

Godthåbsfjord system and the West Greenland shelf with 'R/V Sanna', 11.-16. August 2013

Cruise report



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and the shipboard and on-shore parties*

Introduction and aim

From August 11.-16. 2013, the research vessel 'Sanna' (Nuuk, Greenland) from Greenland Institute of Natural Resources (Pinnngortitaleriffik) served as a platform for a successful Danish-Greenlandic-Canadian research cruise in the Godthåbsfjord complex and on the West Greenland shelf. In total 12 scientists and students from the participating countries partook in the cruise, divided into a shipboard (8 persons) and an on-shore (4 persons) party. The cruise was organised by the Arctic Research Centre of Aarhus University and Greenland Institute of Natural Resources as part of a larger field campaign. The Arctic Research Centre funded the cruise by defraying the cost of ship charter.

The aim of the cruise was to obtain high-resolution marine sediment records from the Holocene for three overall scientific purposes:

- 1) *Geology and palaeoclimate*: The interaction of the comparatively warm West Greenland Current (WGC) and the melting of Greenland inland ice play a major role not only for regional conditions but also for regional and global climate. The varying strength of the WGC is believed to have a significant impact on Labrador Sea deep-water formation, one of the key components of the Atlantic Meridional Overturning Circulation. The WGC is also important as variations in its strength and composition may be traced back to the inflow of water transported from Arctic Ocean combined with varying strength of the Gulf Stream-North Atlantic Drift system. Conditions along the West Greenland shelf and in West Greenland fjords are thus directly linked to the larger North Atlantic circulation system. The West Greenland fjords, which are fed by glaciers directly from the Greenland Ice sheet, also provide a strong record of glacier melting. Marine sediment cores from the Godthåbsfjord Complex will in this project be used to trace detailed variations in current system and glacier melting rates in order to improve our understanding of these important factors of the climate system.
- 2) *Microbiology and biogeochemistry*: The general scientific goal was to determine rates of anaerobic carbon cycling and turnover of microbial biomass in Arctic marine sediments and to identify the factors controlling these rates. Specifically the sampled stations allow contrasting shelf sediments of marine origin with the Godthåbsfjord sediments highly impacted by glacial runoff. The project is structured into individual sub-projects addressing down core carbon mineralization rates, microbial community composition, microbial mediated turnover of acetate, accumulation of methane and organic geochemistry focussing on microbial biomarkers and amino acid stereo-isomeric racemization.
- 3) *Hydrography*: The cruise also provided the opportunity to collect CTD data from sites within Godthåbsfjorden and on the shelf of Nuuk. The purpose was two-fold: A) to support the coring with data on the present hydrographical conditions at the site, and B) to provide additional data to the general long-term monitoring programme.

RV Sanna and shipboard equipment

The RV *Sanna* (Figure 1) belongs to the Greenland Institute of Natural Resources (GINR), Nuuk. The ship is 32.30 m long, 458 GT and accommodates 16 persons (crew and scientists).



Figure 1. R/V *Sanna* of Nuuk (Photo: Christof Pearce).

For sediment sampling, a 6-m gravity corer (Figure 2) and a Rumohr lot corer from the Center for Geomicrobiology, AU, were deployed using the ship's main winch. A CTD (SBE19+, Seabird) was provided by the GINR. We had access to excellent laboratory facilities at the Greenland Institute of Natural Resources (GINR) for subsampling cores and for processing and preserving the subsamples, which were transported to Aarhus University for analysis. Transport of cores from the ship to the laboratory in Nuuk was done either using the small boat '*Aage V. Jensen*' (twice) or when RV *Sanna* had a port call (twice).

When possible (2 out of 8 stations), stations were sampled with the following program: 4 Rumohr lot cores, 2 gravity cores, 1 CTD. The Rumohr lot cores were deployed to collect an undisturbed water-sediment interphase, while the gravity cores provided longer records of up to 6 meters. For most stations the full coring programme was however not possible either due to time constraints, unpermissible weather (swells) or problems with coring. In addition, CTD data were collected from all coring stations as well as from some additional standard monitoring stations. This provided data on modern conditions at the sampling sites, information which is invaluable interpretation of the

geological and microbiological data. The cruise also provided the opportunity of collecting hydrographical data for the general monitoring programme.



Figure 2. For long sediment coring, a 6-m gravity corer deployed using the ship's main winch and A-frame. (Photo: Christof Pearce).

Participants – Scientific party

The cruise participants (Figure 3) consisted of a shipboard party and a shore-based party. The shipboard party collected cores while the shore-based party extracted samples for microbiological studies and pre-treated them in the laboratory at the Greenland Institute of Natural Resources (GINR).

The shipboard scientific party consisted of eight scientists and students:

| | | |
|-----------------------------|-----------------|----------------------------------|
| Seidenkrantz, Marit-Solveig | AU, Denmark | Chief scientist |
| Røy, Hans | AU, Denmark | Responsible for deck work |
| Meire, Lorenz | GINR, Greenland | PhD student, responsible for CTD |
| Pearce, Christof | AU, Denmark | PhD student |
| Ouellet-Bernier | UQAM, Canada | MSc student |
| Lennert, Ann Eileen | GINR, Greenland | PhD student (3 days) |
| Sha, Longbin | AU, Denmark | Postdoc |
| Sheldon, Christina | AU, Denmark | MSc student |

The shore-based scientific party consisted of four scientists and students:

| | | |
|-----------------------|----------------------------|---------------------------------|
| Lomstein, Bente Aa., | Aarhus University, Denmark | Responsible microbial. lab work |
| Kjeldsen, Kasper Urup | Aarhus University, Denmark | Scientist |
| Jaussi, Marion | Aarhus University, Denmark | PhD student |
| Braun, Stefan | Aarhus University, Denmark | PhD student |

Captain: Aqqaluk Egede, Nuuk

Logistic support was provided by: Egon Randa Frandsen, AU and Carl Isaksen, GINR, Jens Weinell, GINR, Paaviaaraq Ludvigsen, GINR.



Figure 3. The scientific party on the last day in Nuuk. (Photo and edits: Christof Pearce).

Results

Core collection was carried out at 8 different stations around the Godthåbsfjord complex and one station on the West Greenland shelf north of Fyllas Banke.

Weather was fair and calm during the entire cruise, although fog was common in the mornings. Rain was relatively limited. Despite of the fair weather conditions, coring from this relatively small vessel (unstable and very moving platform) proved to be very dangerous and only one of the originally two planned stations of the shelf was cored (Station 3). Coring in the fjord system went without such problems and here only strong current (Station 4) or stones (Station 1 and 2) or highly water-logged sediments (Station 7) proved problematic. Especially Rumohr lot cores proved to be difficult to obtain, although repeated trials and tweaking of the equipment sometimes solved the problem. Consequently, despite some general problems of lost core material, coring was successful.

Eight gravity cores (Stations 3, 5, 6, 8, 9) and 17 Rumohr lot cores (Stations 1, 3, 4, 6, 8, 9) were obtained (Appendix 1). In addition, some of the failed Rumohr lot cores still contained sufficient surface sediment for collection of surface sediment samples for modern data base work (dinoflagellate cysts, diatoms, foraminifera).

Gravity cores were cut into ~1-m sections, marked and stored for transport to Denmark (Geology) or transported to Greenlands Institute for Natural Resources for subsampling of porewater and solid phase (microbiology and biogeochemistry). Rumohr lot cores were capped and stored intact and upright after the sea water overlying the sediment surface had been removed. Only a few long (~180 cm) Rumohr lot cores were transported lying down. Those cores that were to be samples for microbiological studies were brought to land in order to be subsampled in the laboratory at the Greenland Institute for Natural Resources. Core stations are listed Table 1, CTD stations are listed Table 2, samples for microbiology are listed Table 3 and the full list of casts (successful and failed) is shown in Appendix 1.

Table 1: List of sample stations and cores collected. There are two columns with water depth

| Station | Depth | Latitude | Longitude | Water depth (m) |
|----------------|--------------|-----------------|------------------|------------------------|
| Station 1 | 106,4 | 64°10.5369' | 51°31.2530' | 106,4 |
| Station 2 | 142,2 | 64°09.8083' | 51°25.6679' | 142,2 |
| Station 3 | 498,2 | 64°26.7425' | 52°47.6486' | 498,2 |
| Station 4 | 260 | 64°13.9706' | 51°40.6450' | 260 |
| Station 5 | 622,4 | 64°25.3479' | 51°30.6209' | 622,4 |
| Station 6 | 389 | 64°29.0604 | 50°42.3240' | 389 |
| Station 7 | 576 | 64°36.65' | 50°57.17' | 576 |
| Station 8 | 475,8 | 64°40.7078' | 50°17.4672' | 475,8 |
| Station 9 | 413,7 | 64°19.4360' | 51°16.4756' | 413,7 |

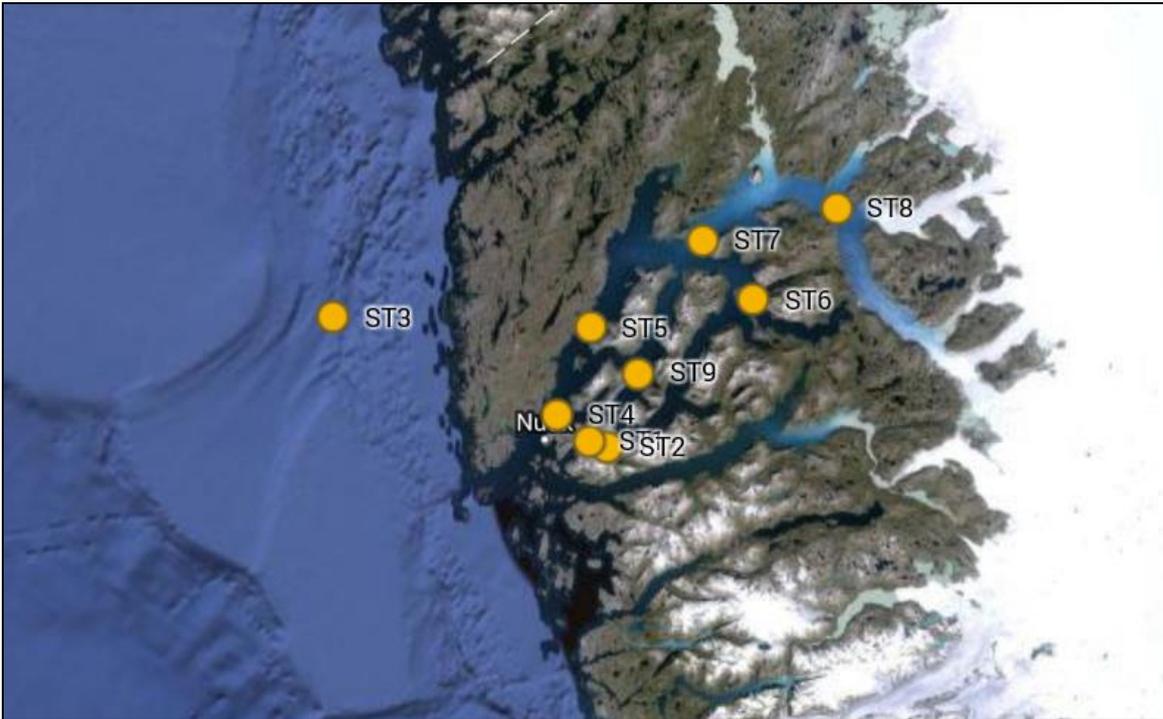


Figure 3. Sample stations (produced via Google Map).

Table 2: CTD stations

| Station | Cast name | Latitude (N) - Start | Latitude (N) - stop | Longitude (W) - Start | Longitude (W) - stop | Water depth (m) start | Water depth (m) stop |
|------------|----------------|----------------------|---------------------|-----------------------|----------------------|-----------------------|----------------------|
| Station 1 | SA13-ST1-09CTD | 64°10.5390 | 64°10.5584 | 51°31.1810 | 51°31.2808 | - | - |
| Station 3 | SA13-ST3-19CTD | 64°26.7574' | 64°26.7993' | 52°46.7231 | 52°46.6569 | 518,9 | 517,2 |
| Station 4 | SA13-ST4-24CTD | 64°14.0019' | 64°14.0748' | 51°40.4838 | 51°40.3236 | 192,8 | 184,2 |
| Station 4 | SA13-ST4-23CTD | 64°15.98' | 64°16.00' | 51°40.26 | 51°40.7 | 362 | 360 |
| Station 5 | SA13-ST5-28CTD | 64°25.47' | 64°25.4201' | 51°29.62 | 51°29.5255 | 593 | 565,5 |
| Station 5 | SA13-ST5-29CTD | - | 64°25.3020' | - | 51°29.5222 | 539,6 | - |
| Station 6 | SA13-ST6-41CTD | 64°29.214' | 64°29.118' | 50°42.331 | 50°42.390 | - | 450 |
| Station 7 | SA13-ST6-43CTD | 64°36.573' | 64°36.579' | 50°57.68 | 50°57.620 | 530 | - |
| Station 8 | SA13-ST8-44CTD | 64°41,68' | 64°41,620' | 50°21,424 | 50°21,175 | 340 | - |
| Station 8 | SA13-ST8-48CTD | 64°40.675 | 64°40.637 | 50°17.447 | 50°17.322 | 465 | - |
| Station 7 | SA13-ST7-57CTD | 64°36.65 | 50°57.17 | - | - | 576 | - |
| Station 10 | SA13-ST9-65CTD | 64°19.4208 | - | 51°16.4818 | - | 413 | - |

Table 3: Microbiological samples. Gravity cores were sampled at 10 cm intervals within the upper 1 m of the core and at 25 cm intervals in the remaining part of the core. Porewater was analysed for ammonium, sulphate, methane and volatile fatty acids and the solid phase is analysed for density, water content, sulphate reduction rates, micro-sopic cells counts, microbial nucleic acids, amino acids and stereochemistry and endospores.

| Nr. | Station | Core | Depth (cmbsf) |
|-----|---------|------|---------------|
| 1 | 1 | 12R | 1,25 |
| 2 | 1 | 12R | 10 |
| 3 | 1 | 12R | 15 |
| 4 | 1 | 12R | 20 |
| 5 | 1 | 12R | 25 |
| 6 | 1 | 12R | 30 |
| 7 | 1 | 12R | 35 |
| 8 | | | |
| 9 | 3 | GC01 | 587 |
| 10 | 3 | GC01 | 562 |
| 11 | 3 | GC01 | 537 |
| 12 | 3 | GC01 | 512 |
| 13 | 3 | GC01 | 487 |
| 14 | 3 | GC01 | 462 |
| 15 | 3 | GC01 | 437 |
| 16 | 3 | GC01 | 412 |
| 17 | 3 | GC01 | 387 |
| 18 | 3 | GC01 | 362 |
| 19 | 3 | GC01 | 337 |
| 20 | 3 | GC01 | 312 |
| 21 | 3 | GC01 | 287 |
| 22 | 3 | GC01 | 262 |
| 23 | 3 | GC01 | 237 |
| 24 | 3 | GC01 | 212 |
| 25 | 3 | GC01 | 187 |
| 26 | 3 | GC01 | 167 |
| 27 | 3 | GC01 | 142 |
| 28 | 3 | GC01 | 117 |
| 29 | 3 | GC01 | 97 |
| 30 | 3 | GC01 | 87 |
| 31 | 3 | GC01 | 77 |
| 32 | 3 | GC01 | 67 |
| 33 | 3 | GC01 | 57 |
| 34 | 3 | GC01 | 47 |

| | | | |
|----|---|------|------|
| 35 | 3 | GC01 | 37 |
| 36 | 3 | GC01 | 27 |
| 37 | 3 | GC01 | 17 |
| 38 | 3 | GC01 | 7 |
| 39 | 3 | 17R | 1,25 |
| 40 | 3 | 17R | 15 |
| 41 | 3 | 17R | 25 |
| 42 | 3 | 17R | 35 |
| 43 | 3 | 17R | 45 |
| 44 | 3 | 17R | 50 |
| 45 | 5 | GC30 | 590 |
| 46 | 5 | GC30 | 565 |
| 47 | 5 | GC30 | 540 |
| 48 | 5 | GC30 | 515 |
| 49 | 5 | GC30 | 490 |
| 50 | 5 | GC30 | 465 |
| 51 | 5 | GC30 | 440 |
| 52 | 5 | GC30 | 415 |
| 53 | 5 | GC30 | 390 |
| 54 | 5 | GC30 | 365 |
| 55 | 5 | GC30 | 339 |
| 56 | 5 | GC30 | 314 |
| 57 | 5 | GC30 | 289 |
| 58 | 5 | GC30 | 264 |
| 59 | 5 | GC30 | 239 |
| 60 | 5 | GC30 | 214 |
| 61 | 5 | GC30 | 189 |
| 62 | 5 | GC30 | 164 |
| 63 | 5 | GC30 | 139 |
| 64 | 5 | GC30 | 114 |
| 65 | 5 | GC30 | 89 |
| 66 | 5 | GC30 | 64 |
| 67 | 5 | GC30 | 39 |
| 68 | 5 | GC30 | 14 |

Table 3: Microbiological samples, continued.

| Nr. | Station | Core | Depth (cmbsf) |
|-----|---------|-------|---------------|
| 69 | 6 | GC40 | 550 |
| 70 | 6 | GC40 | 525 |
| 71 | 6 | GC40 | 500 |
| 72 | 6 | GC40 | 475 |
| 73 | 6 | GC40 | 450 |
| 74 | 6 | GC40 | 425 |
| 75 | 6 | GC40 | 400 |
| 76 | 6 | GC40 | 375 |
| 77 | 6 | GC40 | 350 |
| 78 | 6 | GC40 | 325 |
| 79 | 6 | GC40 | 300 |
| 80 | 6 | GC40 | 275 |
| 81 | 6 | GC40 | 250 |
| 82 | 6 | GC40 | 225 |
| 83 | 6 | GC40 | 200 |
| 84 | 6 | GC40 | 175 |
| 85 | 6 | GC40 | 150 |
| 86 | 6 | GC40 | 125 |
| 87 | 6 | GC40 | 100 |
| 88 | 6 | GC40 | 95 |
| 89 | 6 | GC40 | 85 |
| 90 | 6 | GC40 | 75 |
| 91 | 6 | GC40 | 65 |
| 92 | 6 | GC40 | 55 |
| 93 | 6 | GC40 | 45 |
| 94 | 6 | GC40 | 35 |
| 95 | 6 | GC40 | 25 |
| 96 | 6 | GC40 | 15 |
| 97 | 6 | GC40 | 5 |
| 98 | 6 | RL35R | 1,25 |
| 99 | 6 | RL35R | 15 |
| 100 | 6 | RL35R | 25 |
| 101 | 6 | RL35R | 35 |

| | | | |
|-----|---|-------|-----|
| 102 | 6 | RL35R | 45 |
| 103 | 6 | RL35R | 55 |
| 104 | 6 | RL35R | 65 |
| 105 | 6 | RL35R | 75 |
| 106 | 8 | GC47 | 561 |
| 107 | 8 | GC47 | 536 |
| 108 | 8 | GC47 | 511 |
| 109 | 8 | GC47 | 486 |
| 110 | 8 | GC47 | 461 |
| 111 | 8 | GC47 | 436 |
| 112 | 8 | GC47 | 411 |
| 113 | 8 | GC47 | 386 |
| 114 | 8 | GC47 | 361 |
| 115 | 8 | GC47 | 336 |
| 116 | 8 | GC47 | 311 |
| 117 | 8 | GC47 | 286 |
| 118 | 8 | GC47 | 261 |
| 119 | 8 | GC47 | 236 |
| 120 | 8 | GC47 | 211 |
| 121 | 8 | GC47 | 186 |
| 122 | 8 | GC47 | 161 |
| 123 | 8 | GC47 | 136 |
| 124 | 8 | GC47 | 111 |
| 125 | 8 | GC47 | 101 |
| 126 | 8 | GC47 | 91 |
| 127 | 8 | GC47 | 81 |
| 128 | 8 | GC47 | 71 |
| 129 | 8 | GC47 | 61 |
| 130 | 8 | GC47 | 51 |
| 131 | 8 | GC47 | 41 |
| 132 | 8 | GC47 | 31 |
| 133 | 8 | GC47 | 21 |
| 134 | 8 | GC47 | 11 |

Future analyses

The cores collected during the cruise will among other be studied for sedimentology (grain size, lithology, trace elements and magnetic susceptibility), micropalaeontology (foraminiferal, dinoflagellate cyst and diatom communities) carried out at the Department of Geoscience, Aarhus University in collaboration with national and international partners. Furthermore, based on the results from solid phase and porewater analysis, carried out in the laboratories in the Center for Geomicrobiology, we will gain insight into the function of the microbial communities buried in Arctic sediments. Parts of this work will be carried out by PhD students as part of their PhD projects.

Educational perspective

A total of eight students and early stage researchers from Denmark, Greenland, and Canada participated in the cruise thus giving the cruise a very significant educational impact. In addition six of the students from Aarhus University and Greenland have continued studying the material from the cruise for their projects.

Acknowledgements

We thank the captain and crew of *RV Sanna*. We are very grateful to the ship's captain and crew as well as to the shipboard party for their hard work and help during the cruise. We are also thankful for the logistical support provided by Egon Randa Frandsen, AU and Carl Isaksen, Jens Weinell, and Paaviaaraq Ludvigsen from the Greenland Institute of Natural Resources (GINR). The cruise was funded by the Arctic Research Centre of Aarhus University and the GINR. The work of B. Aa. Lomstein, M. Jaussi, S. Braun, H. Røy and K.U. Kjeldsen was sponsored by the Danish National Research Foundation, while M.-S. Seidenkrantz, C. Pearce, L. Sha and C. Sheldon were funded by the Danish Council for Independent Research (DFF-FNU), the EU-FP7 project "Past4Future" and Aarhus University.

Appendix 1. Full list of casts (gravity cores, rumohr lot cores and CTD) during the August 11-16 cruise with RV Sanna; both successful and failed casts listed. In core/cast name 'G' = gravity cores, and 'R' = Rumohr lot cores, CTD = CTD cast.

| Date | Area | Station | Hydrographical monitoring station no. | Core name | Latitude (N) | Longitude (W) | Water depth (m) | Core Length (cm) |
|--------------------------|------------|-----------|---------------------------------------|-----------------------|--------------|---------------|-----------------|------------------|
| August 11, 2013 (Sunday) | Kobbefjord | station 1 | | SA13-ST1-01R-A | 64°10.479' | 51°31.269 | 108,6 | 0 |
| August 11, 2013 (Sunday) | Kobbefjord | station 1 | | SA13-ST1-01R-B | 64°10.479' | 51°31.270 | 108,6 | 0 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-01R-C | 64°10.479' | 51°31.271 | 108,6 | 45 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-02R | 64°10.50' | 51°31.32 | 107,7 | 41 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-03R | 64°10.5304' | 51°31.2827 | 106,8 | 39,5 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-04R | 64°10.5369' | 51°31.2530 | 106,4 | 43,5 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-05R | 64°10.5369' | 51°31.2108 | 105,6 | 39 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-06G | 64°10.446' | 51°31.3210 | 107,7 | 0 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-07G-A | 64°10.4775' | 51°31.3344 | 106,8 | 0 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-07G-B | 64°10.5304' | 51°31.3061 | 106 | 0 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-08G | 64°10.5384' | 51°31.2688 | 104,4 | 70 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-09CTD | 64°10.4775' | 51°31.280 | - | - |
| August 11, 2013 (Sunday) | Kobbefjord | Station 2 | | SA13-ST2-10G | 64°09.8083' | 51°25.6679 | 142,2 | 0 |

| Core name | Coring device | Succeeded/ Failed | Remarks | Weather |
|----------------|---------------|----------------------|---|---------|
| SA13-ST1-01R-A | Rumohr lot | Failed | Cast 1; Came up empty | Sunny |
| SA13-ST1-01R-B | Rumohr lot | Failed | Cast 2; Sediment flushed out when the corer was lifted up on deck. | Sunny |
| SA13-ST1-01R-C | Rumohr lot | OK | Cast3: Recovered ca 45 cm. | Sunny |
| SA13-ST1-02R | Rumohr lot | OK | Surface sampled for diatoms, dinoflagellate cysts and Foraminifera. The rest used by Hans Røy (for colleague). | Sunny |
| SA13-ST1-03R | Rumohr lot | OK | | Sunny |
| SA13-ST1-04R | Rumohr lot | OK | | Sunny |
| SA13-ST1-05R | Rumohr lot | OK | | Sunny |
| SA13-ST1-06G | Rumohr lot | Failed | Corer fell over when hitting bottom. Came up with only a little sediment in core catcher, incl. Stones. The stones were sharp-edged and seem to be broken, not rounded from ice transport. The stones are presumably from a rock fall. The sides of the fjord are basically made up of rock fall, and as the fjord is very narrow, the rocks probably reached to the centre of the fjord. | Sunny |
| SA13-ST1-07G-A | Gravity | Failed | Corer fell over when hitting bottom. Empty | Sunny |
| SA13-ST1-07G-B | Gravity | Failed | Stones in core catcher | Sunny |
| SA13-ST1-08G | Gravity | Quality uncertain | The core hit bottom twice and we may thus have the surface twice. | Sunny |
| SA13-ST1-09CTD | CTD | OK | For details see list of CTD casts | Sunny |
| SA13-ST2-10G | Gravity | Failed | Stones in core catcher. Station 2 is a bit further into Kobbefjord than Station 1, where the fjord is slightly wider with less steep mountain sides. However, the same problem with rock slides seems to have governed this site, so we abandoned. | Sunny |

| Date | Area | Station | Hydrographical monitoring station no. | Core name | Latitude (N) | Longitude (W) | Water depth (m) | Core Length (cm) |
|------------------------------|---|-----------|---------------------------------------|-----------------------|--------------|---------------|-----------------|------------------|
| August 11, 2013 (Sunday) | Kobbefjord | Station 2 | | SA13-ST2-11CTD | 64°09.8206' | 51°25.3120 | 130 | 0 |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-12R | 64°10.4390' | 51°31.2475 | 106 | ? |
| August 11, 2013 (Sunday) | Kobbefjord | Station 1 | | SA13-ST1-13R | 64°10.4496' | 51°31.4151 | 107,3 | 33 |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-14R | 64°26.8437' | 52°47.6616 | 496,5 | ? |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-15R | 64°26.8855' | 52°47.6544 | 495,5 | 53,5 |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-16R | 64°27.0694' | 52°47.5783 | 475 | ? |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-17R-A | 64°26.7465' | 52°47.6144 | 498,2 | 0 |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-17R-B | 64°26.743' | 52°47.3664 | 498,2 | ? |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-18R-A | 64°26.747' | 52°47.026 | 499,1 | 0 |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-18R-B | 64°26.7392' | 52°46.8718 | 515,2 | 0 |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-19CTD | 64°26.7574' | 52°46.7231 | 518,9 | - |
| August 12, 2013 (Monday) | Shelf | Station 3 | | SA13-ST3-20G | 64°26.7425' | 52°47.6486 | 498,2 | 587 |
| August 13, 2013 (Tuesday) | Outer Godthåbsfjord, close to Nuuk; basin where two fjords meet | Station 4 | | SA13-ST4-21R | 64°13.9706' | 51°40.6450 | 260 | 15 |

| Core name | Coring device | Succeeded/ Failed | Remarks | Weather |
|----------------|---------------|----------------------|--|---|
| SA13-ST2-11CTD | CTD | OK | For details see list of CTD casts | Sunny |
| SA13-ST1-12R | Rumohr lot | Failed? | Good recovery. Clear water on top of sediment | Sunny |
| SA13-ST1-13R | Rumohr lot | OK | Clear water on top of sediment. Udes for surface samples for dinocyst, diatoms and benthic forams. | Sunny |
| SA13-ST3-14R | Rumohr lot | Shaken | When core came on deck it was shaken due to the big swells making sampling difficult. Therefore the top sediment was mixed with water. The core was used for sampling for a colleague of Hans. Røy | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-15R | Rumohr lot | OK | Good core with water on top. | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-16R | Rumohr lot | Somewhat shaken | Somewhat shaken making the water above the top sediment muddy. However the stratigraphy of the core seemed OK. | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-17R-A | Rumohr lot | Failed | | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-17R-B | Rumohr lot | OK | | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-18R-A | Rumohr lot | Failed | | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-18R-B | Rumohr lot | Failed | | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-19CTD | CTD | OK | For details see list of CTD casts | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST3-20G | Gravity | OK | 6 sections + 0.07 top ("Section 7") which was mixed. Section 1 + section 6 (bottom + near top) may have been a bit disturbed. Very high swells made this a very difficult and dangerous work. The top was collected for potential surface samples. | Clam wind, but swells made coring difficult/dangerous |
| SA13-ST4-21R | Rumohr lot | OK | Very strong currents. The ship was drifting a lot due to strong currents so the water depth is only approximate. Sandy sediment on top underlain by more silty/clayish sediment. Affiliated organisms (forams or worm tubes) at surface. | Calm wind, strong current |

| Date | Area | Station | Hydrographical monitoring station no. | Core name | Latitude (N) | Longitude (W) | Water depth (m) | Core Length (cm) |
|----------------------------------|---|-----------|---------------------------------------|-----------------------|--------------|---------------|-----------------|------------------|
| August 13, 2013 (Tuesday) | Outer Godthåbsfjord, close to Nuuk; basin where two fjords meet | Station 4 | | SA13-ST4-22R-A | 64°13.9535' | 51°41.2323 | 366,3 | 0 |
| August 13, 2013 (Tuesday) | Outer Godthåbsfjord, close to Nuuk; basin where two fjords meet | Station 4 | | SA13-ST4-22R-B | 64°13.9183' | 51°40.7906 | 283,2 | 0 |
| August 13, 2013 (Tuesday) | Outer Godthåbsfjord, close to Nuuk; basin where two fjords meet | Station 4 | | SA13-ST4-23CTD | 64°14.0019' | 51°40.4838 | 192,8 | - |
| August 13, 2013 (Tuesday) | Outer Godthåbsfjord, close to Nuuk; basin where two fjords meet | Station 4 | close to monitoring station GF5 | SA13-ST4-24CTD | 64°15.98' | 51°40.26' | 362 | - |
| August 13, 2013 (Tuesday), 12h52 | Godthåbsfjord | Station 5 | | SA13-ST5-25R | 64°25.6397' | 51°30.4519' | 624,1 | - |
| August 13, 2013 (Tuesday) | Godthåbsfjord | Station 5 | | SA13-ST5-26R | 64°25.2' | 51°29.2 | 624,1 | - |
| August 13, 2013 (Tuesday) | Godthåbsfjord | Station 5 | | SA13-ST5-27R | 64°25.45' | 51°30.19 | 624,1 | - |
| August 13, 2013 (Tuesday) | Godthåbsfjord | Station 5 | | SA13-ST5-28CTD | 64°25.47' | 51°29.62 | 593 | - |
| August 13, 2013 (Tuesday) | Godthåbsfjord | Station 5 | | SA13-ST5-29CTD | 64°25.3020' | 51°29.5222 | 539,6 | - |
| August 13, 2013 (Tuesday) | Godthåbsfjord | Station 5 | | SA13-ST5-30G | 64°25.3479' | 51°30.6209 | 622,4 | 607 |
| August 13, 2013 (Tuesday) | Godthåbsfjord | Station 5 | | SA13-ST5-31G | 64°25.35' | 51°30.98 | 622,4 | 635,5 |

| Core name | Coring device | Succeeded/ Failed | Remarks | Weather |
|----------------|---------------|----------------------|---|-----------------------------|
| SA13-ST4-22R-A | Rumohr lot | Failed | Very strong currents. | Calm wind, strong current |
| SA13-ST4-22R-B | Rumohr lot | Failed | Very strong currents. | Calm wind, strong current |
| SA13-ST4-23CTD | CTD | OK | For details see list of CTD casts | Calm wind, strong current |
| SA13-ST4-24CTD | CTD | OK | For details see list of CTD casts | Calm wind, strong current |
| SA13-ST5-25R | Rumohr lot | Failed | Top valve failed to release | Calm, medium strong current |
| SA13-ST5-26R | Rumohr lot | Failed | Additional led weight was put on the cable to make the top valve close | Calm, medium strong current |
| SA13-ST5-27R | Rumohr lot | Failed | Mud seen on the outside of the core all the way up to the core top (led), i.e. >1 m | Calm, medium strong current |
| SA13-ST5-28CTD | CTD | OK | For details see list of CTD casts; Iceberg turned over right next to the station while the CTD was descending. This was after the CTD had passed the relevant depth | Calm, medium strong current |
| SA13-ST5-29CTD | CTD | OK | For details see list of CTD casts. Only short cast to check if the iceberg had influence the results of SA13-ST5-28CTD | Calm, medium strong current |
| SA13-ST5-30G | Gravity | OK | 7 sections. Very fine light gray mud/clay. Probably intact surface. | Calm, medium strong current |
| SA13-ST5-31G | Gravity | OK | 7 sections. Very fine light gray mud/clay. Top ca 70 cm may be slightly disturbed. This core has been used for geomicrobiology. | Calm, medium strong current |

| Core name | Coring device | Succeeded/ Failed | Remarks | Weather |
|----------------|---------------|----------------------|---|-----------------------------|
| SA13-ST4-22R-A | Rumohr lot | Failed | Very strong currents. | Calm wind, strong current |
| SA13-ST4-22R-B | Rumohr lot | Failed | Very strong currents. | Calm wind, strong current |
| SA13-ST4-23CTD | CTD | OK | For details see list of CTD casts | Calm wind, strong current |
| SA13-ST4-24CTD | CTD | OK | For details see list of CTD casts | Calm wind, strong current |
| SA13-ST5-25R | Rumohr lot | Failed | Top valve failed to release | Calm, medium strong current |
| SA13-ST5-26R | Rumohr lot | Failed | Additional led weight was put on the cable to make the top valve close | Calm, medium strong current |
| SA13-ST5-27R | Rumohr lot | Failed | Mud seen on the outside of the core all the way up to the core top (led), i.e. >1 m | Calm, medium strong current |
| SA13-ST5-28CTD | CTD | OK | For details see list of CTD casts; Iceberg turned over right next to the station while the CTD was descending. This was after the CTD had passed the relevant depth | Calm, medium strong current |
| SA13-ST5-29CTD | CTD | OK | For details see list of CTD casts. Only short cast to check if the iceberg had influence the results of SA13-ST5-28CTD | Calm, medium strong current |
| SA13-ST5-30G | Gravity | OK | 7 sections. Very fine light gray mud/clay. Probably intact surface. | Calm, medium strong current |
| SA13-ST5-31G | Gravity | OK | 7 sections. Very fine light gray mud/clay. Top ca 70 cm may be slightly disturbed. This core has been used for geomicrobiology. | Calm, medium strong current |

| Date | Area | Station | Hydrographical monitoring station no. | Core name | Latitude (N) | Longitude (W) | Water depth (m) | Core Length (cm) |
|--------------------------------|---------------|-----------|---------------------------------------|---------------------|--------------|---------------|-----------------|------------------|
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-32R | 64°29.0882' | 50°42.2266 | 389,5 | 98,5 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-33R | 64°29.0110' | 50°42.2318 | 373,3 | 182 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-34R | 64°28.9163' | 50°42.3219 | 344,8 | 181 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-35R | 64°29.1406' | 50°42.4669 | 411,6 | 83 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-36R | 64°29.0765' | 50°42.5532 | 398,7 | 96 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-37R | 64°29.0461' | 50°42.5604 | 391,1 | 90,5 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-38R | 64°29.1391' | 50°42.3719 | 406,2 | - |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-39R | 64°29.1288' | 50°42.3716 | 403 | 83 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-40G | 64°29.0604' | 50°42.3240 | 389 | 562 |

| Core name | Coring device | Succeeded/ Failed | Remarks | Weather |
|--------------|---------------|------------------------|---|---|
| SA13-ST6-32R | Rumohr lot | Surface may be lost | Core overshoot and no water was left on the surface --> surface may have been lost. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-33R | Rumohr lot | OK | Water on top = intact surface. Upper 2.5 cm of the sediment is reddish brown, below the sediment is olive gray with heavy bioturbation down to 76 cm. Manganese horizon at 44 cm. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-34R | Rumohr lot | OK | Water on top = intact surface. Upper 2-4 cm of the sediment is reddish brown, below the sediment is olive gray with heavy bioturbation down to 66 cm. Manganese horizon at 66 cm. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-35R | Rumohr lot | OK | 1-m tube; Reddish-brown surface at top 2-3 cm, below olive gray bioturbated mud. Used for geomicrobiology. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-36R | Rumohr lot | OK | Water on top = intact surface. Top = reddish brown, below the sediment is olive gray with heavy bioturbation down to 46 cm. For Geoscience. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-37R | Rumohr lot | OK | Water on top = intact surface. Top 1-2 cm of reddish brown sediment, below the sediment is olive gray with heavy bioturbation down to 43 cm. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-38R | Rumohr lot | Failed | Tube empty, sediment was flushed out while bringing it on board | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-39R | Rumohr lot | OK | 1-m tube; water on top = intact surface; top 2 cm reddish brown sediment. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-40G | Gravity | OK | Full penetration; sediment all to the plate. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |

| Date | Area | Station | Hydrographical monitoring station no. | Core name | Latitude (N) | Longitude (W) | Water depth (m) | Core Length (cm) |
|--------------------------------|-------------------------|-----------|---------------------------------------|-----------------------|--------------|---------------|-----------------|------------------|
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-41CTD | 64°29.214' | 50°42.331 | 450 | - |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 6 | | SA13-ST6-42G | 64°28.9248' | 50°42.4486 | 348,5 | 571 |
| August 14, 2013 (Wednesday) | Godthåbsfjord | Station 7 | GF10 | SA13-ST7-43CTD | 64°36.573' | 50°57.68 | 530 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-44CTD | 64°41.68' | 50°21.424 | 340 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-45R | 64°40.7498 | 50°17.4609 | 475,8 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-46R | 64°40.7413 | 50°17.4899 | 475,8 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-47G | 64°40.7078 | 50°17.4672 | 475,8 | 569 |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-48CTD | 64°40.675 | 50°17.447 | 465 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-49R | 64°40.6230 | 50°17.0147 | 470 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-50R | 64°40.5765 | 50°16.8461 | 468,9 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-51R | 64°40.6536 | 50°17.4042 | 472,4 | - |
| August 14, 2013 (Wednesday) | In front of the glacier | Station 8 | GF13 | SA13-ST8-52R | 64°40.5659 | 50°17.3319 | 468,9 | - |
| August 15, 2013 (Thursday) | Godthåbsfjord | Station 7 | GF10 | SA13-ST7-53R | 64°36.4932 | 50°57.6022 | 577,5 | - |

| Core name | Coring device | Succeeded/ Failed | Remarks | Weather |
|----------------|---------------|----------------------|---|---|
| SA13-ST6-41CTD | CTD | OK | For details see list of CTD casts | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST6-42G | Gravity | OK | Worm tupe at the top - the surface may be near-intact. Lower ca 10 cm sediment in the core was caught in the core catcher and during opening of the core it was pushed into the core liner. | Cloudy, calm, ship was very steady; sun come out during the day. Only relatively week currents. |
| SA13-ST7-43CTD | CTD | OK | For details see list of CTD casts | Clam, cloudy |
| SA13-ST8-44CTD | CTD | OK | For details see list of CTD casts | Clam, cloudy, MANY icebergs |
| SA13-ST8-45R | Rumohr lot | Failed | Sediment flushed out right as it reached deck. Sediment seemed light gray, finegrained, water filled. Weather: calm, heavy fog, many icebergs | Clam, cloudy, MANY icebergs |
| SA13-ST8-46R | Rumohr lot | Failed | Sediment flushed out right as it reached deck. Sediment seemed light gray, finegrained, water filled. Weather: calm, heavy fog, many icebergs | Clam, cloudy, MANY icebergs |
| SA13-ST8-47G | Gravity | OK | Sediment light gray, finegrained | Clam, cloudy, MANY icebergs |
| SA13-ST8-48CTD | CTD | OK | For details see list of CTD casts | Clam, cloudy, MANY icebergs |
| SA13-ST8-49R | Rumohr lot | Failed | Sediment flushed out (2-m core, 2 x lead) | Clam, cloudy, MANY icebergs |
| SA13-ST8-50R | Rumohr lot | Failed | the corer did not close (2-m tube, no lead) | Clam, cloudy, MANY icebergs |
| SA13-ST8-51R | Rumohr lot | Failed | Jerry-rigged with a plate of wood to stop it from overpenetrating. Did not release. | Clam, cloudy, MANY icebergs |
| SA13-ST8-52R | Rumohr lot | Failed | | Clam, cloudy, MANY icebergs |
| SA13-ST7-53R | Rumohr lot | Failed | Return to Station 7; Sediment flushed out (1-m core). Sediment: very fine mud with small drop-stones. | Clam, cloudy |

| Date | Area | Station | Hydrographical monitoring station no. | Core name | Latitude (N) | Longitude (W) | Water depth (m) | Core Length (cm) |
|-------------------------------|---------------|----------------|--|-----------------------|---------------------|----------------------|------------------------|-------------------------|
| August 15, 2013 (Thursday) | Godthåbsfjord | Station 7 | GF10 | SA13-ST7-54R | 64°36.5493 | 50°57.5055 | 577,5 | - |
| August 15, 2013 (Thursday) | Godthåbsfjord | Station 7 | GF10 | SA13-ST7-55R | 64°36.6050 | 50°57.3924 | 577,5 | - |
| August 15, 2013 (Thursday) | Godthåbsfjord | Station 7 | GF10 | SA13-ST7-56R | 64°36.6370 | 50°57.2780 | 575,8 | - |
| August 15, 2013 (Thursday) | Godthåbsfjord | Station 7 | GF10 | SA13-ST7-57CTD | 64°36.65 | 50°57.17 | 576 | - |
| August 15, 2013 (Thursday) | Godthåbsfjord | Station 7 | GF10 | SA13-ST7-58G | 64°36.6989 | 50°56.9117 | 575,8 | - |
| August 16, 2013 (Friday) | Godthåbsfjord | Station 9 | | SA13-ST9-59R | 64°19.3106 | 50°16.3892 | 417 | 137 |
| August 16, 2013 (Friday) | Godthåbsfjord | Station 9 | | SA13-ST9-60R | 64°19.3446 | 50°16.4082 | 415,9 | 95 |
| August 16, 2013 (Friday) | Godthåbsfjord | Station 9 | | SA13-ST9-61R | 64°19.3741 | 50°16.4888 | 414,8 | - |
| August 16, 2013 (Friday) | Godthåbsfjord | Station 9 | | SA13-ST9-62R | 64°19.3831 | 50°16.5015 | 414,8 | - |
| August 16, 2013 (Friday) | Godthåbsfjord | Station 9 | | SA13-ST9-63R | 64°19.3975 | 50°16.5029 | 413,7 | 96 |
| August 16, 2013 (Friday) | Godthåbsfjord | Station 9 | | SA13-ST9-64G | 64°19.4360 | 51°16.4756 | 413,7 | 592 |
| August 16, 2013 (Friday) | Godthåbsfjord | Station 10 | | SA13-ST9-65CTD | 64°19.4208 | 51°16.4818 | 413 | - |

| Core name | Coring device | Succeeded/ Failed | Remarks | Weather |
|----------------|---------------|----------------------|---|---|
| SA13-ST7-54R | Rumohr lot | Failed | Sediment flushed out (1-m core) | Clam, cloudy |
| SA13-ST7-55R | Rumohr lot | Failed | Sediment flushed out | Clam, cloudy |
| SA13-ST7-56R | Rumohr lot | Failed | Sediment flushed out just before the core was brought on board | Clam, cloudy |
| SA13-ST7-57CTD | CTD | OK | | Clam, cloudy |
| SA13-ST7-58G | Gravity | Failed | Just a little sediment caught in the core catcher and a few cm sediment above. Seems to consist of mixed surface sediments. The sediment consists of fine clay and drop stones. The core must have started filling than hitting stones. The sediments are sampled for surface studies of diatoms, dinocysts and foraminifera. | Clam, cloudy |
| SA13-ST9-59R | Rumohr lot | OK | Sediment: Olivegray mud, surface layer of 2-3 cm was disturbed during coring. Below OK. Dark manganese layer at 3 cm depth, some bioturbation. | Beautiful, calm with a slight morning fog, low clouds, very calm sea. |
| SA13-ST9-60R | Rumohr lot | OK | | Beautiful, calm with a slight morning fog, low clouds, very calm sea. |
| SA13-ST9-61R | Rumohr lot | Failed | Valve never closed | Beautiful, calm with a slight morning fog, low clouds, very calm sea. |
| SA13-ST9-62R | Rumohr lot | Failed | | Beautiful, calm with a slight morning fog, low clouds, very calm sea. |
| SA13-ST9-63R | Rumohr lot | OK | | Beautiful, calm with a slight morning fog, low clouds, very calm sea. |
| SA13-ST9-64G | Gravity | OK | Core catcher contained 13 cm of undisturbed sediment. This core catcher sediment was placed into the bottom of the core yet undisturbed. Sea grass leaf found at the bottom of the core catcher sediment. A shell fragment was found 4 cm above the bottom in the core catcher sediment. Upper few cm of the cores and thus the surface was lost, but a dark manganese horizon is seen. | Beautiful, calm with a slight morning fog, low clouds, very calm sea. |
| SA13-ST9-65CTD | CTD | OK | For details see list of CTD casts | Beautiful, calm with a slight morning fog, low clouds, very calm sea. |