temp:

Bag#	Depth, cmbsf	Specific comments
32	2.5/1.25*	Density frozen morning Aug 28
31	12	Density frozen morning Aug 28
30	22	Density frozen morning Aug 28
29	32	Density frozen morning Aug 28
28	42	Density frozen morning Aug 28
27	52	Density frozen morning Aug 28
26	62	Density frozen morning Aug 28
25	72	Density frozen morning Aug 28

Solid phase:

SRR: 5 mL cut syringe
MBIO: 5 mL cut syringe
AA's: 5 mL cut syringe
Cells: 2 mL
Density: 2 mL
Methane: 2 mL

*First sample taken from above, which integrated the upper 5 cm for SRR and upper 2.5 cm for Cells, CH4 and density
Remaining samples taken from the side at specific depth

Station: SKA-2

Appendix 3

B07

Date: 280814	Water depth: 586 m

Position: 58°02,971'N/9°07,515'E	Type of sampling: Geomicro PW
Length of core: 25 cm	Bottom temp:

ID	Depth, cmbsf	Specific comments
57	5	None
56	10	None
55	15	None
54	20	None

Station: SKA-2

B12

Date: 280814	Water depth: 586 m

Position: 58°02,987'N/9°07,497'E	Type of sampling: Geomicro - Solid Phase & Methane
Length of core: 25 cm	Bottom temp:

Bag#	Depth, cmbsf	Specific comments
57	5	Density frozen morning Aug 28
56	10	Density frozen morning Aug 28
55	15	Density frozen morning Aug 28
54	20	Density frozen morning Aug 28

Samples taken from the side at specific depth

Solid phase:

SRR: 5 mL cut syringe
MBIO: 5 mL cut syringe
AA's: 5 mL cut syringe
Cells: 2 mL
Density: 2 mL
Methane: 2 mL

Station: SKA-2; GC02

Appendix 4

Date: 280814; 9:19 am	Water depth: 586 m

Position: 58°02,964'N/9°07,515'E	Type of sampling: porewater solutes (alkalinity, DIC, sulfate, sulfide, Fe, VFA, ammonium etc) and solid phase (MBIO, AA's, Sulfate reduction, Density and Cells)
Length of core: 390 cm	Bottom temp:
	Bottome salinity:

Sample ID	Depth, cmbsf	Section number	CH4 bubbles	Sediment texture	Other
33	385	1		Dry mud	
34	360	1		Dry mud	Temp at 3:35 pm 15.5°C
35	335	1		Dry mud	
36	310	1		Dry mud	
37	285	2		Dry mud	
38	260	2		Nice mud	
39	235	2		Nice mud	
40	210	2		Nice mud	
41	185	3		Nice mud	
42	160	3		Nice mud	
43	135	3		Nice mud	
44	110	3		Nice mud	
45	85	4		Fine fluid mud	
46	75	4		Fine fluid mud	
47	65	4		Fine fluid mud	
48	55	4		Fine fluid mud	
49	45	4		Fine fluid mud	
50	35	4		Fine fluid mud	
51	25	4		Fine fluid mud	
52	15	4		Fine fluid mud	
53	5	4		Fine fluid mud	

Temperature at the bottom of sections at time the cores were sectioned:

Section 1: 9.1°C(?); Section 2: 7.3°C; Section 3: 7.0°C; Section 4: 8.1°C

Methane sampling depths

Sample ID	Depth, cmbsf	Section number			
33	372.5	1			
34	347.5	1			
35	322.5	1			
36	297.5	1			
37	272.5	2			
38	247.5	2			
39	222.5	2			
40	197.5	2			
41	172.5	3			
42	147.5	3			
43	122.5	3			
44	97.5	3			
45	80	4			
46	70	4			
47	60	4			
48	50	4			
49	40	4			
50	30	4			
51	20	4			
52	10	4			
53	Surface no sample	4			

Station: SKA-3

Appendix 5

RL13

Date: 290814	Water depth: 182 m

Position: 57°54,200'N/9°20,617'E	Type of sampling:Gasproject, CH4, DNA & Live sediment
Length of core: 45 cm	Bottom temp:

CH4 and DNA sampling:

0. 5. 15. 25. 35 and 45 cmbsf

Live sediment:

0- 15 cmbsf

5 - 15 cmbsf

15 - 25 cmbsf

25 - 35 cmbsf

35 - 45 cmbsf

Station: SKA-4; GC03

Appendix 6

Date: 300814; 10:54 am	Water depth: 46 m

Position: 57°48,396'N/11°03,194'E	Type of sampling: porewater solutes (alkalinity, DIC, sulfate, sulfide, Fe, VFA, ammonium etc) and solid phase (MBIO, AA's, Sulfate reduction, Density and Cells)
Length of core: 468 cm	Bottom temp:
	Bottome salinity:

Sample ID	Depth, cmbsf	Section number	CH4 bubbles	Sediment texture	Other
58	463	1	+	Grey dry	At 17:10 the temp was 18.3°C
59	438	1	+	Grey dry	
60	413	1	+	Grey dry	
61	388	1	+	Greyish	
62	363	2	+	Greyish	
63	338	2	+	Greyish	
64	313	2	+	Grey dry	
65	288	2	+	Drier	
66	263	3	+++	Drier	
67	238	3	+++	Drier	
68	213	3	+++	Drier	
69	188	3	+++	Drier	
70	163	4	+++	Soft mud	
71	138	4	+++	Soft mud	
72	113	4	+++	Soft mud+H2S	
73	88	4	+++	Soft mud+H2S	
74	83	5	+	Soft mud+H2S	
75	73	5	+	Soft mud+H2S	
76	63	5		Soft mud+H2S	
77	53	5		Soft mud+H2S	
78	43	5		Black greyish soft mud	
79	33	5		Black greyish soft mud	
80	23	5		Black watery mud with little grey	
81	13	5		Soft watery mud with some black	

Temperature at the bottom of sections at time the cores were sectioned:

Section 1: 11.1°C; Section 2: 10.5°C; Section 3: 11.2°C; Section 4: 12.8°C; Section 5: 15.1°C

Methane sampling depths

Sample ID	Depth, cmbsf	Section number			
58	450.5	1			
59	425.5	1			
60	400.5	1			
61	375.5	1			
62	350.5	2			
63	325.5	2			
64	300.5	2			
65	275.5	2			
66	250.5	3			
67	225.5	3			
68	200.5	3			
69	175.5	3			
70	150.5	4			
71	125.5	4			
72	100.5	4			
73	85.5	4			
74	78	5			
75	Skipped	5		In between two sedtions	
76	58	5			
77	48	5			
78	38	5			
79	28	5			
80	18	5			
81	8	5			

Station: SKA-4

Appendix 7

RL15

Date: 300814	Water depth: 43 m

Position: 57°48,396'N/11°03,212'E	Type of sampling: Geomicro PW
Length of core: 83 cm	Bottom temp:

ID	Depth, cmbsf	Specific comments
89	3	None
88	13	None
87	23	None
86	33	None
85	43	None
84	53	None
83	63	None
82	73	None

Station: SKA-4

RL17

Date: 300814	Water depth: 43 m

Position: 57°48,396'N/11°03,211'E	Type of sampling: Geomicro - Solid Phase & Methane
Length of core: 90 cm	Bottom temp:

Bag#	Depth, cmbsf	Specific comments
89	3	
88	13	
87	23	
86	33	
85	43	Density frozen morning Aug 28
84	53	Density frozen morning Aug 28
83	63	Density frozen morning Aug 28
82	73	Density frozen morning Aug 28

Upper sample sampled from above; remaining from the side

Solid phase:

SRR: 5 mL cut syringe
MBIO: 5 mL cut syringe
AA's: 5 mL cut syringe
Cells: 2 mL
Density: 2 mL
Methane: 2 mL

Station: SKA-5; GC04

Appendix 8

Date: 010914; 10:35 am	Water depth: 37 m

Position: 55°00,263'N/10°06,483'E	Type of sampling: porewater solutes (alkalinity, DIC, sulfate, sulfide, Fe, VFA, ammonium etc) and solid phase (MBIO, AA's, Sulfate reduction, Density and Cells)
Length of core: 535 cm	Bottom temp:
	Bottome salinity:

Sample ID	Depth, cmbsf	Section number	CH4 bubbles	Sediment texture	Other
90	530	1	+	Black, dry - no H2S	
91	505	1	+	Black, dry - no H2S	
92	480	1	+	Black, dry - no H2S	
93	455	1	+	Black, dry - no H2S	
94	430	2	+	Black, dry - no H2S	
95	405	2	+	Black, dry - no H2S	
96	380	2	+	Black, dry - no H2S	
97	355	2	+	Black, dry - no H2S	
98	330	3	+	Black, dry - no H2S	
99	305	3	+	Black, dry - no H2S	
100	280	3	+	Black, dry - no H2S	
101	255	3	+	Black, dry - no H2S	
102	230	4	+	Black, little dry, little H2S	
103	205	4	+	Black, little dry, little H2S	
104	180	4	+	Black, little dry, little H2S	
105	155	4	+	Black, little dry, little H2S	
106	130	5	++++	Black + H2S	
107	105	5	++++	Black + H2S	
108	80	5	++++	Black + H2S	
109	70	5	++++	Black + H2S	
110	60	5	++++	Black + H2S	
111	50	5	++++	Black + H2S	
112	33	6	+	Black + H2S	
113	23	6	+	Black + H2S	
114	13	6	+	Black + H2S	
115	3	6	+	Black + H2S	

Temperature at the bottom of sections at time the cores were sectioned:

Section 1: 7.9°C; Section 2: 7.9°C; Section 3: 7.9°C; Section 4: 7.9°C; Section 5: 8.3°C, Section 6: 9.6

Methane sampling depths

Sample ID	Depth, cmbsf	Section number			
90	517.5	1			
91	492.5	1			
92	467.5	1			
93	442.5	1			
94	417.5	2			
95	392.5	2			
96	367.5	2			
97	342.5	2			
98	317.5	3			
99	292.5	3			
100	267.5	3			
101	242.5	3			
102	217.5	4			
103	192.5	4			
104	167.5	4			
105	142.5	4			
106	117.5	5			
107	92.5	5			
108	75	5			
109	65	5			
110	55	5			
111	45	5			
112	28	6			
113	18	6			
114	8	6			
115	115C missing - sur	6			

Station: SKA-5; GC05

Appendix 9

Date: 010914; 15:18	Water depth: 37 m

Position: 55°00,254'N/10°06,516'E	Samples for Vienna, Ben Brunner and Brandi Reese
Length of core: 407 cm	Bottom temp:
	Bottome salinity:

Samples for Alex Loy, University of Vienna

10 cm WR:
12-22 cmbsf
21-222 cmbsf

Sediment for Ben Brunner, University of Texas, USA

2 × 0 - 30 cmbsf from RL giving 2 L of sediment from main sulfate zone
2 bags from 112 - 222 cmbsf for methane zone giving a total of 10 L
1 bag from 12 - 22 cmbsf from top of GC-05, but fear this may already be methanogenic

Samples for Brandi Reese, University of Southern California

Sampled in cut windows, inserted 3 cutoff 20 mL syringes, where 1 was stored at -80°C and 2 were stored at -20°C

1	25 cmbsf	B25	
2	50 cmbsf	B50	
3	75 cmbsf	B75	
4	100 cmbsf	B100	
5	125 cmbsf	B125	
6	150 cmbsf	B150	
7	200 cmbsf	B200	
8	250 cmbsf	B250	
9	300 cmbsf	B300	
10	350 cmbsf	B350	
11	400 cmbsf	B400	
12	0 cmbsf	Φ	Taken from top of RL

Station: SKA-5

Appendix 10

RL21

Date: 010914	Water depth: 37 m

Position: 55°00,258'N/10°06,511'E	Type of sampling: Geomicro PW
Length of core: 47 cm	Bottom temp:

ID	Depth, cmbsf	Specific comments
120	2.5	None
119	10	None
118	20	None
117	30	None
115	40	None

Station: SKA-5

RL28

Date: 010914	Water depth: 37 m

Position: 55°00,260'N/10°06,525'E	Type of sampling: Geomicro - Solid Phase & Methane
Length of core: 47 cm	Bottom temp:

Bag#	Depth, cmbsf	Specific comments
116	2.5	
117	10	
118	20	
119	30	
120	40	

Upper sample sampled from above; remaining from the side

Solid phase:

SRR: 5 mL cut syringe
MBIO: 5 mL cut syringe
AA's: 5 mL cut syringe
Cells: 2 mL
Density: 2 mL
Methane: 2 mL

OBS numbering opposite to PW and all other cores!!

Appendix 11

Pore-water sampling

Core	Number	VFA	SO42-	S2-	NH4+	FE 2+	DIC	IONS	date	comment	DIC (volume
	#	(-80°C)	(4°C)	(-20°C)	(-20°C)	(4°C)	(4°C)	(4°C)	distribution		
SKA-1-GC01	1		+	+	+	o	o	o	8/27/14	feeling it smell alcanes in general (1-16)	o
SKA-1-GC01	2		+	+	+	+	+	o	8/27/14		<2mL
SKA-1-GC01	3		+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	4		+	+	+	+	+	o	8/27/14		<1mL
SKA-1-GC01	5		+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	6		+	o	<0.5ml	o	o	o	8/27/14		o
SKA-1-GC01	7		+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	8		+	+	+	+	+	+	8/27/14		+
SKA-1-GC01	9		+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	10		+	+	+	+	+	o	8/27/14		<2mL
SKA-1-GC01	11		+	+	+	+	+	+	8/27/14		+
SKA-1-GC01	12	see with	+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	13	clemens	+	+	+	*	+	+	8/27/14	Fe volume <0.5mL	<2mL
SKA-1-GC01	14		+	+	+	+	+	+	8/27/14		<1mL
SKA-1-GC01	15		+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	16		+	+	+	+	+	+	8/27/14	smell H2S ?	<2mL
SKA-1-GC01	17		+	+	+	+	+	+	8/27/14		<1ml
SKA-1-GC01	18		+	+	+	+	+	+	8/27/14		+
SKA-1-GC01	19		+	+	+	*	+	+	8/27/14	Fe: < 250µl of PW (rest some µl in tip)	<1ml
SKA-1-GC01	20		+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	21		+	+	+	+	+	+	8/27/14		<2mL
SKA-1-GC01	22		+	+	+	+	+	+	8/27/14		+
SKA-1-GC01	23		+	+	+	+	+	+	8/27/14		+
SKA-1-GC01	24		+	+	+	+	+	+	8/27/14		<2mL

Pore-water sampling

Core	Number	VFA	SO42-	S2-	NH4+	FE 2+	DIC	IONS	date	comment	DIC volume
	#	(-80°C)	(4°C)	(-20°C)	(-20°C)	(4°C)	(4°C)	(4°C)	distribution		
SKA-1-RL02	25	o	o	o	<1mL	o	o	o	8/28/14	Pw hard to get due to gas bubble(?) PW sampled	o
SKA-1-RL02	26		+	+	+	+	+	+	8/28/14	PW sampled overnight	+
SKA-1-RL02	27		+	+	+	+	+	+	8/28/14	PW sampled overnight	+
SKA-1-RL02	28	see with	+	+	+	+	+	+	8/28/14	Fe and S2- evenning 27/08/14, rest of PW store i	+
SKA-1-RL02	29	Clemens	+	+	+	+	+	+	8/28/14	PW sampled overnight	+
SKA-1-RL02	30		+	+	+	+	+	+	8/28/14	Fe and S2- evenning 27/08/14, rest of PW store i	<2mL
SKA-1-RL02	31		+	+	+	+	+	+	8/28/14	Fe and S2- evenning 27/08/14, rest of PW store i	+
SKA-1-RL02	32		+	+	+	+	+	+	8/28/14	Fe and S2- evenning 27/08/14, rest of PW store i	<2mL
A	BOTTOM WATER		+	o	+	o	+	+	8/27/14	Bottom water in Flakon tube (4deg)	+

Pore-water sampling

Core	Number	VFA	SO42-	S2-	NH4+	FE 2+	DIC	IONS	date	comment	DIC volume
	#	(-80°C)	(4°C)	(-20°C)	(-20°C)	(4°C)	(4°C)	(4°C)	distribution		
SKA2-GC02	33		+	+	+	+	+	+	8/28/14		DIC<2mL
SKA2-GC02	34		+	+	+	+	+	+	8/28/14		DIC<2mL
SKA2-GC02	35		+	+	+	+	+	+	8/28/14		DIC<2mL
SKA2-GC02	36		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	37		+	+	+	+	+	+	8/28/14		DIC<1mL
SKA2-GC02	38		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	39		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	40		+	+	+	+	+	+	8/28/14		DIC<2mL
SKA2-GC02	41		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	42	see with	+	+	+	+	+	+	8/28/14		+

SKA2-GC02	43	see with clemens	+	+	+	+	+	+	8/28/14		+
SKA2-GC02	44		+	+	+	+	+	o	8/28/14		+
SKA2-GC02	45		+	+	+	+	+	+	8/28/14		DIC<2mL
SKA2-GC02	46		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	47		+	+	+	+	+	+	8/28/14		DIC<1mL
SKA2-GC02	48		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	49		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	50		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	51		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	52		+	+	+	+	+	+	8/28/14		+
SKA2-GC02	53		+	+	+	+	+	+	8/28/14		+

Pore-water sampling											
Core	**Number**	**VFA**	**SO42-**	**S2-**	**NH4+**	**FE 2+**	**DIC**	**IONS**	**date**	**comment**	**DIC volume**
	#	**(-80°C)**	**(4°C)**	**(-20°C)**	**(-20°C)**	**(4°C)**	**(4°C)**	**(4°C)**	**distribution**		
SKA-2-Box-BO7	54	see with Clemens	+	+	+	+	+	+	8/28/14		DIC <2mL
SKA-2-Box-BO7	55		+	+	+	+	+	+	8/28/14		DIC <2mL
SKA-2-Box-BO7	56		+	+	+	+	+	+	8/28/14		+
SKA-2-Box-BO7	57		+	+	+	+	+	+	8/28/14		+
B	BOTTOM WATER		+	+	+	+	+	Falkon	8/28/14		+

Pore-water sampling												
Core	**Number**	**VFA**	**SO42-**	**H2S**	**NH4+**	**FE 2+**	**DIC**	**IONS**	**date**	**comment**	**DIC volume**	**FLUSH**
	#	**(-80°C)**	**(4°C)**	**(-20°C)**	**(-20°C)**	**(4°C)**	**(4°C)**	**(4°C)**	**distribution**		**+**	
SKA-4-GC03	58	see with clemens	+	+	+	+	+	+	8/30/14		+	Flushed samples with CO2 several times
SKA-4-GC03	59		+	+	+	*	+	+	8/30/14	Fe sample may not be ratio 1:1	+	
SKA-4-GC03	60		+	o	+	o	+	o	8/30/14		+	
SKA-4-GC03	61		+	+	+	+	+	o	8/30/14		+	
SKA-4-GC03	62		+	*	+	+	+	+	8/30/14	H2S less than 250µl	+	
SKA-4-GC03	63		+	o	+	+	+	+	8/30/14		DIC <2 mL	
SKA-4-GC03	64		+	o	+	+	+	+	8/30/14		DIC <2 mL	
SKA-4-GC03	65		+	+	+	+	+	+	8/30/14	smell "alcane"	DIC <2 mL	
SKA-4-GC03	66		+	+	+	+	+	+	8/30/14	no sulfide smell,but "alcane	+	
SKA-4-GC03	67		+	+	+	+	+	+	8/30/14	smell slightly H2S	DIC <2 mL	
SKA-4-GC03	68		+	+	+	+	+	+	8/30/14	smell slightly H2S	+	
SKA-4-GC03	69		+	+	+	+	+	+	8/30/14	smell slightly H2S	+	
SKA-4-GC03	70		+	+	+	o	+	+	8/30/14	smell slightly H2S	DIC <2 mL	
SKA-4-GC03	71		+	+	+	+	+	o	8/30/14	smell slightly H2S	DIC <2 mL	
SKA-4-GC03	72		+	+	+	+	+	+	8/30/14	smell H2S	+	
SKA-4-GC03	73		+	+	+	+	+	+	8/30/14	smell H2S++	DIC <2 mL	
SKA-4-GC03	74		+	+	+	+	+	+	8/30/14	smell H2S+++	+	
SKA-4-GC03	75		+	+	+	o	o	o	8/30/14	little PW volume, smell H2S+++	o	
SKA-4-GC03	76		+	+	+	+	+	+	8/30/14	smell H2S+++	DIC <2 mL	
SKA-4-GC03	77		+	+	+	+	+	+	8/30/14	smell H2S+++	+	
SKA-4-GC03	78		+	+	+	+	+	+	8/30/14	smell H2S+++	DIC <2 mL	
SKA-4-GC03	79		+	+	+	+	+	+	8/30/14	smell H2S+++	DIC <2 mL	
SKA-4-GC03	80		+	+	+	+	+	+	8/30/14	smell H2S+++	DIC <2 mL	
SKA-4-GC03	81		+	+	+	+	+	+	8/30/14	no H2S smell	DIC <2 mL	

Pore-water sampling												
Core	**Number**	**VFA**	**SO42-**	**H2S**	**NH4+**	**FE 2+**	**DIC**	**IONS**	**date**	**comment**	**DIC volume**	**FLUSH**
	#	**(-80°C)**	**(4°C)**	**(-20°C)**	**(-20°C)**	**(4°C)**	**(4°C)**	**(4°C)**	**distribution**			
SKA-4-Rumohr-RL15	82		+	+	+	+	+	+	8/30/14	smell H2S	+	
SKA-4-Rumohr-RL15	83		+	+	+	+	+	+	8/30/14	smell H2S	DIC<2mL	

SKA-4-Rumohr-RL15	84	see with Clemens	+	+	+	+	+	+	8/30/14	smell H2S	+	Flushed samples with CO2 several times
SKA-4-Rumohr-RL15	85		+	+	+	+	+	+	8/30/14	smell H2S	+	
SKA-4-Rumohr-RL15	86		+	+	+	+	+	+	8/30/14	smell H2S	+	
SKA-4-Rumohr-RL15	87		+	+	+	+	+	+	8/30/14	no smell H2S	+	
SKA-4-Rumohr-RL15	88		+	+	+	+	+	+	8/30/14	no smell H2S	+	
SKA-4-Rumohr-RL15	89		+	+	+	+	+	+	8/30/14	no smell H2S	+	
C	Bottom water		+	+	+	+	+	Falcon	8/30/14	from rumohr	+	

Pore-water sampling													
Core	**Number**	**VFA**	**SO42-**	**H2S**	**NH4+**	**FE 2+**	**DIC**	**IONS**	**date**	**comment**	**DIC volume**	**color,precipitate**	**FLUSH**
SKA-5-GC04	**#**	**(-80°C)**	**(4°C)**	**(-20°C)**	**(-20°C)**	**(4°C)**	**(4°C)**	**(4°C)**	**distribution**				
SKA-5-GC04	90	see with clemens	+	+	+	+	+	+	9/1/14	no smell H2S anymore	DIC<2mL	yellow, precipitate small flakes	Flushed samples with CO2 several times
SKA-5-GC04	91		+	+	+	+	+	+	9/1/14	no smell H2S anymore	DIC<2mL	yellow, precipitate small flakes	
SKA-5-GC04	92		+	o	+	o	+	+	9/1/14	no smell H2S anymore	DIC<2mL	yellow, precipitate small flakes	
SKA-5-GC04	93		+	o	+	o	+	+	9/1/14	no smell H2S anymore	+	yellow, precipitate small flakes	
SKA-5-GC04	94		+	o	+	o	+	+	9/1/14	no smell H2S anymore	+	yellow, precipitate small flakes	
SKA-5-GC04	95		+	+	+	+	+	+	9/1/14	no smell H2S anymore	+	yellow, precipitate small flakes	
SKA-5-GC04	96		+	o	+	+	+	+	9/1/14	no smell H2S anymore	+	yellow, precipitate small flakes	
SKA-5-GC04	97		+	o	+	o	+	+	9/1/14	no smell H2S anymore	+	yellow, precipitate small flakes	
SKA-5-GC04	98		+	+	+	+	+	*	9/1/14	(ion from first mL of PW)	+	yellow, precipitate small flakes	
SKA-5-GC04	99		+	+	+	o	+	+	9/1/14	no smell H2S anymore	+	yellow, precipitate small flakes	
SKA-5-GC04	100		+	+	+	+	+	+	9/1/14	no smell H2S anymore	DIC<2mL	yellow, precipitate small flakes	
SKA-5-GC04	101		+	o	+	o	+	o	9/1/14	no smell H2S anymore	DIC<2mL	yellow, precipitate small flakes	
SKA-5-GC04	102		+	+	+	+	+	+	9/1/14	no smell H2S anymore	DIC<2mL	yellow, precipitate small flakes	
SKA-5-GC04	103		+	+	+	+	+	+	9/1/14	no smell H2S anymore	DIC<2mL	yellow, precipitate small flakes	
SKA-5-GC04	104		+	+	+	o	+	+	9/1/14	comment	+	yellow, precipitate small flakes	
SKA-5-GC04	105		+	+	+	+	+	+	9/1/14	no smell H2S	DIC<2mL	yellow turbid	
SKA-5-GC04	106		+	+	+	o	+	+	9/1/14	no smell H2S	DIC<2mL	yellow turbid	
SKA-5-GC04	107		+	+	+	+	+	+	9/1/14	no smell H2S	DIC<2mL	yellow turbid	
SKA-5-GC04	108		+	+	+	+	+	+	9/1/14	no smell H2S	DIC<2mL	yellow turbid	
SKA-5-GC04	109		+	+	+	+	+	+	9/1/14	no smell H2S	DIC<2mL	yellow color	
SKA-5-GC04	110		+	+	+	*	+	+	9/1/14	H2S+++, 2 samples for Fe, one has 500µl of HcL	DIC<2mL	yellow color	
SKA-5-GC04	111		+	+	+	+	+	+	9/1/14	H2S+++	DIC<2mL	yellow color	
SKA-5-GC04	112		+	+	+	+	+	+	9/1/14	H2S+++	DIC<2mL	yellow color	
SKA-5-GC04	113		+	+	+	+	+	+	9/1/14	H2S+++	+	yellow color	
SKA-5-GC04	114		+	+	+	+	+	+	9/1/14	H2S+++	+	yellow color	
SKA-5-GC04	115		+	+	+	+	+	+	9/1/14	H2S+++	+	yellow color	

Pore-water sampling													
Core	**Number**	**VFA**	**SO42-**	**H2S**	**NH4+**	**FE 2+**	**DIC**	**IONS**	**date**	**comment**	**DIC volume**	**color,precipitate**	**FLUSH**
SKA-5-Rumohr RL18	**#**	**(-80°C)**	**(4°C)**	**(-20°C)**	**(-20°C)**	**(4°C)**	**(4°C)**	**(4°C)**	**distribution**				
SKA-5-Rumohr RL18	116	see with clemens	+	+	+	+	+	+	9/1/14	H2S smell	+	yellow,no precipitate	Flushed samples with CO2 several times
SKA-5-Rumohr RL18	117		+	+	+	+	+	+	9/1/14	H2S smell	+	yellow,no precipitate	
SKA-5-Rumohr RL18	118		+	+	+	+	+	+	9/1/14	H2S smell	+	yellow,no precipitate	
SKA-5-Rumohr RL18	119		+	+	+	+	+	+	9/1/14	H2S smell	DIC<2mL	yellow,no precipitate	
SKA-5-Rumohr RL18	120		+	+	+	+	+	+	9/1/14	H2S smell	+	transparent	
D	Bottom water		+	+	+	+	+	falkon	9/1/14		+		

Indications	
o	no sample
+	sample
*	comments